



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

January 17, 2003

Duke Energy Corporation
ATTN: Mr. D. Jamil
Vice President
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

**SUBJECT: MCGUIRE NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT
50-369/02-04 AND 50-370/02-04 AND INDEPENDENT SPENT FUEL
STORAGE INSTALLATION INSPECTION REPORT 72-38/02-04**

Dear Mr. Jamil:

On December 21, 2002, the US Nuclear Regulatory Commission (NRC) completed an inspection at your McGuire Nuclear Station. The enclosed report documents the inspection findings which were discussed on January 6, 2003, with you and 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, there was one finding of very low safety significance (Green) identified in the report which was determined to be a violation of NRC requirements. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you deny this non-cited violation, 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, D.C. 20555-0001, with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the McGuire 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

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

Docket Nos. 50-369, 50-370, 72-38
License Nos. NPF-9, NPF-17

Enclosure: NRC Integrated Inspection Report 50-369/02-04, 50-370/02-04, 72-38/02-04
w/Attachment - Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-369, 50-370, 72-38

License Nos: NPF-9, NPF-17

Report Nos: 50-369/02-04, 50-370/02-04, 72-38/02-04

Licensee: Duke Energy Corporation

Facility: McGuire Nuclear Station, Units 1 and 2

Location: 12700 Hagers Ferry Road
Huntersville, NC 28078

Dates: September 15, 2002 - December 21, 2002

Inspectors: S. Shaeffer, Senior Resident Inspector
E. DiPaolo, Resident Inspector
R. Carroll, Senior Project Engineer (Sections 1R01 and 1R06)
R. Chou, Reactor Inspector (Section 4OA5.3)
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4OA5.2)
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Approved by: Robert C. Haag
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Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR05000369/02-04, IR05000370/02-04, IR 07200038/02-04; Duke Energy Corporation; 09/15/2002 - 12/21/2002; McGuire Nuclear Station, Units 1 and 2; Refueling and Outage Activities.

The report covered a three month period of inspection by resident inspectors and announced inspections by six regional inspectors; one project engineer, two physical security inspectors, and three reactor inspectors. One Green non-cited violation (NCV) was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. Inspector Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. Containment sump area cleanliness inspections failed to identify a notable amount of exposed fibrous insulation under an air handling unit housing located directly above the emergency core cooling system (ECCS) emergency sump.

An NCV of Technical Specification (TS) 5.4.1.a. was identified for the inadequate performance of a Unit 1 containment cleanliness inspection which partially implements TS 3.5.2.8 to ensure debris is not present in the area of the ECCS sump. Prior to this identification, the licensee had previously completed inspections for debris in accordance with Nuclear Site Directive (NSD) 104, Material Condition/Housekeeping, Cleanliness/Foreign Material; however, the licensee's containment inspections failed to identify the adverse condition. The finding was more than minor because it could have had a credible impact on safety by reducing the reliability of the ECCS pumps during accident scenarios due to potential blocking of the ECCS sump. The finding was of very low safety significance based on corrective actions taken to contain the fibrous insulation prior to entering a Mode of operation where the ECCS sump was required to be operable. (Section 1R20)

B. Licensee Identified Violations

None.

Report Details

Summary of Plant Status:

Unit 1 began the inspection period in Mode 5 preparing for reactor coolant system cleanup and refueling activities. Mode 1 was achieved on October 9, and after completing startup testing, the unit returned to full rated thermal power (RTP) on October 15, 2002. On October 26, power was reduced to 99 percent due to fluctuation in the reactor coolant system temperature calculation on loop C, which caused unwarranted control rod movement. On November 2, the licensee performed a modification to adjust the loop C temperature indications to correct the problem and the unit was returned to 100 percent power. The unit remained at 100 percent RTP for the remainder of the inspection period.

Unit 2 began the inspection period at approximately 100 percent RTP. On December 16, 2002, operators commenced a rapid downpower to approximately 50 percent due to indications that a main generator output breaker could be failing. In addition to repairing the main generator breaker, the licensee further reduced power to 43 percent to make repairs to the 2A main feedwater (CF) pump speed controller power supply, which had experienced previous problems with low voltage. On December 18, 2002, the unit returned to 100 RTP, where it continued to operate for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

The inspectors assessed the effectiveness of the licensee's cold weather protection program as it related to ensuring that the facility's fire (RF) pumps, as well as the Unit 2 refueling water storage tank (FWST) and CF flow transmitters, would remain functional and available for plant shutdown in cold weather conditions. In addition to reviewing the licensee's program-related documents and procedures, walkdowns were conducted of the freeze protection equipment (e.g., heat tracing, area space heaters, etc.) associated with the above systems/components. Licensee problem identification and resolution was also assessed by determining if cold weather-related problems identified during the inspection, as well those identified at other times by the licensee, were appropriately entered into their corrective action program and properly addressed for resolution. Documents reviewed during the course of this inspection are listed in the Attachment at the end of this report.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

For the systems identified below, the inspectors reviewed plant documents to determine correct system lineup, and conducted walkdowns to verify that the systems were correctly aligned when the redundant trains were inoperable or out-of-service. For the auxiliary feedwater (CA) system, the walkdowns were partially performed while the opposite train was declared inoperable for maintenance and testing.

- Unit 1 CA system supply
- Station RF pumps
- Unit 1 A emergency diesel generator (EDG) when B EDG was inoperable due to engine governor repairs (10/15/02)
- standby shutdown facility (SSF) - full system walkdown

The inspectors assessed conditions such as equipment alignment (i.e., valve positions, damper positions, and breaker alignment) and system operational readiness (i.e., control power and permissive status) that could affect operability of these systems. The inspectors also reviewed the licensee's corrective action system and component health database for previously identified conditions adverse to quality to assess the licensee's ability to identify and correct problems. For the full system walkdown, the inspectors included reviews of the Updated Final Safety Analysis Report (UFSAR), operating procedures, and system drawings. Material deficiencies were verified to be in the licensee's corrective action system and properly prioritized for resolution.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

To assess the adequacy of the fire protection program implementation, the inspectors toured the following areas to assess transient combustible material control, visible material condition and lineup of fire detection and suppression systems, status of manual fire equipment, and condition of passive fire barriers:

- Unit 1 and Unit 2 control room
- Unit 1 lower containment (selected areas)
- Unit 1 spent fuel pool area
- Unit 1 spent fuel cooling pump and heat exchanger room
- Unit 2 reactor trip breaker penetration room
- Unit 2 service water pump areas
- SSF

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

Through walkdowns and document reviews, the inspectors assessed the licensee's flooding mitigation plans and equipment to determine if they were consistent with design requirements and risk analysis, with respect to: (1) the potential flooding affects from probable maximum precipitation on the reactor building, auxiliary building (AB), FWST related instrumentation, and the SSF intrenched cables; (2) the potential flooding and uplift/overturning affects of groundwater on the AB; and (3) the potential affects of a CF line break on safety-related equipment in the dog houses. Included in this assessment determination were the presence/condition of credited exterior flood barriers; operability of related sump pumps, level alarms, and system isolation switches (i.e., SSF and FWST related sump systems, AB ground water (WZ) level monitoring and sump systems, AB floor drain sump system, and dog house level isolation systems); and appropriateness of credited human recovery/compensatory actions. Licensee problem identification and resolution was also assessed by determining if flood-related problems identified during the inspection, as well those identified at other times by the licensee, were appropriately entered into their corrective action program and properly addressed for resolution. Documents reviewed during the course of this inspection are listed in the Attachment at the end of this report.

b. Findings

There were no findings of significance identified.

1R08 Inservice Inspection (ISI) Activities

a. Inspection Scope

The inspectors examined the Unit 1 containment vessel, observed in-process work activities, and reviewed selected records. The observations and records were compared to the Technical Specifications (TS); ASME Boiler and Pressure Vessel Code, Article IWE of Section XI, 1992 Edition and 1992 Addenda; and 10 CFR 50.55a. The inspectors reviewed the licensee's ISI procedures for containment inspection to verify the procedures complied with the above listed requirements and specified acceptance criteria. The inspectors examined the accessible interior surfaces of the steel containment vessel (SCV) in the raceway area above the insulation panels, the moisture barriers in the interior raceway and the exterior annulus areas, and the exterior surfaces of the SCV between elevations 722 and 730. The inspectors observed a licensee inspector perform ultrasonic testing (UT) measurements of the SCV thickness in areas selected by the inspectors to verify results of UT data previously completed by the licensee. The inspectors also reviewed records documenting visual inspection of the SCV and moisture barriers, results of UT measurements to determine SCV thickness, and results of ISI performed on bolted connections in electrical penetrations to verify

that the ISI activities were conducted in accordance with program requirements and the acceptance criteria specified in the licensee's procedures. In addition, calibration records for UT equipment used to measure the SCV thickness, and qualification and certification records for inspection personnel who performed non-destructive examination (NDE) of the SCV were reviewed. The inspectors additionally reviewed the results of the licensee's bare metal visual inspection of the reactor head and penetration nozzles. The results of the inspection are documented in section 4OA5.2.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

On November 12, 2002, the inspectors reviewed licensed operator requalification performance and associated training documentation to verify that performance deficiencies had been addressed through the requalification training program. Specifically, the inspectors observed classroom training activities associated with operation of the residual heat removal (ND) system. The inspector focused on operator actions during abnormal operations and the incorporation of lessons learned from previous industry operating experiences.

Additionally, the inspectors reviewed just-in-time training in preparation for the Unit 1 restart from the end-of-cycle 15 (EOC15) refueling outage. During the review, the inspectors assessed if operations and engineering personnel involved in the activity adequately conducted pre-job briefs and established plant parameters within requirements to support the reactor startup.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the licensee's effectiveness in performing routine maintenance activities. This review included an assessment of the licensee's practices pertaining to the identification, scoping, and handling of degraded equipment conditions, as well as common cause failure evaluations. For each selected item, the inspectors performed a detailed review of the problem history and surrounding circumstances, evaluated the extent of condition reviews as required, and reviewed the generic implications of the equipment and/or work practice problem. For those systems, structures, and components (SSCs) scoped in the maintenance rule per 10 CFR 50.65, the inspectors verified that reliability and unavailability were properly monitored and that 10 CFR 50.65 (a)(1) and (a)(2) classifications were justified in light of the reviewed degraded equipment condition. The inspectors conducted this inspection for the following two

Problem Investigation Process reports (PIPs):

<u>PIP Number</u>	<u>Title/Description.</u>
M-02-5655	Unit 2 reactor trip breaker response time slower than normal
M-02-5323	Closing stroke time on main feedwater isolation valve 1CF32 close to 10 second limit

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors reviewed the licensee's control of plant risk and configuration, due to emergent or planned work activities, as related to SSCs listed below which were within the scope of the maintenance rule or which were otherwise risk-significant. Emphasizing potential high risk configurations and high priority work items, the inspectors evaluated the following: (1) effectiveness of the work prioritization and control; (2) assessment of integrated risk of the work backlog; and (3) safety assessments and/or management activities performed when SSCs are taken out of service. The inspectors reviewed the licensee's implementation of Maintenance Rule 10 CFR 50.65 (a)(4), with respect to risk assessments for work activities.

The inspectors also reviewed work orders (WOs) and PIPs to verify the adequacy of planned and implemented corrective actions.

<u>PIP Number/ WO/Procedure</u>	<u>Title/Description</u>
M-02-5183	Unit 1 turbine driven CA pump steam supply from C steam generator (1SA-48) failed to open during testing (emergent)
M-02-5313	Unit 1 B EDG inoperable due to engine governor failure (emergent)
M-02-5449	Troubleshoot Unit 1 C loop Tave instrument which caused inadvertent rod movement (emergent)
WO98483729	EVCC vital battery performance discharge test
M-02-6064	Unit 2 load reduction to 50 percent due to main generator circuit breaker 2A control air leakage (emergent)

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-routine Plant Evolutionsa. Inspection Scope

The inspectors reviewed the operating crews' performance during the following non-routine evolutions and/or transient conditions to determine if the response was appropriate to the event and in accordance with procedures and training. Operator logs, plant computer data, and associated operator actions were reviewed.

<u>PIP Number</u>	<u>Title/Description</u>
M-02-5013	Abnormal Procedure (AP) -7, Loss of Electrical Power, due to loss of power to Unit 1 Bus ETB during B Train engineered safeguards testing
M-02-5174	AP-10, Abnormal Reactor Coolant (NC) System Leakage, on October 8, due to Unit 1 leakage exceeding one gallon per minute (gpm) due to broken instrument line.
M-02-5580	AP-10, NC system leakage within the capacity of both chemical and volume control (NV) pumps, due to a Unit 2 NC system leakage event (Notification of Unusual Event on November 4, 2002)

b. Findings

No findings of significance were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors reviewed selected operability evaluations affecting risk significant SSCs listed below to assess the technical adequacy of the evaluations. Where compensatory measures were involved, the inspectors also determined whether the compensatory measures were in place, would work as intended, and were appropriately controlled.

<u>PIP Number</u>	<u>Title/Description</u>
M-02-3430	Use of temporary covers during periods of containment closure
M-02-4427	Time critical operator action for steam relief valve 1SV-7
M-02-4891	Safety Injection (NI) valves 1NI-184 and 1NI-185 power supply adequacy during No Mode testing

M-02-5031	Suction flow to the 1B CA pump isolated during engineered safety features (ESF) actuation testing
M-02-4538	Condition of anti-rotation pins in large motor split sleeve bearing (operating experience review of Westinghouse technical bulletin)

c. Findings

No findings of significance were identified.

1R16 Operator Workarounds

a. Inspection Scope

The inspectors evaluated the operator workaround described in M-01-2369 for RF pump operation causing inadvertent fire protection and detection alarms. The workaround was reviewed to determine: (1) if the functional capability of the system or human reliability in responding to an initiating event was affected; (2) the affect on the operator's ability to implement abnormal or emergency procedures; and (3) if operator workaround problems were captured in the licensee's corrective action program. The inspectors reviewed the potential abnormal plant configurations and conditions to assess if the conditions could increase the likelihood of an initiating event or affect multiple mitigating systems and that implemented and planned licensee actions were appropriate to address the issue.

In addition, the inspectors reviewed the cumulative effects of all identified operator workarounds on the reliability, availability, and potential for misoperation of the identified systems; the potential for increasing an initiating event frequency; and impact on the ability of operators to respond in a correct and timely manner to a plant transient and accident. Aggregate impacts of the identified workarounds on each individual operator watch station were also reviewed.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed modification MM 12192, Replacement Actuator for 1NI-136B (cold leg injection valve), to: (1) verify that the design bases, licensing bases, and performance capability of risk significant SSCs have not been degraded through the modification; and (2) verify that the modification performed during risk significant configurations did not place the plant in an unsafe condition. In addition, reviews were conducted to evaluate system readiness and overall effectiveness of the modification implementation.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (PMT)

a. Inspection Scope

The inspectors reviewed PMT instructions and/or observed testing activities for the equipment below to ensure the equipment was returned to service satisfactorily. The inspectors evaluated the PMT to ensure it properly addressed the work performed and that equipment functional capabilities were adequately verified. The inspectors also reviewed PIPs to verify the adequacy of planned and implemented corrective actions, including PIP M 02-5269 concerning increased oil leakage on the 2A service water outboard pump bearing.

<u>PIP or Procedure Number</u>	<u>Title/Description</u>
M-02-5183	PMT following troubleshooting the Unit 1 turbine driven CA pump steam supply from C steam generator (1SA-48) after failing to open during testing
M-02-4942	PMT for 1A ND motor upper thrust bearing temperature abnormality
MP/0/A/7400/031	Functional verification for 1A EDG extended outage maintenance and governor replacement
PT/A/4201/001	Refueling water storage tank automatic switchover actuation logic test following modification to the actuation logic
M-02-4424	PMT for active leakage on 1NC37 (primary loop piping drain valve identified during outage walkdowns)

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

During the inspection period, the inspectors reviewed refueling and outage-related activities for the Unit 1 EOC15 refueling outage. Unit shutdown, refueling and unit startup preparation parameters were monitored during increased risk periods. The inspectors reviewed just in time training (including classroom and simulator portions) for operators involved in the preplanned reactor trip to begin the refueling outage and for unit restart activities. The inspectors observed portions of the refueling activities and

verified that adequate controls and communications were in place to control the core loading activities in accordance with the cycle-specific reload plan. The inspectors also reviewed PIPs to verify the adequacy of planned and implemented corrective actions, including PIP M 02-4038, New fuel assembly WC10 damaged during insertion into pool location A-12.

The inspectors also performed walkdowns of the reactor building in preparation for reactor startup to verify that debris was not present which could affect operability of the containment sump for the ECCS. Walkdowns were also performed on key equipment such as the upper to lower containment refueling drains and the condition of the ice condenser to verify compliance with applicable TS surveillance requirements.

The inspectors verified that appropriate equipment was available during reduced inventory and mid-loop operations (i.e., emergency power, sources of NC system make-up water, and NC system level instrumentation), and that outage risk control measures were implemented to prevent a loss of ND. The inspectors also verified compliance with TS for low temperature overpressure protection (LTOP) requirements at different periods during the outage. The inspectors also reviewed PIPs to verify the adequacy of planned and implemented corrective actions, including PIP M 02-1456, Debris covers on recirculation sump not installed.

Portions of the following procedures were also reviewed during the shutdown, refueling, and restart preparation activities for Unit 1:

- OP/1/A/6100/003, Power Reduction
- OP/1/A/6100/SU-2, Draining the NC system
- OP/1/A/6100/SU-17, Aligning CA for standby readiness
- OP/1/A/6100/SU-20, Mode 1 and 2 checklist
- AP/1/A/5500/19, Loss of ND or ND system leakage
- OP/1/A/6100/006, Reactivity Balance Calculation
- OP/1/A/6100/001, Controlling procedure for unit startup

b. Findings

Introduction: A Green finding was identified and dispositioned as a NCV for an inadequately performed inspection of the Unit 1 ECCS recirculation sump area for foreign material.

Description: On October 5, 2002, the inspectors performed a detailed review of areas of influence associated with the Unit 1 containment recirculation sump. The inspection was completed following the licensee's performance of containment cleanliness inspections in accordance with NSD 104, "Material Condition/Housekeeping, Cleanliness/Foreign Material," which implements, in part, TS requirement 3.5.2.8 for

inspection of the ECCS sump and surrounding areas. The inspectors identified a notable amount of loose fibrous insulation under the C containment lower compartment ventilation air handling unit (AHU). This AHU enclosure is located in an open equipment area just above the emergency sump. The licensee identified that work on the AHU during the refueling outage likely caused the bottom of the AHU enclosure not to have been restored in accordance with the design and left the insulation exposed.

Analysis: This issue affects the Mitigating Systems Cornerstone. The finding, if left uncorrected, could result in operation with fibrous insulation material in the vicinity of the ECCS recirculation sump. Based on the location of the fibrous material being within the sump's "area of influence," this condition could have resulted in sump blockage and degraded performance of both ECCS recirculation trains in the event of a loss of coolant accident. This finding was determined to be of very low safety significance (Green) because the inspectors identified the adverse condition just prior to the Unit entering Mode 4, which requires the ECCS sump be operable. The licensee made repairs to the AHU enclosure to remove or contain the insulation prior to restart of the unit from the refueling outage. The inspectors reviewed the corrective action plan and found it to be adequate.

Enforcement: Technical Specification 5.4.1.a. requires that written procedures shall be implemented covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33 requires procedures for maintenance and operations activities which could affect safety-related components. Contrary to this requirement, a violation of TS 5.4.1.a. was identified for failure to adequately perform foreign material exclusion inspections of the ECCS recirculation sump area per NSD 104, Revision 22. The licensee's performance of restart containment cleanliness inspections in accordance with NSD 104, failed to identify a substantial amount of fibrous insulation close to the ECCS recirculation sump, until identified by the NRC inspectors on October 5, 2002, just prior to the unit entering Mode 4.

Because the finding is of very low safety significance (Green) and is captured in the licensee's corrective action program as PIP M-02-5148, it is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. Accordingly, it is identified as NCV 50-369/02-04-01: Inadequate Performance of Unit 1 ECCS Recirculation Sump Inspection.

1R22 Surveillance Testing

.1 Routine Surveillance Testing

a. Inspection Scope

The inspectors witnessed surveillance tests and/or reviewed test data of selected risk-significant SSCs listed below, to assess, as appropriate, whether the SSCs met TS requirements, UFSAR, and licensee procedure requirements. The inspectors also determined if the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions. Compensatory measures, where applicable, were also verified.

<u>Procedure</u>	<u>Title/Description</u>
PT/1/A/4200/009A	ESF Periodic Test Train A (Safety Injection, Phase A Isolation, Phase B Isolation, and Blackout Signals actuated concurrently, followed by Manual Safety Injection portions)
PT/1/A/4200/009B	ESF Periodic Test Train B (blackout portion only)
PT/2/A/4150/001B	Reactor Coolant Leakage Calculation
PT/2/A/4200/002E	Containment Personnel Airlock Seals and Interlock Test (containment isolation)
PT/1/A/4350/002	1A EDG Fast Start Performance Test

b. Findings

No findings of significance were identified.

.2 Inservice Surveillance Testing

a. Inspection Scope

The inspectors reviewed the results of PT/1/A/4255/003C, Main Steam Valve Timing Test at Full Temperature and Pressure, performed on Unit 1. The inspectors evaluated the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program to determine equipment availability and reliability. The inspectors evaluated selected portions of the following areas: (1) testing procedures; (2) acceptance criteria; (3) testing methods; (4) compliance with the licensee's in-service testing program, TS, Selected Licensee Commitments, and code requirements; (5) range and accuracy of test instruments; and (6) required corrective actions. The inspectors also assessed whether corrective actions were taken as applicable.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the following McGuire temporary modifications (MGTM) to establish that they have not affected the safety function of associated systems. The inspectors reviewed the MGTM design, verified procedural controls were adequate for the installation and removal of the MGTM, and evaluated the impact of the MGTM on system operability and accident mitigation functions. For the containment penetration modification, the review was also performed to determine whether configuration control was maintained, containment integrity was maintained, and that proper containment penetration testing was performed following the modification.

MGTM-0261	Modify Unit 1 containment penetrations by removing instrument sensing lines associated with the excess letdown heat exchange flow detector (1NVFE7400)
MGTM-0237	Temporary repair for duct on isolated phase bus fan 1A
MGTM-0257	Enable 1RF832A to be opened in the event of a fire in the Unit 2 containment during deenergizing of 1EVDA power supply

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed the licensee's emergency preparedness training evolution conducted on November 20, 2002. The inspectors reviewed the drill scenario narrative to identify the timing and location of classification, notification, and protective action recommendation (PAR) development activities. During the drill the inspectors assessed the adequacy of event classification and notification activities. The licensee's drill critique was also reviewed. The inspectors assessed the licensee's evaluation of drill performance with respect to performance indicators. The inspectors verified that identified drill performance deficiencies were entered into the licensee's corrective action program.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

Reactor Safety PI Verification

a. Inspection Scope

The inspectors reviewed data for the Reactor Safety Mitigating Systems safety system functional failures PI for the period of March 31, 2001, to June 30, 2002, to verify the accuracy of the PI reported during that period. PI definition and guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Indicator Guideline, Revision 2, were used while assessing the accuracy in reported data.

To verify the PI data, the inspectors reviewed control room logs, TS Action Item Log entries, system availability information, and maintenance rule data for the aforementioned time frame.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed in-depth reviews of selected PIPs to determine whether conditions adverse to quality were addressed in a manner that was commensurate with the safety significance of the issue. The inspectors reviewed the actions taken to determine if the licensee had adequately addressed the following attributes:

- Complete, accurate, and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with the safety significance
- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue

The following issues and associated corrective actions were reviewed:

- PIP M-02-4038, damage to a new fuel assembly during insertion into fuel pool location A-12. The inappropriate use of fuel handling interlock bypass functions led to damaging a non-irradiated assembly, resulting in the assembly being removed from the pool and shipped off site for repairs. Review of the extensive corrective actions included the proposed modifications to the fuel handling interlocks.
- Approximately 75 EDG related PIPs from 1995 to December 2002, in light of an adverse trend being identified by the licensee. The inspectors reviewed EDG related programs, annual EDG reliability and unavailability values for 1995 to 2002, and previously identified common cause type EDG problems attributed to inadequate vendor service or replacement parts.

b. Findings

No findings of significance were identified.

4OA3 Event Followup

.1 Unit 1 Reactor Coolant System Leak

On October 8, while in Mode 3, Unit 1 experienced reactor coolant unidentified leakage in excess of the TS limit of 1 gpm. The leak (1.2 gpm) was caused by a sheared high pressure sensing line associated with the excess letdown heat exchanger flow detector. The instrument line sheared at the containment penetration on the inside of containment. The licensee isolated the leak and determined that the break was due to high cycle fatigue failure caused by high vibrations when the heat exchanger was in service. Because the instrument is not required for plant operation, the licensee removed the low pressure sensing line and plugged both containment penetrations. Additionally, the licensee inspected similar instrument lines in Unit 2 and determined that they were not subject to high vibrations. The inspectors reviewed operator performance during the event and the reportability requirements of the event. The event was determined to be of very low safety significance because the leak was relatively small and was isolated within the TS allowed completion time of four hours; therefore, the event did not warrant additional NRC response.

.2 Unit 2 Reactor Coolant (NC) System Leak and Notification of Unusual Event (NOUE)

On November 4, at 11:08 a.m., McGuire Unit 2 entered a NOUE based on indications of unidentified NC system leakage exceeding 10 gpm. Operators received an alarm for the volume control tank (VCT) level dropping and were subsequently informed that ongoing maintenance activities associated with 2NV-371, a letdown system demineralizer bed isolation valve, had experienced leakage during unbolting of the valve bonnet. The valve had been isolated for maintenance; however, one of the boundary valves chosen for the isolation (2NV127) experienced leakage past its seat, which caused 2NV-371 not to be fully isolated. Workers retorqued the bonnet bolts on 2NV-371 and quickly secured the leak. After the licensee performed a satisfactory NC system leak rate calculation and reverified the boundary valves, the NOUE was terminated at 1:02 p.m. The leakage during the event was estimated at 13 to 15 gpm, which did not adversely affect charging, letdown, seal injection, or boration capability. Leakage from 2NV-371 would be automatically isolated during an ECCS system actuation. The inspector responded to the control room during the event and observed implementation of the abnormal procedure governing excessive NC system leakage and reviewed the results of the subsequent leak rate calculation. The event was determined to be of very low safety significance because the leak was relatively small and was isolated within the TS allowed completion time of 4 hours. Therefore, the event did not warrant additional NRC response.

.3 (Closed) Licensee Event Report (LER) 50-370/02-02: Unit 2 Reactor Trip Due to Rapid Loss of Generator Hydrogen and Subsequent Fire

NRC reviews of this event were previously documented in Inspection Report 50-369, 370/02-03. No new information was identified during review of the LER. No findings of significance or violations of regulatory requirements were identified. This LER is closed.

.4 (Closed) LER 50-369/02-02: Automatic Actuation of Diesel Generator 1B due to Cutler-Hammer Model E30 Control Switch Failure

NRC reviews of this event were reviewed under Section 1R22. The root cause was determined to be an isolated equipment failure of control room switch EG85 due to a stuck plunger while in the depressed position. No new information was identified during review of the LER. No findings of significance or violations of regulatory requirements were identified. This LER is closed.

4OA5 Other

.1 Review of Institute of Nuclear Power Operations (INPO) Interim Report

The inspectors and the Chief of Reactor Projects Branch 1 reviewed the INPO Interim Report for the McGuire Nuclear Station, dated September 12, 2002. The review determined results of the INPO report were generally consistent with the results of similar evaluations conducted by the NRC. No additional Regional followup concerning the results of the report is planned.

.2 Reactor Vessel Head Penetration Inspection

a. Inspection Scope

The inspectors reviewed procedures and records documenting activities relative to inspection of the Unit 1 reactor vessel head penetrations to verify that the licensee complied with commitments made in response to NRC Bulletins 2001-01 and 2002-01. The guidelines for the inspection were provided in NRC Temporary Instruction (TI) procedure TI2515/145, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (NRC Bulletin 2001-01)."

b. Findings

There were no indications of reactor vessel head or penetration degradation identified by the licensee during their inspections.

TI 2515/145-05 Reporting Requirements:

(a) Was the examination:

1. Performed by qualified and knowledgeable personnel?

The "bare-metal" visual examinations of the RV head were conducted by licensee personnel who had been trained and qualified in accordance with applicable inspection procedures and the guidance detailed in Electric Power Research Institute (EPRI) Update: Visual Examination for Leakage of PWR Reactor Head Penetration in Top Head, Revision 1.

2. Performed in accordance with approved and adequate procedures?

The visual inspections were conducted in accordance with Duke Power procedure MP/0/A/7150/153, Reactor Vessel Head Bare Metal Inspection, Revision 1. The inspectors reviewed the inspection procedure and verified that it had been reviewed and approved in accordance with the licensee's procedure review process and NRC requirements. The inspectors verified that the procedure specified inspection prerequisites, inspection requirements, included minimum lighting requirements, adequate instructions for performing the visual examination of the reactor vessel head, and inspection documentation requirements. The procedure incorporated the recommendations contained in the above referenced EPRI document.

3. Adequately able to identify, disposition, and resolve deficiencies?

The inspectors reviewed the licensee's procedures controlling the visual examination and determined that the procedure provided adequate guidance to identify, disposition and resolve identified deficiencies on the reactor vessel head or in the head penetrations.

4. Capable of identifying the Primary Water Stress Corrosion Cracking (PWSCC) phenomenon described in the bulletin?

The visual examination methods and equipment was capable of identifying PWSCC phenomenon as evident by leakage through and around areas adjacent to the reactor vessel head penetrations.

- (b) What was the condition of the reactor vessel head (debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions)?

The licensee removed reflective metal insulation from the top of the reactor vessel head area and performed a 100 percent visual inspection of the Unit 1 vessel head. The majority of the vessel head penetrations were documented by video. Vessel head penetrations obstructed from examination by camera were directly examined by licensee examiners. The inspectors reviewed video tapes which document the results of remote visual inspections performed on the Unit 1 reactor pressure vessel head penetrations and completed procedure MP/0/A/7150/153. The quality and resolution of the video was very good and clearly showed the condition of the reactor vessel head penetrations. Small debris (grit and scale) which had collected at the base of numerous nozzles could be easily distinguished. This debris was easily removed and did not impose any adverse effects on the visual inspection. All vessel head penetrations were satisfactorily visually examined by the licensee. No material deficiencies were identified that required repair.

- (c) Could small boron deposits, as described in the bulletin, be identified and characterized?

With the lighting available on the remote visual equipment, and the clarity of the pictures, boron deposits, as described in the bulletin, could have been readily identified and characterized. Vessel head penetrations obstructed from examination by camera were directly examined by qualified licensee personnel. No boron deposits were found.

- (d) What material deficiencies (associated with the concerns identified in the bulletin) were identified that required repair?

No material deficiencies were identified that required repair. The inspectors observed that the vessel head was free of any evidence of boron leakage through and/or around areas adjacent to the reactor vessel head penetrations.

- (e) What, if any, significant items that could impede effective examinations and/or ALARA ([dose] as low as reasonably achievable) issues were encountered.

No significant items were encountered that impeded the bare metal examinations of the reactor vessel head and no significant ALARA issues were encountered.

.3 Review of Independent Spent Fuel Storage Installation (ISFSI) Vertical Concrete Cask Numbers 1 and 3 Construction

a. Inspection Scope

The inspectors reviewed construction activities associated with the ISFSI Vertical Concrete Cask (VCC) numbers 1 and 3. The inspectors measured the rebar size, spacing, splice length, plastic wrapped supporting chair, and the concrete coverage protection on the top, side, and bottom. The inspectors measured dimensions of the inside steel shell and related components such as trunnions. The inspectors evaluated steel form-work installation, including spacing, tightening, and bracing. The inspectors verified that the licensee performed air content tests and took appropriate steps to reject unacceptable results. The inspectors reviewed the licensee Quality Control (QC) inspectors' reports for pre-pour inspection. The inspectors reviewed the specification and construction documents related to the VCC construction activities. The inspectors compared the observation and inspection results to the project construction specification; the design drawings; and standards, codes, and criteria of the American Concrete Institute (ACI) and the American Society for Testing Materials (ASTM).

b. Findings

No findings of significance were identified.

.4 Temporary Instruction (TI) 2515/148, Appendix A, Pre-inspection Audit for Interim Compensatory Measures (ICMs) at Nuclear Power Plants

a. Inspection Scope

The inspectors conducted an audit of the licensee's actions in response to a February 25, 2002, Order which required the licensee to implement certain interim security compensatory measures. The audit consisted of a broad-scope review of the licensee's actions in response to the Order in the areas of operations, security, emergency preparedness, and information technology as well as additional elements prescribed by the TI. The inspectors selectively reviewed relevant documentation and procedures; directly observed equipment, personnel, and activities in progress; and discussed licensee actions with personnel responsible for development and implementation of the ICM actions.

The licensee's activities were reviewed against the requirements of the February 25, 2002 Order; the provisions of TI 2515/148, Appendix A; the licensee's response to the Order; and the provisions of the NRC-endorsed NEI Implementation Guidance, dated July 24, 2002.

b. Findings

No findings of significance were identified. A more in-depth review of the licensee's implementation of the February 25, 2002, Order utilizing Appendix B and C of TI 2515/148 will be conducted in the near future.

40A6 Meetings

Exit Meeting

The inspectors presented the inspection results to Mr. D. Jamil, Site Vice President, McGuire Nuclear Station, at the conclusion of the inspection on January 6, 2003. 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.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

Baily, D., Fire Protection/Civil Engineering
Bradshaw, S., Superintendent, Plant Operations
Bramblett J., Chemistry Manager
Brenton D., Shift Operations Manager
Bryant, J., Licensing Engineer
Caldwell D., Inservice Inspection
Dolan, B., Manager, Safety Assurance
Evans W., Security Manager
Geer, T., Manager, Mechanical and Civil Engineering (MCE)
Grass F., Inservice Inspection
Harrall, T., Station Manager, McGuire Nuclear Station
Houser, D., Reactor Electrical Systems (RES) - Freeze Protection Coordinator
Jamil, D., Site Vice President, McGuire Nuclear Station
Loucks L., Radiation Protection Manager
Moore T., System Engineer
Nesbitt B., Civil Engineer
Patrick, M., Superintendent, Maintenance
Peele, J., Manager, Engineering
Robson M., ISFSI Project Manager
Simms N., Licensing Specialist
Sloan H. , RP Shift/Effluent Controls Supervisor
Stone, R., RES - Instrumentation & Controls
Thomas, J., Manager, Regulatory Compliance
Thomas, K., Manager, RES Engineering
Travis, B., Superintendent, Work Control
Williams, D., RES Supervisor

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

50-369/02-04-01	NCV	Inadequate Performance of Unit 1 ECCS Recirculation Sump Inspection (Section 1R20)
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Closed

50-370/02-02	LER	Manual Reactor Trip due to Rapid Loss of Generator Hydrogen and Subsequent Fire (Section 4OA3.3)
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50-369/02-02	LER	Automatic Actuation of Diesel Generator 1B due to Cutler-Hammer Model E30 Control Switch Failure (Section 4OA3.4).
2515/145	TI	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (NRC Bulletin 2001-01) - Unit 1 only (Section 4OA5.2)
<u>Discussed</u>		
2515/148	TI	Pre-inspection Audit for Interim Compensatory Measures ICMs) at Nuclear Power Plants (Section 4OA5.4)

LIST OF DOCUMENTS REVIEWED

(Section 1R01)

Nuclear Station Directive (NSD) 317, Freeze Protection Program, Revision 1
 Engineering Support Program Document for Freeze Protection, dated 11/26/01
 Inspection Procedure (IP)/0/B/3250/059, Preventive Maintenance And Operational Check Of Freeze Protection, Revision 8
 IP/0/B/3250/059A, Monthly Check Of Freeze Protection, Revision 5
 Operation Procedure (OP)/0/A/6500/013, Service Building Rounds Sheets, Revision 21
 Performance Test (PT)/0/B/4700/070, On Demand Freeze Protection Verification Checklist, Revision 10
 PT/0/B/4700/038, Verification of Freeze Protection Equipment and Systems, Revision 11
 Model Work Order 98481367, Inspection of Heat Trace per IP/0/B/3250/059, dated 9/10/02
 Operator Aid Computer Alarm Response(s):

- Unit 2 FWST Instrument Room Temperature (M2A1074)
- Unit 2 East CF Transmitter House Temperature (M2A1301)
- Unit 2 West CF Transmitter House Temperature (M2A1307)

PIP M-00-04451, Standby Shutdown Facility Electrical Space Heaters Do Not Have a PM
 PIP M-00-04439, Revise Procedure IP/0/B/3250/059 to List Correct Setpoint for Heat Trace Circuit CA-1
 PIP M-00-05098, FWST Level Instruments 1FWP-5020 and 5341 Failed Due to Freezing Temperatures
 PIP M-02-05642, Unit 2 East CF Transmitter House Unit Heater Fan Found on Floor Disconnected During Performance of Freeze Protection PT
 PIP M-02-05617, Cold Weather Preparation Not Completed by 11/01/02

PIPs Generated During Inspection

PIP M-02-05786, Discrepancies in Monthly and Annual Heat Trace Procedures for FWST Circuits
 PIP M-02-05790, RF Pump Room Heater Labeling Discrepancies

(Section 1R06)

PIP M-02-01778, Cables Submerged in Trench to SSF
 WO 98501112, Visual Inspection of Submerged Cables in Trench to SSF
 PIP M-01-03250, Turbine Building/Diesel Building Flood Curbing
 PIP M-01-04091, Turbine Building/Diesel Building Flood Response Time
 PIP M-00-02998, Calibration of Doghouse Level Switches
 PIP M-02-03847, Water in Trench from FWST
 PIP M-99-00922, FW Sump Pump 1FWPU0006 Not Working
 PIP M-00-05098, FWST Level Instruments (1FWP-5341 and -5020) Failed due to Freezing
 PIP M-01-03622, Level Transmitter 2FWLT5341 Out Of Tolerance Greater Than Two Times
 PIP M-99-05764, SSF Cable Trays Filled With Water
 PIP M-99-00431, Auxiliary Building Flood Design Bases
 PIP M-99-01343, Overflow of WZ Sump in Unit 1 CA Pump Room
 PIP M-01-01825, SSF Operability When A Pumps in A and B WZ Sumps Are Inoperable
 PIP M-00-02178, Inadequate TSAIL Guidance on Removing Three WZ Pumps
 AP/0/A/5500/044, Rev 3, Plant Flooding
 PT/0/A/4600/029, Rev 9, Doghouse Water Level Trip Actuating Device Functional Test
 IP/0/A/3215/004, Rev 13, Magnetrol Liquid Level Control Switch Calibration
 OP/1/A/6100/010F, Rev 38, Annunciator Response For Panel 1AD-5
 OP/1(2)/A/6100/010N, Annunciator Response For Panel 1AD-13
 IP/0/A/3215/002, Rev 4, Robertshaw SL-400 Series Level AC-Liquid Level Controller
 Calibration
 NSM MG-12496/00, Refueling Water Storage Tank Modification
 PT/0/A/4973/007, Rev 10, WZ Sump Performance Test
 PT/1/A/4200/41, Rev 0, SSF WZ Test
 OP/0/A/6101/010C, Rev 11, Annunciator Response For SSF Panel 0AD-14
 IP/0/B/3050/026, Rev 7, Groundwater Level Loop Calibration
 OP/1/A/6100/010I, Rev 42, Annunciator Response For Panel 1AD-8

PIPs Generated During Inspection

PIP M-02-04591, Steel Plate Trench Cover at Unit 2 FWST Not Bolted Down
 PIP M-02-04602, Evaluate Trench Security Barrier
 PIP M-02-04582, Flood Curbing Around Exterior Auxiliary Building Doors
 PIP M-02-04646, Training for Operator Time Critical Flood Actions
 PIP M-02-04569, FWST Sump System Calibration and Labeling
 PIP M-02-04578, SSF Control and Annunciator for WZ Sump Pumps
 PIP M-02-04592, WZ C Sump HI Setpoint Set at 6.5 Instead of 7.0 Feet

(Sections 1R08 and 4OA5.2)

Procedure QAL-13, Inservice Inspection (ISI) Visual Examination, VT-1 and VT-1C, Rev. 18
 Procedure QAL-14, Inservice Inspection (ISI) Visual Examination, VT-3 and VT-3C, Rev. 24
 Procedure NDE-951, Ultrasonic Thickness Measurement of Metallic Containment Structures,
 Rev. 2
 Procedure QAL-15, Inservice Inspection (ISI) Visual Examination, VT-2, Pressure Test,
 Rev. 20
 Procedure MP/0/A/7150/153, Reactor Vessel Head Bare Metal Inspection, Rev 1

Drawing number MC-1042-1, Reactor Building 1 & 2, Containment Vessel Cylinder Plate Layout and Penetration Location, Rev. 40
 Drawing number MC-ISIC-1042-001, Reactor Building Unit 1, Steel Containment Vessel Inservice Inspection Areas, Plan of Base Line Plates, Rev. 0
 Drawing numbers MC-ISIC-1042-002 & -003, Reactor Building Unit 1, Steel Containment Vessel, Inside Surfaces, Developed Elevation, Sheets 1 & 2, Rev. 1
 Drawing Number MC-ISIC-1042-004 & -005, Reactor Building Unit 1, Steel Containment Vessel, Outside Surfaces, Developed Elevation, Sheet 1, Rev. 0 and Sheet 2, Rev. 1

 Drawing Number MC-ISIC-1042-006, Reactor Building Unit 1, Steel Containment Vessel, Dome Plan & Elevation, Rev. 0
 Drawing Number MC-ISIC-1042-007, -008, & -009, Reactor Building Unit 1, Steel Containment Vessel Penetrations, Inservice Inspection Areas, Typical Details, Sheets 1, 2, & 3, Rev. 0
 Drawing Number MC-ISIC-1042-015, Reactor Building Unit 1, Steel Containment Vessel, Penetration Details, Rev. 2
 Drawing Number MC-ISIC-1042-016, -017, -018, & -019, Reactor Building Unit 1, Steel Containment Vessel, Outside Surfaces, Augumented Examination Areas, Details, Sheets 1, 2, 3, & 4, Rev. 2
 Work Order 98439622-01, Inspect Unit 1 Containment Vessel Steel Liner, QAL -13 and QAL-14
 Work Order 98498258-01, Perform Bare Metal Inspection of Reactor Head
 Calculation number MCC-1167.01-00-0001, Coatings Inside Containment, Rev. 2
 EPRI Report 1006899, Visual Examination for Leakage of PWR Reactor Head Penetrations on Top Head, Rev. 1
 PIP M-02-04709, Reactor Vessel Head Bare Metal Inspection

(Section 40A2)

MPR-1776, Reliability Assessment of McGuire EDGs, Rev. 0
 Engineering Support Document - EDGs, Rev. 5
 Emergency AC Power Unavailability Rankings 1st quarter 2000 - 3rd quarter 2002
 Nordberg Diesel Owners Group Recommended Maintenance Program, Rev. 5
 Nordberg Instruction Manual for Nordberg Diesel Engine, dated June 26, 1975
 EDG Health Report, 3rd quarter, 2002
 Duke Power Company Assessment, Nuclear Supply Chain, Functional Area Evaluation, 3/25-5/9/02
 LER 50-370/98-02, Inoperable EDG 2A from May 12, 1998 to June 3, 1998
 LER50-370/96-02, Past Inoperability of EDG 2B Due to Low Lube Oil Pressure
 LER 50-369/96-03, Concurrent Inoperability of Both Unit 1 EDGs
 LER 50-369/95-03, Failure of Turbo-chargers Associated with the EDGs due to inadequate Design Oversight
 LER 50-369/2002-02, Automatic Actuation of EDG 1B Due to Cutler-Hammer Model E30 Control Switch Failure
 PIPs - all EDG related PIPs January 1995 to December 2002

(Section 4OA5.3)

Specification No. 790-S-07, Rev. 4, Procurement/Construction Specification for NAC-UMS and NAC-MPC Vertical Concrete Cask Concrete and Rebar
 FSAR-UMS Universal Storage System Docket No. 72-1015, Rev. 0
 Drawing No. 790-061, Sheets 1 - 3, Rev. 11, Weldment and Structure, Vertical Concrete Cask, NAC-UMS
 Drawing No. 790-062 Sheets 1 - 6, Rev. 14, Reinforcing Bar and Concrete Placement, Vertical Concrete Cask, NAC-UMS
 Procedure 12418-P-01, Rev. 1, Vertical Concrete Cask Work Record and Inspection Forms for Duke McGuire Spent Fuel Storage Project
 Installation/Inspection Check List for Cask Numbers 1 and 3
 DCR 790-062-14A, Reinforcing Bar and Concrete Placement, Vertical Concrete Cask, NAC-UMS
 Material Test Reports
 Batch Plant Qualification Review by NAC International

LIST OF ACRONYMS

ACI	-	American Concrete Institute
AHU	-	Air Handling Unit
ALARA	-	As Low As Reasonably Achievable
AP	-	Abnormal Procedure
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing Materials
CA	-	Auxiliary Feedwater
CCWS	-	Component Cooling Water System
CF	-	Feedwater
CFR	-	Code of Federal Regulations
ECCS	-	Emergency Core Cooling System
EDG	-	Emergency Diesel Generator
EOC	-	End-Of-Cycle
EP	-	Emergency Procedure
EPRI	-	Electric Power Research Institute
ESF	-	Engineered Safeguards Feature
EVCC	-	Vital Battery C
FWST	-	Fueling Water Storage Tank
GPM	-	Gallons Per Minute
ICM	-	Interim Compensatory Measures
INPO	-	Institute of Nuclear Power Operations
IR	-	Inspection Report
ISFSI	-	Independent Spent Fuel Storage Installation
ISI	-	In Service Inspection
LER	-	Licensee Event Report
LTOP	-	Low Temperature Overpressure Protection
MGMTM	-	Temporary Modifications
NCV	-	non-cited violation
ND	-	Residual Heat Removal

NDE	-	Non-Destructive Examination
NEI	-	Nuclear Energy Institute
NI	-	Safety Injection
NOUE	-	Notice of Unusual Event
NSD	-	Nuclear Site Directive
NV	-	Chemical and Volume Control
PAR	-	Protective Action Recommendation
PI	-	Performance Indicator
PIP	-	Problem Investigation Process report
PMT	-	Post-Maintenance Testing
PT	-	Liquid Penetrant
PWR	-	Pressurized Water Reactor
PWSCC	-	Primary Water Stress Corrosion Cracking
QC	-	Quality Control
RF	-	Fire System
RTP	-	Rated Thermal Power
SCV	-	Steel Containment Vessel
SDP	-	Significance Determination Process
SSC	-	Structures, Systems, Components
SSF	-	Standby Shutdown Facility
TI	-	Temporary Instruction
TS	-	Technical Specifications
UFSAR	-	Updated Final Safety Analysis Report
UT	-	Ultrasonic Testing
VCC	-	Vertical Concrete Cask
VCT	-	Volume Control Tank
WO	-	Work Order