UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

April 29, 2002

Duke Energy Corporation
ATTN: Mr. W. R. McCollum
Site Vice President
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT 50-269/01-05, 50-270/01-05, AND 50-287/01-05

Dear Mr. McCollum:

On March 30, 2002, the NRC completed an inspection at your Oconee Nuclear Station. The enclosed report documents the inspection findings which were discussed on April 4, 2002, with Mr. Ron Jones 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 two issues of very low safety significance (Green). These 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 any of these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, 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 Oconee facility.

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/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket Nos.: 50-269, 50-270, 50-287
License Nos.: DPR-38, DPR-47, DPR-55

Enclosure: NRC Integrated Inspection Report 50-269/01-05, 50-270/01-05, and 50-287/01-05 w/Attachment - Supplemental Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-269, 50-270, 50-287
License Nos:	DPR-38, DPR-47, DPR-55
Report No:	50-269/01-05, 50-270/01-05, 50-287/01-05
Licensee:	Duke Energy Corporation
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7800 Rochester Highway Seneca, SC 29672
Dates:	December 30, 2001 - March 30, 2002
Inspectors:	M. Shannon, Senior Resident Inspector S. Freeman, Acting Senior Resident Inspector D. Billings, Resident Inspector E. Christnot, Resident Inspector W. Rogers, Senior Reactor Analyst (Section 4OA5.2) R. Schin, Senior Reactor Inspector (Section 4OA5.3)
Approved by:	R. Haag, Chief Reactor Projects Branch 1 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000269-01-05, IR 05000270-01-05, IR 05000287-01-05, on 12/30/2001–03/30/2002, Duke Energy Corporation, Oconee Nuclear Station; Post-Maintenance Testing and Other Activities.

The inspection was conducted by the Resident Inspectors, a Senior Reactor Analyst, and a Senior Reactor Inspector. The inspection identified two 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.

A. <u>Inspector Identified Findings</u>

Cornerstone: Mitigating Systems

- Green. A non-cited violation was identified for an improper post-maintenance test of the refurbished standby shutdown facility diesel generator output breaker. The breaker was returned to service after maintenance without performing a full cycle operation of the breaker while connected to the bus.

  This issue was considered to be of very low safety significance because the breaker operated properly when later tested in a configuration that demonstrated its ability to function properly (Section 1R19).

- Green. A non-cited violation was identified for inadequate corrective action related to a the potential flooding problem that would result from actuation of the cable spreading room fire suppression system. Resolution to this licensee identified problem, which involved replacement of the open head sprinklers with a closed head design, was not completed in a prompt manner.

  This issue was considered to be of very low safety significance, because no fires occurred in the cable spreading rooms, therefore, the lack of adequate corrective action had no adverse affect on the plant. Additionally, sufficient margin existed in the plant response capability for a reactor coolant pump seal failure/loss of coolant accident that could occur from a fire and resulting suppression actuation in the cable spreading rooms (Section 4OA5.4).

B. <u>Licensee Identified Violations</u>

None

Report Details

Summary of Plant Status:

Unit 1 began the inspection report period at 100 percent rated thermal power (RTP) and remained there until March 23, 2002 when the unit shut down for a scheduled refueling outage. The unit remained shut down through the end of the inspection period.

Unit 2 operated at or near 100 percent RTP during the entire inspection period.

Unit 3 operated at or near 100 percent RTP during the entire inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R04 Equipment Alignment

a. Inspection Scope

The inspectors conducted partial equipment alignment walkdowns to evaluate the operability of selected redundant trains or backup systems, while the other train or system was inoperable or out of service. The walkdowns included, as appropriate, reviews of plant procedures and other documents to determine correct system lineups, verification of critical components to identify any discrepancies which could affect operability of the redundant train or backup system, and verification that alignment problems that could cause initiating events or affect mitigating systems or barriers were identified and corrected. The following systems were included in this review:

- Alignment of Lee Station during planned maintenance on both Keowee Hydro Units and the new underground cable
- The backup instrument air system following the removal from service of the primary instrument air compressor for maintenance, which affected all three units
- The Unit 1 Low Pressure Injection (LPI) system for chemical addition prior to the refueling outage

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors conducted tours of selected areas to verify that combustibles and ignition sources were properly controlled, that fire detection and suppression capabilities were intact, and that related problems were identified and entered into the corrective action program. The inspectors selected the areas based on a review of the licensee’s safe shutdown analysis and probabilistic risk assessment based sensitivity studies for fire-related core damage accident sequences. Inspection of the following areas were conducted during this inspection period:

- CT-1, CT-2, CT-3 Startup Transformers
- Keowee Hydro Station Units 1 and 2
- Unit 3 Cable Room
- Unit 1 Electrical Equipment Room

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

The inspectors observed licensed operator simulator training on March 4, 2002. The scenario involved a failure of the automatic power to the integrated control system with a subsequent reactor trip, a main steam line rupture, and a steam generator tube rupture. The inspectors observed crew performance in terms of communications; ability to take timely and proper actions; prioritizing, interpreting, and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high-risk operator actions; and oversight and direction provided by the shift supervisor, including the ability to identify and implement appropriate Technical Specifications (TS) actions.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed structure, system, and component (SSC) problems listed below, to assess the effectiveness of maintenance efforts that apply to scoped SSCs and that related problems were identified and entered into the corrective action program. The reviews focused, as appropriate, on: (1) maintenance rule scoping in accordance with 10 CFR 50.65; (2) characterization of failed SSCs; (3) safety significance classifications; (4) 10 CFR 50.65 (a)(1) or (a)(2) classifications; and (5) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1).

- Problem Investigation Process report (PIP) O-02-00209, 2C Condensate Booster Pump Low Lube Oil Pressure (Note that condensate booster pumps are credited in the emergency operating procedure as an alternate means of supplying water to the steam generators)

- Nuclear Station Modification (NSM) ON-53078, Modification to replace water treatment system with new equipment to change system status from (a)1 to (a)2
- PIP O-02-00696, Evaluation of scaffolding in place for greater than 90 days for 10 CFR 50.59 and maintenance rule requirements
- PIP O-02-00770, Functional failure of the 2C condensate booster pump auto start
- PIP O-01-1303, Functional failure of the Station Auxiliary Service Water pump oil level adjuster assembly
- Work Order (WO) 98473465, Elevated Water Storage Tank and the high pressure service water pumps (HPSW), backup cooling water supply

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors evaluated, as appropriate for the selected SSCs listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved.

- Removal of the Keowee underground cable from service to inspect and measure CT4 transformer connection panel for modification NSM ON-53065
- Unexpected removal from service of Battery 3CA due to low cell specific gravity
- Possible loss of DC panel 1DIA due to replacing 1ADA Breaker
- Problems on an Engineered Safeguard (ES) Channel following failure of newly installed digital trip module
- Replacement of the 2B High Pressure Injection (HPI) motor due to high vibration
- Removal of 3B LPI and 3B Reactor Building Spray from service during testing
- Removal of HPSW backup cooling water supply to Unit 2 HPI pumps for sight glass cleaning
- Removal of all Unit 1 & 2 spent fuel (SF) cooling for maintenance on Valve SF-49

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed operability evaluations affecting risk significant systems to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered; (4) if compensatory measures were involved, whether the compensatory measures were in place, would work as intended, and were appropriately controlled; (5) where continued operability was considered unjustified, the impact on TS limiting conditions for operation; and (6) that related problems were identified and entered into the corrective action program. The inspectors reviewed the operability evaluations described in the following PIPs:

- PIP O-01-04457, Low Pressure Service Water (LPSW) Valve 1LPSW-68 Did not Open during Performance Test
- PIP O-02-00287, Feedwater (FDW) Valve 1FDW-315 Fails to Stroke With Manual Loader
- PIP O-02-00136, Lake Level Limits do not Consider Decrease in Lake Level During Applicable Design Basis Events
- PIP O-02-00112, Piping Attachment Lugs Between LPI System Valves 3LP-14 and 3LP-18 not per Design
- PIP O-02-00646, Operability of Various Under Voltage Relays Installed in the TC Switchgear Breakers Located in Units 1, 2 , and 3
- PIP O-02-01222, Operability of ES system Channel A during DC Power and Fan Failure Test
- PIP O-02-01365, Main Steam (MS) Valves 1MS-9 and 1MS-14 Failed As-Found Set Pressure Test

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors evaluated NSM ON-53065 (Replace Underground Power, Auxiliary Power, & Control Cables from Keowee Hydro to Oconee Nuclear Station) to verify that the emergency power system design basis, licensing basis, and performance capability was not degraded due to the modification; and that the modification did not leave the plant in an unsafe condition.

The inspectors walked down the new trench and cables on several occasions during installation to verify that: (1) there was no affect on existing underground power path during installation; (2) the new cables were protected from the effects of external events, including tornados and water intrusion into the trench; (3) the ampere rating of the new cables met design requirements of the modification; and (4) there were no unintended interactions.

The inspectors observed post-modification testing to verify that no cable damage was done during installation or termination and that proper voltage and phase rotation was available after installation (i.e., the cables were not crossed).

The inspectors reviewed the following documents during the inspection:

- TN/5/A/3065/00/AL1, Keowee Underground Cable Replacement, Revision 0
- IP/0/A/2000/001, Power and Control Cable Inspection and Maintenance, Revision 5
- IP/0/A/2000/001U, Keowee Underground Power Cable Partial Discharge Test, Revision 3
- K-0904, Layout of Cables, Power Supervisory & Control, Keowee to Oconee, Revision 7A
- O-396 T1-001, Miscellaneous Yard Structures, Oconee-Keowee Underground Cable Trench, General Arrangement Plan, Sections, & Details

In addition, the inspectors reviewed a sample of problem investigation process reports to confirm that the licensee was identifying issues and initiating actions to resolve concerns.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed post-maintenance test (PMT) procedures and/or test activities for risk significant systems to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; (8) equipment was returned to the status required to perform its safety function; and (9) that related problems were identified and entered into the corrective action program. The inspectors observed testing and/or reviewed the results of the following tests:

- WO 98256747-03, Install Refurbished Breaker OTS1-4
- PT/1/A/0251/01AB, 1B LPI Pump Test - Recirculation, Revision 70
- TT/0/A/0620/54, Test for Modification for Keowee Hydro Station to Recover Auxiliary Power Following a Tornado, Revision 0
- PT/0/A/0620/09, Keowee Hydro Operation, Revision 22, Following Bi-Annual Turbine/Generator Inspection
- WO 98460383-02, Functional Verification Leak Check Following Repairs to Valve SF-49
- PT/2/A/0202/11, HPI Pump Test, Revision 57, Following Replacement of 2B HPI Pump Motor

b. Findings

The inspectors identified a green finding and non-cited violation (NCV) for an improper post-maintenance test of the refurbished standby shutdown facility (SSF) diesel generator output breaker.

On January 8, 2002, technicians replaced breaker OTS1-4, SSF diesel output breaker, with a breaker that had been previously removed from a different cubicle and refurbished. Operators later cleared tags, racked the breaker into the connect position, and declared it operable. When asked about post maintenance testing, the technicians indicated that testing was done in the shop as part of a preventive maintenance task on the refurbished breaker. The inspectors reviewed Nuclear System Directive (NSD)-408, Testing, Revision 9, and Work Process Manual (WPM) 501, Post Maintenance Testing, Revision 5. NSD steps 408.9.4 and 408.9.5 required that the test boundary be extended from the affected component to at least the next component, that each utilized feature of the component be functional, and that proper connections be made. WPM 501 Attachment 1, Page 1 of 3, required functional testing of breakers to include equipment operation. Based on these requirements the test boundary should include the SSF diesel and the test should include operation with the breaker connected to the bus. The inspectors reviewed Preventive Maintenance Procedure IP/0/A/2001/003A, and noted that it did not require operating the breaker while connected to the bus. The SSF diesel was run on January 8, 2002, after the breaker was replaced, but the diesel was not paralleled and loaded on the bus. Therefore, the breaker was not functionally tested while connected to the bus. The SSF diesel was again run on February 5, 2002, and the breaker was successfully operated at that time.

The inspectors also reviewed Breaker OTS1-4 elementary drawings OEE-117-95-OB, and OEE-117-B-04. These drawings showed 11 connections between the external control power circuits and the breaker internals that had to connect when the breaker was racked to the connect position. The testing performed only checked 4 of these (i.e., those associated with the spring charging motor and the green light). Therefore, all proper connections were not verified.

If one of the unverified connections on Breaker OTS1-4 was not properly made when it was connected to the bus, or if the breaker was damaged during installation, the improper post-maintenance test would not have detected it and the breaker would not have operated properly when called upon. The inspectors considered this to have a credible impact on safety. However, this issue was considered to be of very low significance (Green) because the breaker operated properly when tested later in its installed configuration.

Criterion XI of 10 CFR 50, Appendix B, requires in part that all testing required to demonstrate that components will perform satisfactorily in service is identified and performed in accordance with written test procedures. Contrary to Criterion XI testing of Breaker OTS1-4 was not properly performed as required by NSD 408 and WPM 501. This is being treated as a NCV, consistent with Section VI.A.1 of the enforcement policy and is identified as NCV 50-269,270,287/01-05-01: Improper Post-Maintenance Testing of the SSF Diesel Output Breaker. This violation is in the licensee’s corrective action program as part of PIP O-99-04193.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors conducted reviews and observations for selected licensee outage activities to ensure that: (1) the licensee considered risk in developing the outage plan; (2) the licensee adhered to the outage plan to control plant configuration based on risk; (3) that mitigation strategies were in place for losses of key safety functions; and (4) the licensee adhered to operating license and TS requirements. Between March 23, 2002, and March 30, 2002, the inspectors reviewed the following activities related to the Unit 1 refueling outage to verify conformance to applicable procedures and witnessed selected portions of each evolution:

- Reactor shutdown
- Reactor cooldown and shutdown cooling operation
- Mode changes from Mode 3 (Hot Standby) to Mode 6 (Refueling)
- Reduced inventory and mid-loop conditions for installation of steam generator nozzle dams
- Fuel handling operations
- System lineups, including electrical, during major outage activities

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors observed the following surveillance tests and/or reviewed applicable test data, to verify that the subject risk-significant SSCs were capable of performing their intended safety function and that related problems were identified and entered into the corrective action program. The inspectors conducted reviews of TS, Updated Final Safety Analysis Report (UFSAR), and licensee procedure requirements, as well as evaluated the tests for potential preconditioning effects on plant risk, clear and adequate acceptance criteria, operator procedural adherence, test data completeness, and whether test control was properly coordinated with the control room.

- PT/2/A/0150/022M, 2FDW-315 and 2FDW-316 Stroke Test, Revision 18
- PT/1/A/0610/01C, Emergency Power Switching Logic (EPSL) Standby Bus 1 and 2 Voltage Sensing Circuit, Revision 14
- IP/2/A/0270/004, Main Steam Line Break On-Line Analog Functional Test, Revision 6
- PT/1/A/2200/011, Keowee Hydro Unit -1 Turbine Guide Bearing Oil System IST Surveillance, Revision 4
- PT/2/A/0261/010, Essential Siphon Vacuum System Test, Revision 10
- PT/3/A/0400/007, SSF Reactor Coolant Makeup Pump Test, Revision 40

b. Findings

No findings of significance were identified.

1R23 Temporary Modifications

a. Inspection Scope

The inspectors reviewed documents and observed portions of temporary modification installations. Among the documents reviewed were system design bases, the UFSAR, TS, system operability/availability evaluations, and the 10 CFR 50.59 screening. The inspectors observed, as appropriate, that the installation was consistent with the modification documents, it was in accordance with the configuration control process, that adequate procedures and changes were made, that post installation testing was adequate, and that related problems were identified and entered into the corrective action program. The following items were reviewed under this inspection procedure:

- ONTM-2145, Temporary modification for Keowee Hydro Unit 1 main transformer cooling fans
- TSM-2076, Provide temporary power to mobile trailer units outside Unit 3 turbine building (reviewed to determine if the temporary modification had any potential impact on the ensured plant power supply)

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors reviewed circumstances related to an April 2001 incomplete surveillance test for the 1B motor driven emergency feedwater (MDEFW) pump in which the pump was secured when the motor bearing temperature alarm actuated. In particular the inspectors reviewed this item to determine if unavailability hours associated with the 1B MDEFW pump were included in the Heat Removal System Unavailability PI reporting data. The inspectors reviewed PIP O-01–01402 which documented the high temperature and securing of the pump and other documentation which supported the licensee's position that the 1B MDEFW pump capable of performing its safety function.

b. Findings

On April 25, 2001, while testing the 1B MDEFW pump, the outboard motor bearing temperature came into alarm at 180 degrees and operators secured the pump. The highest recorded temperature was approximately 192 degrees. The bearing temperature was continuing to increase at the time the pump was secured. The bearing was subsequently disassembled and damage was noted on the thrust (axial) face and the lower portion of the radial surface. The licensee assessed the condition of the bearing and concluded that the 1B MDEFW pump would have been able to perform its safety function (provide water to the steam generators) for its prescribed mission time of seven hours.

The licensee's technical basis for concluding that the 1B MDEFW pump would have continued to function for seven hours with a degraded bearing was based on a determination that the bearing high temperature was a self-arresting axial rubbing phenomenon that would eventually stop. From this determination the licensee concluded that the bearing temperature would have stopped increasing at some point and would have returned to an acceptable range. Additionally, they concluded that damage on the radial surface of the bearing would be limited, such that the bearing would continue to function. As supporting evidence, the licensee cited a previous test run on January 31, 2001, the robust design of the bearing, the lubrication flow path, and the rotor geometry.

The inspectors did not find the licensee's conclusion sufficiently convincing. The bearing temperature observed in the April 25, 2001, test exceeded that of the January 31, 2001, test, and continued to increase until after the pump was stopped. The approximate peak temperature during the January test was 173 degrees. The licensee's analysis did not determine how long the axial rubbing would continue, how high the temperature would go, the highest temperature the bearing could withstand, or how much damage would be done to the bearing by any increased temperature. Additionally, the final two temperature points recorded in the last four minutes of the April test, represented an increase in the rate at which temperature was rising.

This and the higher temperature for the April test indicated that an additional phenomenon occurred, which most likely caused the damage to the lower radial surface of the bearing. Also, the recorded temperature points for the April test did not indicate temperature had peaked at the time the pump was secured.

The licensee's conclusion relied heavily on engineering judgement and their belief that the damage to the bearing would not have caused the bearing to fail in a manner which would have prevented the pump from operating for seven hours. The inspectors believe there are too many uncertainties with the licensee's analysis and the pump parameters during the April test to confidently predict how long the pump would have remained functional in this degraded condition. Without this information the inspectors determined the licensee could not know how long the bearing would function under accident conditions.

Therefore, the inspectors concluded that the analysis did not provide an adequate basis to demonstrate that the 1B MDEFW pump was functional while in this degraded condition. Based on this, the inspectors determined that the hours in which the 1B MDEFW train was required to be available between January 31, 2001, to April 25, 2001, are considered fault exposure hours and should be added as unavailable time for the train.

4OA5 Other

.1 NRC Temporary Instruction (TI) 2515/145, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (NRC Bulletin 2001-01)

a. Inspection Scope

The inspectors reviewed the Unit 1 visual examination program for reactor vessel head penetrations as discussed in the licensee's response to NRC Bulletin 2001-01. The inspection guidelines were provided in TI 2515/145.

b. Findings

Verification that visual examination was performed by qualified and knowledgeable personnel

Three individuals performed the examination of the Unit 1 reactor head. One of the individuals was a QC inspector qualified to perform VT-2 inspections. The inspectors reviewed the qualification records and verified that this individual was certified as a Level II VT-2 inspector. The other two individuals who performed the examination of the Unit 1 head were reactor engineers. One of these engineers had performed the previous examinations on the reactor heads for each Oconee unit. However, neither of the reactor engineers were qualified to perform VT-2 inspections. The inspectors interviewed all of the individuals and noted that they were knowledgeable of the criteria to determine leakage.

Verification that visual examination was performed in accordance with approved and adequate procedures

The inspectors reviewed Procedure MP/0/A/1150/029, Reactor Vessel Head Penetrations - Visual Inspection, Revision 0. The inspectors observed that the examination was done using this procedure. The inspectors verified by direct observation and in discussions with examination personnel that the approved acceptance criteria for head penetration leakage were applied in accordance with the procedures.

Verification that the licensee was able to identify, disposition, and resolve deficiencies

The licensee's examination plan included a visual examination from nine reactor head service structure inspection ports with the reactor head in place and the reactor coolant system at normal operating temperature and pressure. Any suspected leakage observed by the visual examination was to be further checked using non-destructive examination (NDE) techniques. The inspectors verified that the examination results for each penetration were individually documented.

The inspectors observed that Penetration No. 1 (top dead center) was hard to see from the inspection ports and that an insulation support partially blocked the view of three penetrations (Penetrations 5, 8, 9) on one row. From this the inspectors questioned the licensee's ability to see 360 degrees around the circumference of these penetrations. The licensee's visual examination had already identified a potential leak on Penetration 1, as well as Penetration 7. In order to positively determine if these penetrations were leaking, the licensee performed NDE on these two penetrations. In response to the inspectors' questions, the licensee also decided to perform NDE on the 3 additional penetrations as well. The NDE results showed five indications in Penetration 7 which had the potential to be a leak path and one indication on Penetration 8 that could not be confirmed as a leak path. No cracks or indications were found on Penetration 1. The licensee repaired Penetrations 7 and 8.

Verification that the licensee was capable of identifying the Primary Water Stress Corrosion Cracking (PWSCC) phenomenon described in the bulletin

The inspectors visually observed the Unit 1 reactor head prior to the licensee's examination; observed the licensee conduct the examination; discussed the examination with the licensee examiners prior to, during, and following the examination; and verified the qualifications of the licensee examination personnel. The inspectors concluded that the licensee's visual examination, in conjunction with NDE, was adequate to identify potential leakage resulting from PWSCC cracking of reactor head penetrations.

Evaluate condition of the reactor vessel head (debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions)

The inspectors performed a direct observation of the Unit 1 reactor vessel head and observed that the head was generally clean. As noted above, Penetration No. 1 was hard to see from the inspection ports and an insulation support partially blocked the view of three other penetrations. The inspectors observed no other significant items that prevented a thorough visual examination.

Evaluate ability for small boron deposits, as described in the bulletin, to be identified and characterized

The inspectors observed that the reactor head was generally free of any deposits that would have hindered the visual examination. There were boric acid crystals around Penetration 21, which was repaired in the most recent Unit 1 outage, however, the licensee characterized these crystals as remaining from the previous outage with no new leakage. The inspectors verified these crystals to be consistent which pictures of Penetration 21 taken during the previous outage. There was also evidence of boric acid around Penetrations 1 and 7. The licensee performed NDE on each of these penetrations and found five indications on Penetration 7 which had the potential to be a leak path. No cracks or indications were found on Penetration 1. In each case, these observations were noted in the procedure. No other significant examples of boron were identified during the examination.

Determine extent of material deficiencies (associated with the concerns identified in the bulletin) which were identified that required repair

The inspectors observed evidence of boric acid around Penetration 7. The licensee performed NDE on this penetration and found five indications that potentially could be a leak path. In addition the licensee performed NDE on four other penetrations and found one indication on Penetration 8 that could not be identified as a leak path. Additional inspection per TI 2515/145 will be performed for Unit 1 in the next inspection period. This will include in more in-depth review of the identified indications in the nozzles and if RCS pressure boundary leakage existed. TI 2515/145 will remain open pending completion of the inspection objectives.

Determine any significant items that could impede effective examinations and/or radiation as-low-as-reasonably-achievable (ALARA) issues encountered

Other than those mentioned above, the inspectors observed no ALARA issues or examples of significant items that could impede the visual examination process.

.2 (Closed) Unresolved Item (URI) 50-269,270,287/00-05-19: Potential Vulnerability of a High Energy Line Break Causing a Loss of the Three 4KV Safety-Related Electrical Busses. This issue was reviewed by personnel in the Office of Nuclear Reactor Regulation. They determined that the susceptibility of the 4KV safety-related electrical buses located in the turbine building to a high energy line break, is associated with pipe break scenarios which have been previously reviewed and accepted by the staff as part of the licensing and design basis for the Oconee facility. Therefore, no performance deficiency or violation exists and this item is closed.

.3 (Closed) URI 50-269,270,287/98-03-08: Licensing Basis Issues With Control Room Habitability. This URI was opened for further NRC review of four licensing basis issues with control room habitability. The four issues were: (1) Unfiltered Air Inleakage Due To Control Room Pressure Less Than 1/8-Inch Water Gauge; (2) Unfiltered Air Inleakage Due To Single Failures; (3) Operator Dose Limits; and (4) TS. The inspectors' concerns with these issues involved apparent inconsistencies and non-conservatisms in operator dose calculations, operator dose limits, and TS requirements, with respect to NRC standards described in Three Mile Island (TMI) Action Item III.D.3.4, Control Room Habitability. Each of these apparent non-conservatisms could potentially result in higher operator radiation doses during a design basis accident than what was allowed by the regulations.

The further NRC review of these issues involved inspector review of historical licensing basis documents, including letters between the NRC and the licensee related to TMI Action Item III.D.3.4; inspector and Regional management discussions with NRR staff; public meetings between the licensee and the NRR staff; and the licensee's submittal of a license amendment request (LAR) regarding control room habitability issues, dated October 16, 2001.

The inspectors found that the NRC had closed TMI Action Item III.D.3.4 in a letter to the licensee dated December 7, 1989, without the licensee meeting all of the standards in the action item. The NRC had stated: "The NRC staff is in the process of developing new criteria and methodology for evaluating control room habitability issues which may lead to the conclusion that the proposed relocation of the (control room ventilation) intake is unnecessary. Therefore, your actions in response to NUREG-0737, Item III.D.3.4, Control Room Habitability, are considered complete for Oconee Units 1, 2, and 3." Consequently, the inspectors and NRR staff concluded that the NRC had not clearly required the licensee to meet the standards of the action item and that the four licensing basis issues of this URI did not involve clear violations of NRC requirements.

The licensee's LAR and NRR staff review of the LAR will potentially resolve the concerns of this URI. The LAR includes licensee commitments to implement the new NRC source term regulations and to install significant plant modifications, including relocating the control room ventilation intake. The NRR staff plans to consider the four concerns of this URI in their review of the licensee's LAR and in the resolution of similar generic industry concerns with control room habitability. This URI is closed.

.4 <u>(Closed) URI 50-269,270,287/00-08-03</u>: Risk Significance of Potential Flooding Problem From Fire Suppression Systems in the Cable Spreading Rooms. This URI concerned the risk significance determination of potential flooding problems, which stemmed from the open head sprinkler design of the fire suppression systems in the cable spreading rooms. Although this issue was initially identified by the licensee in December 1995, the recommendation to replace the open head sprinklers with a closed head design was not entered into their corrective action program until January 11, 1999, when PIP O-99-0062 was initiated. Actual plant modifications were not completed until August 2001. Because flooding from the cable spreading room fire suppression system could have impacted the operability of safe shutdown equipment, the inspectors concluded that this issue not only had a credible impact on safety, but it was also reflective of untimely licensee corrective action. A potential reactor coolant pump (RCP) seal failure/loss of coolant accident that could result from a fire in the cable spreading room and fire suppression actuation was the concern reviewed by the NRC's Phase 3 risk assessment. With respect to Units 2 and 3, the issue was determined to be of very low safety significance (Green) based on the margin provided by their improved RCP seal design. Similarly, the margin provided by the improved RCP seal design also applies to Unit 1 as well; except for the time period prior to installation of the improved seals (i.e., prior to December 2000). For this prior Unit 1 time period, the large uncertainties from the fire/flood related assumptions made in the NRC's Phase 3 risk assessment were further evaluated through the performance of a sensitivity study to consider the impact of the conservative assumptions. The final determination concluded that the risk for this issue was of very low safety significance (Green) for all Unit 1 time periods.

The lack of prompt corrective action for this issue is considered to be a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions, which requires that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. However, because the finding is of very low safety significance (Green), has been captured in PIP O-02-02378, and the sprinkler heads have been replaced, it is being treated as a NCV, consistent with

Section VI.A.1 of the NRC Enforcement Policy. Accordingly, it is identified as NCV 50-269,270,287/01-05-02: Untimely Corrective Action for Potential Flooding Problem From Fire Suppression Systems in the Cable Spreading Rooms.

4OA6 Management Meetings

.1 Exit Meeting

The inspectors presented the inspection results to Mr. Ron Jones, Station Manager and other members of licensee management at the conclusion of the inspection on April 4, 2002. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Annual Assessment Meeting

On March 25, 2002, the NRC Region II Deputy Regional Administrator, the Division of Reactor Projects Branch Chief and the Senior Resident Inspector assigned to Oconee met with Duke Energy Corporation, to discuss the NRC's Reactor Oversight Process (ROP) and the Oconee annual assessment of safety performance for the period of April 1, 2001 - December 31, 2001. The major topics addressed were: the NRC's assessment program, the results of the Oconee assessment, and the NRC's Agency Action Matrix. Attendees included Oconee site management, members of site staff, members of the public, state and local officials, and news media personnel.

This meeting was open to the public. Information used for the discussions of the ROP is available from the NRC's document system (ADAMS) as accession number ML020600179. ADAMS is accessible from the NRC Web site at *http://www.nrc.gov/reading-rm/adams.html* (the Public Electronic Reading Room).

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

S. Batson, Mechanical/Civil Engineering Manager
T. Curtis, Reactor & Electrical Systems Manager
W. Foster, Safety Assurance Manager
B. Hamilton, Manager of Engineering
D. Hubbard, Modifications Manager
R. Jones, Station Manager
W. McCollum, Site Vice President, Oconee Nuclear Station
B. Medlin, Superintendent of Maintenance
L. Nicholson, Regulatory Compliance Manager
R. Repko, Superintendent of Operations
J. Twiggs, Manager, Radiation Protection
J. Weast, Regulatory Compliance

NRC

L. Olshan, Project Manager

ITEMS OPENED AND CLOSED

Opened, Closed and Discussed During this Inspection

50–269,270,287/01-05-01	NCV	Improper Post-Maintenance Testing of the SSF Diesel Output Breaker (Section 1R19)
50-269,270,287/01-05-02	NCV	Untimely Corrective Action for Potential Flooding Problem From Fire Suppression Systems in the Cable Spreading Rooms (Section 4OA5.4)

Previous Items Closed

50-269,270,287/00-05-19	URI	Potential Vulnerability of a High Energy Line Break Causing a Loss of the Three 4KV Safety-Related Electrical Busses (Section 4OA5.2)
50-269,270,287/98-03-08	URI	Licensing Basis Issues With Control Room Habitability (Section 4OA5.3)
50-269,270,287/00-08-03	URI	Risk Significance of Potential Flooding Problem From Fire Suppression Systems in the Cable Spreading Rooms (Section 4OA5.4)

Items Discussed

2515/145	TI	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles - Unit 1 Only (Section 4OA5.1)

LIST OF ACRONYMS USED

ACB	-	Air Circuit Breaker
ALARA	-	As-Low-As-Resonably-Achievable
CFR	-	Code of Federal Regulations
DEC	-	Duke Energy Corporation
EPSL	-	Emergency Power Switching Logic
ES	-	Engineered Safeguards
FDW	-	Feedwater
GPM	-	Gallons Per Minute
HPI	-	High Pressure Injection
HPSW	-	High Pressure Service Water
IST	-	Inservice Test
KHS	-	Keowee Hydro Station
KHU	-	Keowee Hydro Unit
LAR	-	License Amendment Request
LER	-	Licensee Event Report
LPI	-	Low Pressure Injection
LPSW	-	Low Pressure Service Water
MS	-	Main Steam
NCV	-	Non-Cited Violation
NDE	-	Non-Destructive Examination
NRC	-	Nuclear Regulatory Commission
NRR	-	Nuclear Reactor Regulation
NSD	-	Nuclear System Directive
NSM	-	Nuclear System Modification
PIP	-	Problem Investigation Process
PMT	-	Post-Maintenance Test
PT	-	Performance Test
PWSCC	-	Primary Water Stress Corrosion Cracking
ROP	-	Reactor Oversight Process
RTP	-	Rated Thermal Power
RWP	-	Radiation Work Permit
SDP	-	Significance Determination Process
SF	-	Spent Fuel
SSC	-	Structure, System and Component
SSF	-	Standby Shutdown Facility
TI	-	Temporary Instruction
TMI	-	Three Mile Island
TS	-	Technical Specification
TT	-	Temporary Test
UFSAR	-	Updated Final Safety Analysis Report
WO	-	Work Order
WPM	-	Work Process Manual