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

December 15. 2000

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

SUBJECT: MCGUIRE NUCLEAR STATION - NRC INSPECTION REPORT 50-369/00-09, 50-370/00-09

Dear Mr. Barron:

On November 3, 2000, the NRC completed a triennial fire protection inspection at your McGuire Nuclear Station Units 1 and 2. The enclosed report documents the inspection findings which were discussed on November 3 and December 13, 2000, with Mr. B. Dolan and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection no findings of significance were identified.

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

Sincerely,

/RA/

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

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

Enclosure: See page 2

Enclosure: NRC Inspection Report 50-369,370/00-09

Attachments: (1) Supplemental Information - NRC's Revised Reactor Oversight Process
(2) List of Documents Reviewed
(3) List of Acronyms Used

cc w/encl:
Regulatory Compliance Manager (MNS)
Duke Energy Corporation
Electronic Mail Distribution

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

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

Anne Cottingham
Winston and Strawn
Electronic Mail Distribution

Mel Fry, Director
Division of Radiation Protection
N. C. Department of Environmental
Health & Natural Resources
Electronic Mail Distribution

County Manager of Mecklenburg County
720 East Fourth Street
Charlotte, NC 28202

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

Distribution w/encl:
F. Rinaldi, NRR
PUBLIC

(*) - SEE PREVIOUS PAGES FOR CONCURRENCES

OFFICE	DRS/RII	DRS/RII	DRS/RII	DRS/RII	DRP/RII	DRP/RII	
SIGNATURE	FJape	NMerriweather	MThomas	GWiseman	EBrown	RHaag	
NAME	**JAPE ***	**THOMAS FOR ***	**THOMAS ***	WISEMAN	**BROWN ***	HAAG	
DATE	12/14/2000	12/14/2000	12/14/2000	12/15/2000	12/14/2000	12/15/2000	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: C:\McG0009R.wpd

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-369, 50-370
License Nos:	NPF-9, NPF-17
Report Nos:	50-369/00-09, 50-370/00-09
Licensee:	Duke Energy Corporation
Facility:	McGuire Nuclear Station, Units 1 and 2
Location:	12700 Hagers Ferry Road Huntersville, NC 28078
Dates:	October 30 - November 3, 2000
Inspectors:	E. Brown, Resident Inspector, Brunswick F. Jape, Senior Project Manager, Region II N. Merriweather, Senior Reactor Inspector, Region II K. Sullivan, Contractor, Brookhaven National Laboratories M. Thomas, Senior Reactor Inspector, Region II G. Wiseman, Senior Reactor Inspector (Lead Inspector), Region II
Approved by:	C. Ogle, Chief Engineering Branch Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000369-00-09, IR 05000370-00-09, on 10/30-11/03/2000, Duke Energy Corporation, McGuire Nuclear Station, Units 1 and 2. Triennial fire protection baseline inspection.

The inspection was conducted by a regional fire protection team and one contractor. No findings of significance were identified.

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems

1R05 FIRE PROTECTION

.1 Systems Required to Achieve and Maintain Post-Fire Safe Shutdown

a. Inspection Scope

The team selected five risk significant fire areas to verify that the post-fire safe shutdown (SSD) capability and the fire protection features ensured that at least one post-fire SSD success path was maintained free of fire damage. The fire areas were chosen based on the fire risk ranking in the licensee's individual plant examination for external events (IPEEE). For each of these fire areas, the team focused its inspection on the fire protection features, and on the systems and equipment necessary for the licensee to achieve and maintain SSD conditions. The fire areas chosen for review during this inspection were:

- **[Fire Area 2]:** Unit 1 auxiliary feedwater (CA) system motor driven pumps room - an Appendix R fire in this area would involve alternative shutdown of the unit from the standby shutdown facility (SSF) using the standby shutdown system (SSS).

- **[Fire Area 2A]:** Unit 1 turbine driven CA pump room - an Appendix R fire in this area would involve shutdown of the unit from the main control room (MCR) using Train B equipment as the safe shutdown train.

- **[Fire Area 11]:** Unit 1 Train B 4160 volts (V) switchgear room - an Appendix R fire in this area would involve shutdown of the unit from the MCR using Train A equipment as the safe shutdown train.

- **[Fire Area 14]:** Auxiliary building common area - an Appendix R fire in this area would involve alternative shutdown of the unit from the SSF using the SSS.

- **[Fire Area 20]:** Unit 2 cable spreading room - an Appendix R fire in this area would involve alternative shutdown of the unit from the SSF using the SSS.

b. Findings

The team identified, from a review of cable routing information for a selected sample of components, examples of cable interactions which the licensee was unable to adequately resolve during this inspection. For the purpose of this review, a cable interaction was identified when a power and/or control cable of equipment required to accomplish an essential post-fire safe shutdown function was subject to fire damage, or a power or control cable of equipment whose inadvertent operation or mal-operation could adversely affect safe shutdown was subject to damage as a result of fire.

The systems and equipment that would be relied on to perform essential shutdown functions in the event of a fire in each of the selected fire areas were described in the licensee's safe shutdown analysis (SSA) MCS-1465,00-00-0022, Design Basis Specification for the Appendix R Safe Shutdown Analysis, Revision 1. From a review of this and other supporting documents, a sample of required components were selected and the routing of power and control cables associated with each selected component was examined on a fire area-by-fire area basis. The SSA documented the licensee's resolution of cable interactions identified during evaluation of the post-fire safe shutdown capability for each fire area. However, it did not identify all potentially affected cables of required shutdown equipment that were located in the fire areas and did not include an evaluation of the specific effect potential circuit faults (i.e., hot shorts, open circuits, and shorts to ground) might have on those cables. As a result, for cable interactions described in the following paragraphs, the licensee was not able to demonstrate that fire damage to the identified cables would not have an adverse consequence on the post-fire safe shutdown capability.

(1) Potential for Loss of Auxiliary Feedwater Flow (Fire Areas 2 and 14)

Fire Areas 2 and 14 contained redundant trains of systems, equipment, and cables necessary to accomplish post-fire SSD conditions. In the event of an unmitigated fire in either of these areas the licensee's SSA credited the use of an alternative shutdown capability designated as the SSS. The SSS was comprised of existing plant safety related systems as well as certain dedicated equipment that would be used in the event of a fire which required shutdown of the unit from the SSF. Section III.L.3 of Appendix R to 10 CFR 50 requires, in part, that the alternative shutdown capability be physically and electrically independent of the fire area under evaluation.

The team assessed the adequacy of electrical independence provided for the alternative shutdown capability (i.e., SSS) in the event of a fire in Fire Area 2 or Fire Area 14. The SSS relied on the use of the turbine driven CA pump to accomplish the decay heat removal shutdown function. Hence, the routing of power and control cables associated with a sample of components required to assure the operability of the turbine driven CA pump was reviewed. This review determined that certain cables associated with the turbine driven CA pump suction valve (Valve 1CA7AC) could be subject to damage as a result of a fire in either of these areas. Specific cables included: 1*CA516, 1*CA517, 1*CA519, 1*CA761, and 1*CA763. Fire damage to these cables had the potential to cause valve 1CA7AC to fail closed. Should this occur, the turbine driven CA pump would be damaged in a short period of time due to a loss of pump suction. Although this scenario had been identified by the licensee, operator actions credited in the SSA to mitigate this event were not appropriate. Specifically, the team determined that the licensee's credited recovery actions in the SSA could not be completed in a sufficiently timely manner necessary to prevent pump damage. The operator actions in the SSA had not been translated to appropriate operations procedures (e.g., AP/1/A/5500/24). Additionally, local manual actions to reopen valve 1CA7AC would require an operator to traverse Fire Area 2. This issue will be tracked as Unresolved Item (URI) 50-369, 370/00-09-01: Potential for Loss of Auxiliary Feedwater Flow for an Appendix R Fire in Fire Areas 2 or 14. The team noted that certain "byproduct" associated circuits issues (e.g., fire-induced spurious operations or mal-operations) are the subject of an ongoing, voluntary industry initiative. This URI is considered an example of a "byproduct" associated circuits issue and will be tracked as a URI pending generic resolution of the related issue. This issue was entered in the licensee's corrective action program as Problem Investigation Process (PIP) No. M-00-04480.

(2) Potential for Fire to Cause Pressurizer Power Operated Relief Valve (PORV) to Open (Fire Areas 2, 2A, 14, and 20)

The team reviewed licensee cable routing information and determined that cables associated with Unit 1 PORVs 1NC32B (Cables: 1NC909 and 1ILE664), 1NC36B (Cables: 1ILE664 and 1INC 909) and 1NC34A (Cable 1NC908) and Unit 2 PORV 2NC32B (Cable 2NC798) could be subject to damage as a result of a fire in Fire Area 2. Fire damage to these unprotected cables could cause the PORVs to spuriously open. The team noted that the SSA only identified PORV 1NC36B as being susceptible to adverse actuation. There was no justification provided for why the cables for PORVs 1NC32B, 1NC34A, and 2NC32B were not included in the SSA for Fire Area 2. This was a disparity in the SSA for the PORV cables routed through Fire Area 2.

Unit 1 PORVs 1NC34A and 1NC32B were found to have cables traversing Fire Area 2A. The licensee's evaluation in the SSA did not address the potential for spurious PORV actuations as a result of a fire in Fire Area 2A. There was no justification provided for why the cables for these two PORVs were not included in the SSA for Fire Area 2A. This was a disparity in the SSA for the PORV cables routed through Fire Area 2A.

A fire in Fire Area 14 could damage cables associated with the Unit 1 and Unit 2 pressurizer PORVs and the PORV block valves. Specifically, cables associated with Unit 1 PORVs 1NC32B, 1NC36B, 1NC34A (Cable 1NC908) and Unit 2 PORVs 2NC32B (Cables 2NC780, 2NC783, 2NC836, 2NC796, 2NC798, and 2NC827) and 2NC34A (Cable 2NC780) could be susceptible to damage as a result of a fire in this area. Additionally, Unit 1 PORV Block Valve 1NC35B and the following Unit 2 PORV Block Valves were also subject to damage as a result of a fire in this area: 2NC31B (Cables 2NC766, 2NC780, 2NC771, and 2NC761), 2NC33A (Cables 2NC776 and 2NC771), and 2NC35B (Cables 2NC776, 2NC758, 2NC761, and 2NC780). There was no justification provided for why the cables for these PORVs and block valves were not included in the SSA for Fire Area 14. This was a disparity in the SSA for the PORV and PORV block valve cables routed through Fire Area 14.

Cables associated with Unit 2 PORVs 2NC32B, 2NC34A, and PORV Block Valves 2NC31B, 2NC33A, and 2NC35B were found to be located in Fire Area 20. The potential for these valves to spuriously open as a result of a fire in this area was not addressed in the SSA. There was no justification provided for why the cables for the PORVs were not included in the SSA for Fire Area 20. This was a disparity in the SSA for the PORV and PORV block valve cables routed through Fire Area 20.

With regard to the potential for fire to cause the inadvertent actuation of the PORVs, the licensee had stated that upon transfer to the SSF, fire-induced actuation of the PORVs would be mitigated by manual operator actions to de-energize the PORVs. However, the licensee had also stated that transfer to the SSF was not expected to be implemented for some time after fire initiation. This "time-zero" for transfer to the SSF was defined by the licensee as the time when fire damage had propagated to a point where the shift supervisor no longer felt that control of the plant could be maintained from the MCR. Given this definition, and the presence of PORV control cables in Fire Areas 2, 14, and 20, there was the potential for a PORV to spuriously actuate prior to transfer to the SSF. The capability of the SSF to mitigate this transient and maintain reactor coolant process variables within those predicted for a loss of offsite power (as required by Section III.L.1 of Appendix R) could not be adequately demonstrated by the licensee.

There was no documented justification provided for why cables for the PORVs and block valves were not included in the SSA. This disparity in the SSA with regard to the PORVs and the block valves cables routed through Fire Areas 2, 2A, 14, and 20 was not resolved during this inspection. This issue will be tracked as URI 50-369,370/00-09-02: Potential for Pressurizer PORV Actuations. The team noted that certain “byproduct” associated circuits issues (e.g., fire-induced spurious operations or mal-operations) are the subject of an ongoing, voluntary industry initiative. This URI is considered an example of a “byproduct” associated circuits issue and will be tracked as a URI pending generic resolution of the related issue. This issue was entered in the licensee’s corrective action program as PIP M-00-04491.

<u>(3) Potential for Loss of Availability of a Centrifugal Charging Pump (Fire Area 14 and Fire Area 20)</u>

The team reviewed the routing of cables associated with the volume control tank (VCT) outlet valves and determined that a fire in Fire Area 14 or Fire Area 20 had the potential to cause a loss of charging pump capability.

By letter dated January 5, 1983, the licensee provided a response to NRC staff concerns regarding the ability of the SSS standby makeup pump with a 26 gallon per minute capacity to return reactor coolant level in the pressurizer to the normal shutdown range in the event of reactor coolant system (RCS) inventory loss. The response stated that in the event RCS inventory loss were to exceed the capability of the standby makeup pump, the centrifugal charging pumps would be available by local operation at the switchgear. Contrary to the licensee’s response, the team found that the licensee had not fully evaluated the availability of a charging pump to serve as a back-up to the standby makeup pump.

During normal plant operation, an operating charging pump is aligned to take suction from the VCT. The flowpath between the VCT and the operating pump consisted of two normally open motor-operated valves (MOVs) in series. Since the valves which align the refueling water storage tank to the charging pumps are closed during normal operation, a fire-induced spurious closure of one of the two series VCT outlet valves could cause a loss of suction to the operating centrifugal charging pump and subsequent pump damage. Further, if fire damage to cables prevented the VCT outlet valves from closing, there would be a potential for hydrogen to be drawn into the suction of the operating charging pump when the volume of water in the VCT was depleted, again leading to subsequent pump damage.

The team reviewed cable routing associated with Unit 1 VCT outlet valves 1NV141A, 1NV142B and Unit 2 VCT outlet valves 2NV141A, 2NV142B and determined that the cables were subject to damage as a result of a fire in Fire Area 14. The power and control cables for Unit 2 VCT outlet valves 2NV141A, 2NV142B were also determined to be unprotected and subject to damage as a result of a fire in Fire Area 20. Specific cables located in Fire Area 14 included:

Valve No.	Cables in Fire Area 14
1NV141A:	1NV560, 1NV39, 1NV565, 1NV595, 1NV566
1NV142B:	1NV6, 1NV57, 1NV573, 1NV574, 1NV576, 1NV582, 1IPE566, 1ATC402A
2NV141A:	2NV528, 2NV775, 2NV580, 2NI10, 2NI826
2NV142B:	2NV527, 2NV587, 2ATC401A, 2NV764, 2NV574, 2NV658, 2RN48

The licensee's evaluation of the effects of a fire in Fire Areas 14 or 20 did not address the potential for spurious VCT outlet valve actuations which could result in the charging pumps not being available to perform the function specified in the January 5, 1983, letter and the McGuire Safety Evaluation Report (SER) Supplement 6 (SSER-6) dated February 1983. The team determined from a review of the cable routing associated with the VCT outlet valves that a fire in Fire Areas 14 or 20 had the potential to cause a loss of charging capability.

This issue was entered in the licensee's corrective action program as PIP M-00-04481. This issue was designated as URI 50-369,370/00-09-03, Availability of the Charging Pumps for Fire Damage to the Volume Control Tank Outlet Valves. The team noted that certain "byproduct" associated circuits issues (e.g., fire-induced spurious operations or mal-operations) are the subject of an ongoing, voluntary industry initiative. This URI is considered an example of a "byproduct" associated circuits issue and will be tracked as a URI pending generic resolution of the related issue.

.2 Fire Protection of Safe Shutdown Capability

.21 Fire Detection Systems

a. Inspection Scope

The team walked down the accessible portions of the fire detection and alarm systems in the motor driven and turbine driven CA pump rooms (Fire Areas 2A and 2), Train B lower 4160V switchgear room (Fire Area 11), Unit 1 component cooling water (KC) pumps area (Fire Area 14), and Unit 2 cable spreading room (Fire Area 20) to evaluate the engineering design and operation of the installed configurations. The team also reviewed engineering evaluations for the detection design, spacing criteria, and detector locations in selected plant areas to verify effectiveness of the systems and compliance with the National Fire Protection Association (NFPA) code. Additionally, the team reviewed the surveillance test procedures for the fire detection and alarm systems to determine compliance with the Updated Final Safety Analysis Report (UFSAR) Section 9.5.1, and UFSAR Section 16.9, Selected Licensee Commitments (SLC).

b. Findings

No findings of significance were identified.

.22 Fixed Fire Suppression Systems

a. Inspection Scope

The team reviewed the adequacy of the design and installation of the Halon 1301 fire suppression system for Fire Area 2A, the sprinkler system located in Fire Area 2, and the manually actuated fog mist system for Fire Area 20. Team members performed a walk down of the selected areas to ensure proper placement and spacing of sprinkler and spray heads and the extent of sprinkler head obstructions. The team reviewed Halon 1301 fire suppression system controls to assure accessibility and functionality of the system and associated ventilation system fire dampers. Selected 10 CFR 50, Appendix R exemptions and engineering evaluations for NFPA code deviations were reviewed and compared against the physical configuration of the selected fire areas. Additionally, the team reviewed flow diagrams, and engineering evaluations associated with floor drain and heating, ventilation, and air conditioning systems to verify that systems and operator actions required for post-fire safe shutdown would not be inhibited by leakage or flooding from fire suppression activities or rupture of fire suppression systems.

b. Findings

No findings of significance were identified.

.23 Electrical Raceway Fire Barrier Systems (ERFBS) - Thermo-Lag

a. Inspection Scope

The inspectors reviewed the actions that the licensee had taken to resolve the technical issues related to the fire-resistive performance of Thermo-Lag ERFBS (i.e., cable tray fire wraps). The team also reviewed installed mineral insulated cables, the plant licensing basis, supporting tests, and evaluations.

b. Findings

The team found that the licensee had implemented plant modifications to replace existing centrifugal charging pump cables in Fire Area 11, Unit 1 Train B Switchgear Room, that had been protected by the Thermo-Lag. In the event of an unmitigated fire in this area the licensee's analysis credits the availability of Train A shutdown systems. Centrifugal Charging Pump 1A (Train A component) was found to have cables that traverse this area. Further evaluation found these cables to be credited by the licensee as having a 3-hour fire resistance. These cables were originally protected with an electrical raceway fire barrier system constructed of Thermo-Lag material. In response to NRC GL 92-08 McGuire removed the Thermo-Lag material and replaced the cables with mineral insulated cables manufactured by Whittaker Electronic Resources Unit of Whittaker Electronic Systems.

The team found that the installed cable configurations were completed based on previously conducted air oven thermal exposure testing. The NRC's response to Question 8.10 "ASTM E-119 Design Basis," described in GL 86-10, stated that, some cables are being developed for high temperature (e.g., 1700 ^{o}F) applications. An exemption would be required if such cable were used in lieu of the alternatives of III.G.2 or III.G.3 in a pre-1979 plant. A deviation from the guidelines would be required for similar applications in a post-1979 plant.

The team found that the licensee's fire protection staff position on this matter was contrary to NRC guidance and that a deviation from the guidelines had not been requested for the application of this type cable at McGuire. This issue is identified as URI 50-369,370/00-09-04, Adequacy of the Fire Rating of Mineral Insulated Cables in Lieu of Thermo-Lag Electrical Raceway Fire Barrier Systems. This item is open pending further NRC review to determine the adequacy of the fire resistance rating of these cables.

.24 <u>ERFBS Used to Protect Safe Shutdown Capability</u>

a. <u>Inspection Scope</u>

The team reviewed the technical adequacy of the HEMYC fire wrap material used to separate safe shutdown functions within the same fire area. This review included evaluation of the material's application as a fire barrier system for the protection of safe shutdown functions. It also included a review of the fire endurance testing which substantiated the construction and installation attributes of the fire barrier and its ability to perform as 1-hour and 3-hour rated fire barrier.

b. <u>Findings</u>

Fire protection features required to satisfy General Design Criterion (GDC) 3, "Fire Protection," included features to ensure that one train of those systems necessary to achieve and maintain safe shutdown conditions be maintained free of fire damage. One means for complying with this requirement was to separate one safe shutdown train from its redundant train with fire-rated barriers. The level of fire resistance required, 1-hour or 3-hours, depended on the other fire protection features provided in the fire area of concern.

The NRC issued the following guidance on acceptable methods of satisfying the regulatory requirements of GDC 3:

- Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, "Guideline for Fire Protection for Nuclear Power Plants," May 1, 1976

- Appendix A to BTP APCSB 9.5-1, February 24, 1977

- BTP Chemical Engineering Branch (CMEB) 9.5-1 "Fire Protection for Nuclear Power Plants," July 1981

- Generic Letter (GL) 86-10, “Implementation of Fire Protection Requirements,” April 24, 1986

- Supplement 1 to GL 86-10, “Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area,” March 25, 1994

The team found that, in the event of an unmitigated fire in Fire Area 2A, Unit 1 turbine driven CA pump room, the licensee’s SSA credited the availability of Train B shutdown systems. This area is a 10 CFR 50 Appendix R, III.G.2 area. In Fire Area 2A, the licensee’s Severe Accident Analysis Report, File Number 50, indicated that the nuclear service water (RN) pump control cables for both the Train A and Train B pumps were routed within the fire area. The Train B nuclear service water functions were protected with HEYMC fire wrap material in Fire Area 2A. The licensee was unable to provide the team with documentation which demonstrated that an adequate design basis had been established for fire protection cable wrap fire barrier system (which incorporated the guidance of GL 86-10) to ensure that the shutdown capability was protected. An exposure fire in this area, could result in a loss of turbine driven CA pump and damage to nuclear service water control cables should the fire wrap material fail to perform its designed 1-hour protection function.

The NRC has previously questioned the fire test methodology used to qualify the HEMYC wrap material and an industry/NRC initiative is ongoing to resolve the issues with the material tests. This issue is identified as URI 50-369,370/00-09-05: Adequacy of HEMYC Cable Wrap Fire Barrier Qualification Tests and Evaluations to Scope Installed Configurations. This item is open pending the completion of the NRC and industry initiative to resolve the issues with the material tests. This condition is identified in the licensee’s corrective action program as PIP M-00–00920.

.25 Fire Brigade Equipment

a. Inspection Scope

The team performed a walk down of the fire brigade personal protective equipment to evaluate equipment accessibility and functionality. The adequacy of the fire brigade self-contained breathing apparatus was reviewed as well as the availability of supplemental breathing air tanks. Team members also performed a walk down of the selected fire areas and compared selected fire brigade pre-fire strategy plan drawings with as-built plant conditions.

b. Findings

No findings of significance were identified.

.26 Fire Brigade Drill Program

a. Inspection Scope

The team reviewed the fire brigade training and fire drill program to verify that the fire brigade personnel qualifications and drill participation met the requirements of the licensee's approved fire protection program. Also, the last two years' drill critique records for operating shifts were reviewed to determine when drills had been conducted in the high fire risk plant areas.

b. Findings

No findings of significance were identified.

.3 Post-Fire Safe Shutdown Circuit Analysis

a. Inspection Scope

The team reviewed the licensee's Appendix R related design basis documentation, calculations, and applicable McGuire plant breaker and fuse time versus current characteristic curves in order to verify that fire damage to electrical circuits associated with safe shutdown components and equipment would not adversely affect the post-fire safe shutdown capability of the plant. The team also examined the appropriateness of any required operator actions needed to mitigate such faulted conditions.

b. Findings

No findings of significance were identified.

.4 Alternative Shutdown Capability

a. Inspection Scope

The team performed a review of the licensee's procedures for fire response, abnormal procedures for alternative safe shutdown, and the licensee's Appendix R manual action requirements analyses for a fire in the selected fire areas. The team also walked down selected portions of the procedures. The reviews focused on ensuring that the required functions for post-fire safe shutdown and the corresponding equipment necessary to perform those functions were included in the procedures. The walk downs focused on ensuring that the procedures could reasonably be performed within the required times, given the minimum required staffing level of operators and with or without offsite power available. The team also reviewed the electrical isolation of selected motor operated valves from the control room to verify that operation of the SSS from the SSF and remote locations would not be prevented by a fire-induced circuit fault. The objective of these reviews was to assure that the post-fire safe shutdown analytical approach, safe shutdown equipment, and procedures were consistent and complied with the Appendix R reactor performance criteria for safe shutdown.

b. Findings

No findings of significance were identified.

.5 Operational Implementation of Alternative Shutdown Capability

a. <u>Inspection Scope</u>

The team reviewed the operational implementation of the alternative shutdown capability for a fire in Fire Areas 2, 14, or 20 to verify that: (1) the training program for licensed personnel included alternative or dedicated safe shutdown capability; (2) personnel required to achieve and maintain the plant in hot standby following a fire using the alternative shutdown system could be provided from normal onsite staff, exclusive of the fire brigade; (3) the licensee had incorporated the operability of alternative shutdown transfer and control functions into plant Technical Specifications; and (4) the licensee periodically performed operability testing of the alternative shutdown instrumentation and transfer and control functions, including imposing appropriate compensatory measures during testing when the alternative shutdown capability is declared inoperable. The review focused on ensuring that all required functions for post-fire safe shutdown, and the corresponding equipment necessary to perform those functions, were included in the procedures. The objective of this review was to assure that the safe shutdown equipment, shutdown procedures, and the post-fire safe shutdown analytical approach were consistent and satisfied the Appendix R reactor performance criteria for safe shutdown.

b. <u>Findings</u>

No findings of significance were identified.

.6 Emergency Lighting for Performance of Alternative Shutdown Capability

a. <u>Inspection Scope</u>

The team reviewed the emergency lighting for safe-shutdown activities in the selected fire areas to verify that it was adequate for permitting access to safe shutdown equipment and performing manual actions required to achieve and maintain hot standby conditions. During procedure walk downs, the team examined the material condition of lighting units to verify that emergency lighting unit lamps were operational and the lighting heads were aimed to provide adequate illumination for personnel to perform the procedure steps.

b. <u>Findings</u>

No findings of significance were identified.

.7 Cold Shutdown Repairs

a. <u>Inspection Scope</u>

The team reviewed the licensee’s Procedure OP/0/A/6100/020, Operational Guidelines Following a Fire in Auxiliary Building or Vital Area, Revision 12. This procedure was reviewed to verify that it adequately described the steps to be taken to prepare the plant for hot shutdown, followed by cold shutdown, after an Appendix R fire in the auxiliary building or vital area (battery room, MCR, cable spreading room).

b. Findings

No findings of significance were identified.

.8 Fire Barrier and Fire Area/Zone/Room Penetration Seals

a. Inspection Scope

The team reviewed the selected fire areas to evaluate the adequacy of the fire resistance of fire area barrier enclosure walls, ceilings, floors, structural beam support protection, fire barrier mechanical and electrical penetration seals, fire doors, and fire dampers. This was accomplished by observing the material condition and configuration of the installed fire barrier features, as well as, construction details and supporting fire endurance tests for the installed fire barrier features to verify that the as-built configurations were qualified by appropriate fire endurance tests. The team also reviewed the fire hazards analysis to verify the fire loading used by the licensee to determine the fire resistive rating of the fire barrier enclosures. In addition, the team reviewed the licensing documentation, 10 CFR 50, Appendix R exemptions, GL 86-10 engineering evaluations of fire barrier features, engineering calculations, and NFPA code deviations to verify that the fire barrier installations met licensing commitments.

b. Findings

No findings of significance were identified.

.9 Fire Protection Systems, Features and Equipment

Fire Protection Water Supply System

a. Inspection Scope

The team reviewed flow and wiring diagrams, and cable routing information associated with the fire pumps and fire protection water supply system. These systems are necessary for manual fire fighting activities and water-based fire suppression systems which protect redundant trains of systems for hot shutdown. The review was to determine whether the common fire protection water delivery and supply components could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits.

b. Findings

No findings of significance were identified.

.10 Compensatory Measures

a. Inspection Scope

The team reviewed the administrative controls for out-of-service, degraded, and/or inoperable fire protection systems and post-fire SSD systems and components. The review was performed to verify that the risk associated with removing fire protection and/or post-fire systems or components was properly assessed and adequate compensatory measures were implemented in accordance with the licensee's Technical Specifications and UFSAR Section 16.9, Selected Licensee Commitments.

b. Findings

No findings of significance were identified.

.11 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed Fire Protection Functional Audit, SA-99-04 (MC)(RA)(FPFA), dated April 9, 1999, to verify that appropriate corrective actions were taken to resolve identified adverse conditions or program deficiencies. The audit resulted in 23 findings. Each finding was assigned a PIP number for tracking and resolution. The team reviewed each of the 23 findings, which were arranged into 4 categories by significance and subject.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings

.1 Exit Meeting Summary

The lead inspector presented the inspection results to Mr. Bryan Dolan, Safety Assurance Manager, and other members of licensee management and staff at the conclusion of the inspection on November 3, 2000. Subsequent to the inspection, the lead inspector held a followup exit by telephone with Mr. Mike Cash and other members of the licensee's staff on December 13, 2000. The licensee acknowledged the findings.

The team asked the licensee whether any of the material examined during the inspection should be considered proprietary. Proprietary information was reviewed by the team but is not included in this inspection report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

H. Barron, Vice President, McGuire Nuclear Station
H. Brandes, Engineer, General Office Fire Protection Program
D. Brewer, Engineer, General Office Probabilistic and Risk Assessment (PRA) Group
J. Bryant, Engineer, Regulatory Compliance
M. Cash, Manager, Regulatory Compliance
B. Dolan, Manager, Safety Assurance
T. Geer, Manager, Civil/Electrical/Nuclear Systems Engineering (CEN)
D. Jamil, Station Manager, McGuire Nuclear Station
B. Lanka, Civil Supervisor, CEN
J. Lukowski, Engineer, Appendix R, CEN
R. McAuley, Engineer, General Office PRA Group
J. Oldham, Engineer, Fire Protection, CEN
B. Peele, Manager, Engineering

Other licensee employees contacted included engineers, operations personnel, and administrative personnel.

NRC

H. Christensen, Deputy Director, Division of Reactor Safety, Region II
M. Franovich, Resident Inspector
S. Shaeffer, Senior Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-369,370/00-09-01	URI	Potential for Loss of Auxiliary Feedwater Flow for a Fire in Fire Areas 2 and 14 [Section 1R05.1.b(1)]
50-369,370/00-09-02	URI	Potential for Pressurizer PORV Actuations [Section 1R05.1.b(2)]
50-369,370/00-09-03	URI	Availability of the Charging Pumps for Fire Damage to the Volume Control Tank Outlet Valves [Section 1R05.1.b(3)]
50-369,370/00-09-04	URI	Adequacy of the Fire Rating of Mineral Insulated Cables in Lieu of Thermo-Lag Electrical Raceway Fire Barrier Systems (Section 1R05.23)
50-369,370/00-09-05	URI	Adequacy of HEMYC Cable Wrap Fire Barrier Qualification Tests and Evaluations to Scope Installed Configurations (Section 1R05.24)

Closed

None

Discussed

None

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety

- Initiating Events
- Mitigating Systems
- Barrier Integrity
- Emergency Preparedness

Radiation Safety

- Occupational
- Public

Safeguards

- Physical Protection

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.

LIST OF DOCUMENTS REVIEWED

PROCEDURES

AP/1/A/5500/15, Loss of Vital or Aux Control Power, Revision 7
AP/1/A/5500/17, Loss of Control Room, Revision 14
AP/2/A/5500/17, Loss of Control Room, Revision 10
AP/1/A/5500/20, Loss of RN, Revision 14
AP/1/A/5500/24, Loss of Plant Control Due to a Fire, Revision 16
AP/2/A/5500/24, Loss of Plant Control Due to a Fire, Revision 16
IP/0/B/3260/028, Enclosure 11.1, Deadlight Data Sheet
0P/1/A/6100/010N, Annunciator Response For Panel 1AD-13, Main Fire Pump Control Power Trouble
OP/0/A/6100/020, Operational Guidelines Following a Fire in Auxiliary Building or Vital Area, Revision 12
PT/0/A/4250/004, Fire Barrier Inspection, Revision 16
PT/0/A/4400/001K, Fire Protection Annual Valve Test, Revision 31
PT/1/A/4400/001N, Halon 1301 System Periodic Test, Revision 27
PT/0/A/4400/017, Fire Pump A and B Operability Test, Revision 9
PT/0/A/4400/018, Fire Pump C Operability Test, Revision 9
RP/0/A/5700/025, Fire Brigade Response, Revision 6
Nuclear Station Directive (NSD) 316, Fire Protection Impairment and Surveillance, Revision 3
NSD 112, Fire Brigade Organization, Training, and Responsibilities, Revision 3
Nuclear Station Directive 313, Control of Combustible and Flammable Material, Revision 3
Nuclear Station Directive 314, Hot Work Authorization, Revision 1

CALCULATIONS

DPC 1435.00-00-0006, Penetration Seal Summary, Revision 2
MCC-1381.05-00-0214, Available Fault Current on 125 Volt DC Vital I&C Buses, Revision 3

DRAWINGS

Pre-fire Strategy No. 20, U2 Cable Room, Revision 4
Pre-fire Strategy No. 11, 1ETB Switchgear, Revision 4
Pre-fire Strategy No. 1-14, Auxiliary Building, Elevation 733, Revision 4
Pre-fire Strategy No. 2, Motor Driven Auxiliary Feedwater Pumps, Revision 4
MCFD-1599-02.01, Flow Diagram of Fire Protection System, Revision 7
MCFD-1599-02.03, Flow Diagram of Fire Protection System, Revision 2
MCFD-2599-04.00, Flow Diagram of Fire Protection System, Revision 1
MC-1315-01.05-004 through 104 Series, Fire, Flood, and HVAC Boundaries, General Arrangement, Revision 1
MC-1384-07 Series, Fire Plan, Revision 10
MC-1522-01.41- through 49-00 Series, Heating-Ventilation-Air Conditioning Layout, Revision 24
MC-1762-01-00-02. 03, 04, Fire Detection System Detector Locations, Revision 9
MC-1845-03, Lighting Switchgear Room Unit 1, Revision 24
MCM-1206-07-0074.001, Fire Sprinkler System, Component Cooling Pumps, Revision D7
MCM-1206-07-0085.001, Fire Sprinkler System, Cable Rooms, Revision D00

MCM-1206-07-0075.001, Fire Sprinkler System, Auxiliary Feedwater Pumps, Revision D03
MCM-1206-07-0030.001, Halon 1301 Fire Suppression System, Revision DJ

ENGINEERING EVALUATIONS

MCC 1435.03-00-00006, IPEEE Fire Protection Walkdown Checklist

CODES AND STANDARDS

NFPA 13 Standard for the Installation of Sprinkler Systems, 1979 Edition
NFPA 12A Standard on Halon 1301 Extinguishing Systems, 1977 Edition
NFPA 72D Standard for the Installation , Maintenance, and Use of Proprietary Protection Signaling Systems, 1975 Edition
NFPA 72E Standard on Automatic Fire Detectors, 1974 Edition

OTHER DOCUMENTS

McGuire Engineering Memorandum to File MC-12456/00, “Acceptability of an Appendix R Cable,” July 24, 1995
Memorandum T. McMeekin, DPC, to NRC, “NRC Generic Letter 92-08, Thermo-Lag 330-1 Fire Barriers,” November 28, 1994
NRC Memorandum V. Nerses, NRR to T. McMeekin, DPC, “Generic Letter (GL) 92-08, Thermo-Lag 330-1 Fire Barriers,” April 7, 1995
Memorandum T. McMeekin, DPC, to NRC, “NRC Generic Letter 92-08, Thermo-Lag 330-1 Fire Barriers,” May 29, 1996
Task Interface Agreement 99-028, February 19, 1997
Whittaker Electronic Resources, “Summary Report, Three Hour Qualification Testing of Whittaker Appendix R and Si 2400 Silicon Dioxide Insulated Fire Cable“, December 1994
MCS-1223.SS-00-0001, Design Basis Specification for the Standby Shutdown System, Revision 7
MCS-1465.00-00-0008, Plant Design Basis Specification for Fire Protection, Revision 3
MCS-1465.00-00-0015, Design Basis Specification for the Loss of Control Room System, Revision 5
MCS-1465.00-00-0022, Design Basis Specification for the Appendix R Safe Shutdown Analysis, Revision 1
Building Research Laboratory, The Ohio State University, “Report of a Standard ASTM Fire Endurance Test and Fire Hose Stream Test on a Nonload Bearing Wall Assembly, Project 6579,“ December 12, 1978
Technical Data for Grinnell Type D3 Protectospray Nozzles, TD620A
NRC Generic Letter 86-10, “Implementation of Fire Protection Requirements,” April 24, 1986
Supplement 1 to Generic Letter 86-10, “Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area,” March 25, 1994.
UFSAR Section 16.9, Selected Licensee Commitments, “Auxiliary Systems”
UFSAR Section 9.5.1, “Fire Protection System”
McGuire Engineering, “Fire Protection Indicator Report,” August 2000

McGuire IPEEE Submittal Report, Section 3.5, “Fire Analysis,” June 1, 1994
McGuire PRA Revision 2 Summary Report, December 1997

CORRECTIVE ACTION PROGRAM PIP ITEMS GENERATED DURING INSPECTION

M-00-00920, Need to Evaluate the Configuration of HEMYC Wrap
M-00-04454, PT/0/A/4600/016A Needs Revision to Clarify D/G Lockout
M-00-04461, Appendix K Operator Actions
M-00-04466, Evaluate UFSAR Section 9.5.1 Clarifications for Fire Suppression Systems
M-00-04469, Evaluate Fire Pump Loss Due to Fire in Fire Areas 19 and Main Control Room
M-00-04480, Valve 1CA7AC Cable Routing May Cause Spurious Operation due to Appendix R Fire in Certain Fire Areas
M-00-04481, An Appendix R Analysis Needs to Show the Availability for Either NV Charging Pump for a Fire in any Plant Area as Stated in Tucker’s January 5, 1983 Letter
M-00-04483, The fire protection RY bypass lines around 1RY 113 and 1RY 114 do not Permit the Maximum Flow for the Largest Fire Sprinkler Demand
M-00-04485, The Procedures used to Test UV Fire Detectors do not Clearly State the Operability Requirements Being Satisfied
M-00-04486, Evaluate UFSAR Section 10.4.10 Clarifications for Auxiliary Feedwater System
M-00-04487, Fire Brigade Drills Had Not Been Performed Within 10 Years in Areas Considered Safety Significant
M-00-04491, NRC Appendix R Inspection in Certain Fire Areas Determined the Potential for NC PORV and Block Valve Actuation

LIST OF ACRONYMS USED

APCSB	Auxiliary and Power Conversion Systems Branch
BTP	Branch Technical Position
CA	Auxiliary Feedwater System
ERFBS	Electrical Raceway Fire Barrier Systems
FA	Fire Areas
FB	Fire Barrier Degradation
FMF	Fire Mitigation Frequency
GDC	General Design Criteria
GL	Generic Letter
IF	Ignition Frequency
IPEE	Individual Plant Examination for External Events
KC	Component Cooling Water System
LOOP	Loss of Offsite Power
MCR	Main Control Room
MCR	Main Control Room
MOV	Motor Operated Valve
MS	Manual Suppression
NC	Reactor Coolant System
NCV	Non-cited Violation
ND	Residual Heat Removal
NFPA	National Fire Protection Association
NV	Charging/High Head Safety Injection
PIP	Problem Investigation Process
PIP	Problem Investigation Process
PORV	Power-Operated Relief Valve
PRA	Probabilistic Risk Analysis
RCS	Reactor Coolant System
RN	Nuclear Service Water
RPS	Reactor Protection System
SDP	Significance Determination Process
SER	Safety Evaluation Report
SLC	Selected Licensee Commitments
SRA	Senior Reactor Analyst
SSA	Safe Shutdown Analysis
SSC	Structures, Systems, and Components
SSD	Safe Shutdown
SSER	Supplements Safety Evaluation Report
SSF	Standby Shutdown Facility
SSS	Standby Shutdown System
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
V	Volts
VCT	Volume Control Tank
VDC	Volts Direct Current