



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-348/85-35 and 50-364/85-35

Licensee: Alabama Power Company
600 North 18th Street
Birmingham, AL 35291

Docket Nos.: 50-348 and 50-364

License Nos.: NPF-2 and NPF-8

Facility Name: Farley

Inspection Conducted: August 19-23, 1985

Inspection at Farley site near Dothan, Alabama

Inspectors: W. H. Bradford

9-19-85
Date Signed

P. M. Madden

9-19-85
Date Signed

L. S. Melten

9-20-85
Date Signed

W. H. Miller, Jr.

9-19-85
Date Signed

A. R. Ruff

9-20-85
Date Signed

Accompanying Personnel: E. A. Reeves, NRR/ORB1

Approved by: T. E. Conlon

T. E. Conlon, Section Chief
Plant Systems Section
Division of Reactor Safety

9-20-85
Date Signed

SUMMARY

Scope: This special announced inspection entailed 149 inspector-hours on site in the area of licensee's actions in implementation of the fire protection and plant shutdown requirements of 10 CFR 50, Appendix R, Sections III.G, III.J, III.L and III.O

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *C. L. Buck, Nuclear Engineering Technical Section
- L. Bradshaw, Generation Power Technical Superintendent
- J. Hayes, Plant Fire Protection Staff
- R. Hendley, Fire Brigade Training
- *R. Hill, Operations Superintendent
- *D. H. Jones, Nuclear Engineering Technical Section
- *S. N. Knight, Senior Engineer
- *R. H. Marlow, Assistant Plant Manager
- *J. W. McGowan, Manager Safety Audit and Engineering Review
- *B. L. Moore, Operations Unit Supervisor
- *D. N. Morey, Assistant Plant Manager
- M. D. Stinson, Plant Modification Group
- *L. A. Ward, Maintenance
- *W. G. Ware, Supervisor, Safety Audits and Engineering Review
- *F. G. Watford, Fire Marshal

Other licensee employees contacted included craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

Other Organizations

Bechtel

- *D. G. Butami, Electrical
- C. Folta, Electrical
- W. Francis, Electrical
- *J. E. Love, Electrical
- *P. L. Puhl, Electrical
- *L. J. Vaz, Site Engineer

Southern Company Services

- *R. F. Luca, Fire Protection
- *J. M. Maddry, Fire Protection
- *J. W. Wilson, Fire Protection

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 23, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Compliance with 10 CFR, Appendix R, Section III.G and III.L.

An inspection was conducted to determine if the fire protection features provided for structures, systems, and components important to safe shutdown at Farley Units 1 and 2 were in compliance with 10 CFR 50, Appendix R, Sections III.G and III.L. The scope of this inspection was to determine if the fire protection features provided for the equipment and systems required to bring the plant to a hot standby condition were capable of limiting potential fire damage so that one train of these systems needed to achieve and maintain hot standby from either the control room or emergency control stations would be free from fire damage.

a. Safe Shutdown Capabilities

To ensure safe shutdown capabilities, where cables or equipment of redundant trains of systems necessary to achieve and maintain hot standby conditions are located within the same fire area outside the primary containment, 10 CFR 50, Appendix R, Section III.G.2 requires that one train of hot standby systems be maintained free of fire damage by providing fire protection features which meet the requirements of either III.G.2.a, III.G.2.b, or III.G.2.c.

On the basis of the above Appendix R criteria, the inspectors made an inspection of cabling and components associated with the Chemical Volume Control System, Auxiliary Feedwater System, Component Cooling Water System, Service Water Systems, and Onsite Power Distribution System to determine the adequacy of the fire protection features and separation afforded these essential safe shutdown systems.

The licensee's submittal to NRC Region II of May 28, 1985 identified the specific shutdown systems and support systems required for safe shutdown and the location of the equipment and associated power and control circuit cabling. From this information the inspectors selected a random sample of the following components and associated cables for review:

- Auxiliary Feedwater Pumps
- Component Cooling Water Pumps
- Service Water Pumps

Valves in Service Water Supply to Diesel Generator Building
 Valves in Service Water Return from Diesel Generator Building
 Charging Pumps
 Reactor Water Storage Tank Outlet Valves
 Volume Control Tank Outlet Valves
 Atmospheric Relief Valves
 Charging Pump Room Coolers
 Motor Control Center Room Coolers
 Onsite Power Distribution System

Safe shutdown related instrumentation and associated circuits were not evaluated by the inspectors for compliance to Appendix R Section III.G. The licensee is rerouting cables associated with this instrumentation and conducting other modifications required to meet the NRC guidelines of Regulatory Guide 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following An Accident. These modifications are scheduled to be completed during the 1986 refueling outages. The licensee stated that upon completion of the modifications the safe shutdown instrumentation and related cabling will meet the separation requirements of Appendix R, Section III.G.

The Farley Nuclear Plant Fire Protection Program Reevaluation, Amendment 5 was used during this inspection as the "approved fire protection plan" for the review of the fire protection systems and features provided within each fire area.

The licensee submitted to the NRC on March 31, 1985 for Unit 2 and May 31, 1985 for Unit 1 exemption requests to the requirements of Appendix R involving a number of areas in which the plant did not meet Appendix R requirements. These submittals were supplemented by letters dated June 26 and July 19, 1985. The exemptions include plant areas, shutdown system separation and fire protection features which do not meet the literal requirements of Appendix R. These exemptions are currently under review by the NRC and will be addressed by separate correspondence.

Results

The safe shutdown components, both redundant functions and trains, which were reviewed during this inspection were found to meet one of the following classifications:

- safe shutdown trains (equipment, components and cabling) are located in separate fire areas that are separated from each other by 3-hour fire rated construction;
- redundant shutdown trains are located in the same fire area but are separated by more than 20 feet with no intervening combustibles and with an automatic fire suppression system and smoke detection system provided in the fire area;

- redundant shutdown trains are located in the same fire area but are separated by less than 20 feet, one train is enclosed within a one hour fire rated barrier (raceway fire barrier wrap), and an automatic fire suppression system and a smoke detection system are provided within the fire area; or
- An exemption request with justifications has been submitted to the NRC for items which do not meet the literal requirements of Appendix R Section III.G.

Following NRC approval of the exemption requests and completion of the modifications associated with the exemptions, and completion of the instrumentation modifications associated with NRC Regulatory Guide 1.97, it appears that Farley Units 1 and 2 will meet the equipment train separation requirements of Appendix R, Section III.G.

(1) Fire Protection for Safe Shutdown System/Components

The Farley plant is divided into approximately 80 fire areas for Unit 1 and 54 fire areas for Unit 2. These areas are separated from each other by construction features that have a 3-hour or equivalent fire resistance rating. Most of the fire areas are further subdivided into smaller fire zones by construction features having a fire resistance rating less than 3-hours.

The licensee's safe shutdown Appendix R analysis identified the fire areas in which the shutdown equipment and associated cabling were located. The inspectors reviewed this analysis and all fire areas which contained both Train A and B of the above listed shutdown components were selected for further evaluation. An inspection was made to determine if redundant cabling for the safe shutdown systems, required to achieve and maintain hot standby and cold shutdown conditions had been provided with adequate separation or protected in accordance with Appendix R, Section III.G.2.

Included in the review was an evaluation of the acceptability of the barrier or enclosure construction configuration as a fire rated barrier as used in the plant. Also, the review verified the adequacy of the installed penetration sealing systems, and fire dampers/fire doors with respect to installation and completeness, physical condition, and fire test documentation.

The 1-hour fire barrier enclosures provided for the electrical cable raceways do not extend to or provide protection for the raceway supports. This item has been identified by the licensee. Exemption No. 2-38 in the Farley Appendix R Fire Hazard Reevaluation Report of February 1985 provides justification for this discrepancy and requests that NRC approve an exemption to this requirement. This item is being reviewed by the NRC and will be addressed by separate correspondence.

Within the following fire areas the cable routings for redundant safe shutdown and the fire protection features afforded were inspected:

- (a) Fire Areas (Unit 1) - 4 and 2 (Unit 2) - 4 Auxiliary Building, Elevations (Portions) 100', 121', 130', 139', 155', 165' and 175'

Fire Areas 1-4 and 2-4 includes portions of the radiation controlled areas of the Unit 1 and Unit 2 auxiliary building. Penetrations through the area boundary are sealed or provided with protection equivalent to a 3-hour fire resistance rating, except doors to stairways and elevator shafts have a 1 1/2-hour fire resistance rating and exterior doors are not fire rated. Smoke detection systems are installed in all rooms containing safe shutdown equipment or appreciable combustible materials. Portions of the fire areas are provided with automatic fire suppression systems. Interior hose stations are located throughout the fire area. One hour fire barrier enclosures are provided for electrical cable raceways were required.

The following cabling was inspected and verified to meet separation and protection requirements of Appendix R, Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Charging Pump RWST Suction Valves	1VAFU-05G/AHHB18	*1VBFV-TSD/BHF025
Charging Pump RWST Suction Valves	**1VAFU-05P/AEF028	*1VBFV-T5P/BFDB2G
HVAC for Changing Pump Rooms	1VAFA-H5P/AFD-36 **1VAFA-H5P/AFD-39	*1VBFB-C2P/BFDB06 1VBFB-C2P/BFD-33
	1VAFA-A6P/AFD-36	*1VBFB-C2P/BFDB12&15 &203
HVAC for MCC Rooms	#1VAHUA2A/AHF176 #1VAHUA2P/AHH167	1VBHVA2A/BHF197 and 203 1VBHVA2P/BHF198 and 203
Charging Pumps	*1VADF06P/ADDA09	*1VBDG06P/BDE-09
Swing Charging Pump	1VADF07P/ADDA1A	1VBG07P/BDE-1A

Swing Charging Pump	*1VCDF07P/CDD005	N/A
Swing Charging Pump	*1VCDF07Q/CD0006	N/A
Charging Pump	*2VADF06P/ADD1C-	*2VBDG06P/BDE06-
Swing Charging Pump	2VADF07H/AHF462 2VADF07P/ADD1AA	2VBDG07B/BHM415 2VBDG07P/BDE1A-
Swing Charging Pump	*2VCDF07P/CDD255	N/A
Swing Charging Pump	*2VCDF07Q/CDC256	N/A
Charging Pump Suction Valve (RWST)	**2VAFU-05D/AHF21A 2VAFU-05G/AHF441 2VAFU-05P/AFD12G 2VAQ5061B/AHF410 2VAQ5061D/AHF413 2VAQ5061E/AHF414	2VBFV-T5D/BHF457 2VBFV-T5D/BFD06N
Charging Pump Room Coolers	*2VAFA-H5C/AHD18B *2VAFA-H5P/AFD0AE	*2VBFBC2P/BFD06B
Swing Charging Pump Room Coolers	***2VAFA-A6C/AHD18B	2VBFB-M5B/BHF264
MCC Room Coolers	***2VAHUAZA/AHF426 ***2VAHUA2P/AHH432	2VBHVAA2A/BHG350 2VBHVAA2P/BHG350

Notes: * Raceway enclosed within a nominal one hour fire barrier

** Raceway proposed to be enclosed within a one hour barrier by an exemption request

Redundant cables are located approximately 100' apart with no intervening combustibles

*** Exemption request submitted for cables being in the same fire area; however, the redundant cables are provided with greater than 20 feet separation and at least one cable train is located within a area provided with automatic sprinkler protection.

@ Exemption request submitted regarding existing separation.

- (b) Fire Area 2 (Unit 2) - 1, Auxiliary Building, Elevations 83', 100' and 121'

Fire area 2-1 includes portions of the radiation controlled area of Unit 2. This area is separated from the remainder of the plant by 3-hour fire rated construction, except the ceiling of 2223 room has tendon openings to room 2334 (fire area 2-34) and the doors into the stairways have a 1 1/2-hour fire rating. A smoke detection system is provided throughout the area except for duct and pipe chases and tendon access rooms containing negligible combustibles. An automatic sprinkler system is provided for the piping penetration room on the 121' elevation. Manual hose stations and CO2 have reels from adjacent fire areas are available for use in this area. One hour fire barrier enclosures are provided for electrical cable raceways were required.

The following cabling was inspected and verified to meet the separation and protection requirements of Appendix R Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Charging Pump Room Coolers	2VAFA-H5C/AHD12B, & AHD09B	*2VBFB-C2C/BHJ251, BHM095, BNM065, & BHM03S
Swing Charging Pump Room Coolers	2VAFA-A6C/AHD12B, & AHD09B 2VAFA-A6E/AHD12B	
Auxiliary Feed- water Pump Room Coolers	2VAFA-H4C/AHD12B, & AHD09B	*2VBFB-G5C/BHJ251, BHM09S, BHM06S, & BHM03S

Notes: Refer to description notes in above paragraph 5.a.(1).(a) for additional information

- (c) Fire Areas 1-5 and 2-5, Auxiliary Building, Elevation 100'

Fire Areas 1-5 and 2-5 contains the three charging pumps for each unit. The pumps for each unit are each located in separate rooms that are separated by non-fire rated walls with normally closed, non-fire-rated watertight doors. Fire Areas 1-5 and 2-5 are separated from the remainder of the plant by 3-hour fire rated construction. A smoke detection system is provided throughout these areas. Manual interior hose stations and CO2 hose reels are available in the adjacent fire areas for use in these areas. Automatic sprinkler protection is provided in the hallways which

connect the three pump rooms. This should prevent damage to more than one pump in the event of fire. One hour fire barrier enclosures are provided for electrical cable raceways were required. The licensee has requested an exemption (Nos. 1-34 and 2-8) for the inadequate fire rated barriers provided between the redundant pumps and safe shutdown components. The results of these exemption requests will be handled by separate NRC correspondence.

The following cabling was inspected and verified to meet the separation and protection requirements of Appendix R Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Charging Pumps	**2VADF06P/ADD1C-	2VBDG06P/BDE0A-
Swing Charging Pump (AB)	*2VCDF07P/CDD255	NA
Charging Pump Suction Valve (RWST)	2VAFU-05D/AHF281 2VAFU-05G/AHF409 2VAFU-05P/AEF278 2VAQ5061B/AHF410	#2VBFV-75D/BHF275 #2VBFV-75P/BHD2KB
Charging Pump Room Coolers	#2VAFA-H5C/AHD12B #2VAFA-H5P/AFD3A-	2VBFB-C2P/BFD0BB
Swing Charging Room Cooler	#2VAFA-A6C/AHD15B #2VCFA-A6P/CED254 #2VCFA-A6Q/CED253	2VBFB-M5E/BHF279

Notes: Refer to description notes in above paragraph 5.a(1)(1) for additional information.

- (d) Fire Areas 1-6 and 2-6, Auxiliary Building, Elevations 100', 121', 139', 155' and 175'

Fire Areas 1-6 and 2-6 contains the auxiliary feedwater pumps and component cooling water pumps for each unit. These areas are separated from remainder of the plant by 3-hour fire rated construction, except for removable nonfire-rated steel hatch covers between rooms 185 and 234, rooms 2185 and 2191, and the doors to the stairway have a 1 1/2-hour fire rating. A smoke detection system is installed in all rooms containing safe shutdown equipment or appreciable combustible materials. Automatic water fire suppression systems are provided for portions of this fire area including the component cooling pump room. One hour fire barrier enclosures are provided for electrical cable raceways were required. Also, some raceways are provided with a

nominal 1/2-hour fire barriers which were provided prior to the Appendix R requirements.

The following cabling was inspected and verified to meet the separation and protection requirements of Appendix R, Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Motor Drive Aux Feedwater Pump	*1VADF10P/ADE-0A	1VBDG10P/BDDAOA
Component Cooling Water Pumps	1VADF04P/ADD-1B	*1VBDG04P/BDDA1B
Component Cooling Water Pump (Swing)	1VADF05C/AHD115 NA NA	*1VBDG05N/BHD100 1VCDF05P/CDD004 1VCDF05Q/CDD003
Motor Driven Auxiliary Feedwater Pumps	2VADF10P/ADE0A	*2VBDG10P/BDD12A, BDD09A, BDD06D, BDD03A, BFD0AD
Motor Driven Auxiliary Feedwater Pump Room Coolers	2VAFA-H4C/AHD03B, AHD06- 2VAFA-H4R/AFF0A-	*2VBFB-G5P/BFD12D, BFD09D, BFD06D, BFD03D, BFD0AD
@ Component Cooling Water Pumps	*2VADF04P/ADD12- ADD1B-	*2VBDG04P/BDD12A, BDD1BA
@ Swing Component Cooling Water Pump	*2VADF05C/AHD365 *2VADF05P/ADD12- ADD1A-	*2VBDG05K/BHD09E, BHD06E, BHD350 *2VBDG05P/BDD1AA
	2VCDF05P/CDD254 2VCDF05Q/CDD253	N/A N/A

Notes: Refer to description notes in above paragraph 5.a.(1).(a) for additional information.

As a result of the fire area walkdowns the inspectors identified that redundant component cooling water pump room cooler cabling was not properly separated in accordance with Appendix R Section III.G. The licensee contended that, based on engineering

judgement and the pump room volume, the pump room coolers were not needed to support the component cooling water pumps and that hot standby plant conditions could be achieved and maintain without component cooling pump room cooling. In order to substantiate their position, the licensee on August 22, 1985 conducted an area temperature monitoring test in accordance with surveillance test procedure FNP-2-STP-63.0. The test, with the component cooling water pump room coolers deenergized, monitored the pump room temperature over the operating component cooling water pump every 15 minutes. The test duration was ten hours. At the start of the test the ambient room temperature over the pump was 92°F. The maximum temperature rise above ambient was 3°F and that was achieved six hours into the test. At the conclusion of the test the room temperature was 95°F. Based on the test data, it appears that if redundant cabling associated with the component cooling water pump room coolers was damaged by fire and the room coolers were rendered inoperable the ability to achieve and maintain hot standby conditions would not be jeopardized.

(e) Fire Area 1-13, Auxiliary Building, Elevation 121' through 175'

Fire Areas 1-13 consists of a cable chase which is separated from the remainder of the plant by 3-hour fire rated construction. A smoke detection system and automatic water fire suppression system are provided for this area. Manual interior hose stations and CO2 hose reels are available in the adjacent fire area for use in this area. One hour fire barrier electrical raceway enclosures are provided where required.

The following cabling was inspected and verified to meet separation and protection requirements of Appendix R, Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Component Cooling Water Pumps	*1VADF04B/AHJ029 *1VADF04E/AHE133	1VBDG04G/BHD127
Component Cooling Water Pump (Swing)	*1VADF05B/AHJ029	1VBDG05G/BHD127
Charging Pumps	*1VADF06B/AHJ029 *1VADF06C/AHE133	1VBDG06F/BHD129 1VBDG06H/BHD129 1VBDG06L/BHJ148
Swing Charging Pump	*1VADF07B/AHJ029 *1VADF07C/AHJ133	1VBDG07I/BHD129 1VBDG07J/BHD129 1VBDG07K/BHD129 1VBDG07L/BHD129

Note: Refer to descriptive notes in above paragraph 5.a.(1).(a) for additional information.

The licensee has requested an exemption from Appendix R Section III.G.2.c to the extent that one train of redundant safe shutdown cables associated with instrument air, depressurization/letdown and RCS boundary, main steam isolation, and instrumentation cables are not separated by a 1-hour fire rated barrier in this fire area. Justification for the lack of these barriers has been provided by exemption No. 1-16. The NRC will address this exemption by separate correspondence.

(f) Fire Area 1-20, Auxiliary Building, 121' Elevation

Fire Area 1-20 contains electrical cables associated with both safe shutdown trains. This area is separated from the remainder of the plant by 3-hour fire rated construction, except for a nonfire-rated removable steel hatch between rooms 234 and 345 (fire area 1-42) and doors to the stairways have a 1 1/2-hour fire rating. A smoke detection system and an automatic water suppression system are provided for the entire fire area, except a suppression system is not provided for the battery charger room. A CO₂ hose reel provides coverage for this area. One hour fire barrier enclosures are provided for electrical cable raceways were required.

The following cabling was inspected and verified to meet the separation and protection requirements of Appendix R, Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Component Cooling Water Pumps	*1VADF04B/AHJ029 *1VADF04E/AHE133	1VBDG04G/BHD127
Component Cooling Water Pumps (Swing)	*1VADF05B/AHJ029	1VBDG05G/BHD127
Changing Pumps	*1VADF06B/AHJ029 *1VADF07C/AHJ133	1VBDG06F/BHD129 1VBDG07J/BHD129 1VBDG07K/BHD129 1VBDG07L/BHD129
Charging Pump Room Coolers	*1VAFA-HSB/AHD102	1VBFB-C2E/BHF222
Room Cooler Swing Charging Pump	*1VADF05B/AHJ029 *1VADF05E/AHE133	1VBDG05D/BHG227

Fire Area 2-020

Charging Pumps	*2VADF06B/AHF485 *2VADF06C/AHF487	2VBL2F14A/BFD18M, BFD21M, BFD2CM 2VBDG06F/BHF489, BHF03F, BHD344 2VBDG06H/BHF488, BHF03F, BHD353 2VBDG06L/BHG157 2VBL2F14A/BFD18M, BFD21M, BFD2CM
Swing Charging Pump	*2VADF07B/AHF485 *2VADF07C/AHF487 *2VADF07F/AHF487	2VBDG07B/BHM24Y, BHM21Y, BHM18Y, BHM15Y, BHG463 2VBDG07I/BHF489, BHF03F, BHD344 2VBDG07J/BHF487, BHF03F, BHD353
Charging Pump Room Coolers	*2VAFAH58/AHF487	2VBFBC2D/BHM343, BHM24Y, 2VBFBC2E/BHG372, BHG12A, BHG09A, BHM15Y, BHM18Y, BHM21Y, BHM24Y, BHM343 2VBFBC2F/BHF18C, BHF490 2VBFBM5C/BHF18C, BHF21C, BHF24C 2VBFBM5F/BHM343, BHM24Y, BHM21Y, BHM18Y, BHM15Y, BHG09A, BHG12A,
Swing Charging Pump Room Coolers	*2VAFAA6A/AHF487	

		BHG372
		2VBFBM5G/BHM343,
		BHM24Y
		2VBFBM5H/BFH18C
		BHF490
Motor Driven	*2VADF10E/AHF485	2VBDG10G/BIJ18-
Auxiliary		BIJ21-
Feedwater Pumps		2VBDG10H/BHF487,
		BHF03F,
		BHD344
		2VBDG10L/BHG15Z
		2VBL2F14A/BFD18M
		BFD21M
		BFD2CM
Auxiliary	*2VAF4H4B/AHF487	2VBFBG5D/BHM343,
Feedwater		BHM24Y
Pump Room		2VBFBG5E/BHG372,
Coolers		BHG12A,
		BHG09A,
		BHM15Y
		BHM18Y
		BHM21Y
		BHM24Y
		BHM343
		2VBFBG5F/BHF18C
		BFH490
Component	*2VADF04B/AHF486	2VBDG04D/BHG15Z
Cooling Water	*2VADF04E/AHF485	2VBDG04F/BHG15Z
Pumps		2VBDG04G/BHF488,
		BHF03F
		BHD353
		2VBDG04I/BHF487,
		BHF03F,
		BHD344
		2VBDG04R/BHG15Z
		2VBL2F14A/BFD18M,
		BFD21M,
		BFD2CM
Swing	*2VADF05B/AHF486	2VBDG05D/BHG15Z
Component	*2VADF05C/AHE322	2VBDG05G/BHF489,
Cooling Water	*2VADF05E/AHF486	BHF03F,
Pump		BHD353
		2VBDG05H/BHF488,
		BHF03F,
		BHD344

2VBDG05K/BHF489,
 BHF03F,
 BHD344
 2VBDG05R/BHG15Z
 2VBL2F14A/BFD21M,
 BFD2CM

(g) Fire Areas 1-21 and 2-21, Auxiliary Building, Elevation 121'

Fire Areas 1-21 and 2-21 contain Train B switchgear for the respective unit. These fire areas are separated from the remainder of the plant areas by 3-hour fire rated construction. A smoke detection system is provided. The 4.16 Kv switchgear, 5Kv disconnect switch and the 600V load centers are protected by automatic CO2 systems activated by heat detectors located in each piece of equipment. Manual hose stations and CO2 hose reels are available in adjacent fire areas for use in these fire areas. Cable raceway fire barriers are not required for these areas. The separation and fire protection features provided for these areas meet Appendix R Section III.G.

(h) Fire Areas 1-23 and 2-23, Auxiliary Building, Elevator 121

These fire areas contain Train B switchgear for the respective unit and are provided with 3-hour fire rated separation between other plant areas. Smoke detection systems which activate a total flooding Halon system are provided for each switchgear room. A manual fire hose station is located in the adjacent fire area for use in these areas. Cable raceway fire barriers are not required for these areas. The separation and fire protection features provided for these areas meet the Appendix R Section III.G requirements.

(i) Fire Areas 1-41 and 2-41, Auxiliary Building Elevation 139'

These fire areas contain the Train A switchgear and load centers for respective unit and are separated from the remainder of the plant by 3-hour fire rated construction. A smoke detection system is provided. The 4.16 Kv switchgear, 5 Kv disconnect switch and 600V load center are protected by an automatic CO2 system activated by heat detectors located in each piece of equipment. Manual hose stations and CO2 hose reels in adjacent fire areas are available for use in these fire areas. Cable raceway fire barriers are not required for these areas. The separation and fire protection features provided for these areas meet Appendix R Section III.G.

(j) Fire Areas 1-42 and 2-42, Auxiliary Building, Elevation 139'

Fire Areas 1-42 and 2-42 are the corridors between the cable shaft-(Fire Area 13) and the cable spreading and Train A

switchgear rooms. These areas are separated from the remaining plant areas by 3-hour fire rated construction, except for the nonfire-rated removable steel hatches in the floor and ceiling between fire area 42 and fire areas 4 and 20, and the 1 1/2 hour fire rated doors to the stairways. A smoke detection system and automatic sprinkler system are provided for this area. One hour fire barrier enclosures are provided for electrical raceways were required.

The required cabling was inspected and verified to meet the separation and protection requirements of Appendix R Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Component Cooling Water Pumps	1VADF04B/AHJ029 1VADF04E/AHE133	*1VBDG04D/BHGZ27
Swing Component Cooling Water Pump	1VADF05B/AHJ029 1VADF05E/AHE133	*1VBDG05D/BHGZ27
Charging Pump	See comments below	*2VBDG06E/BHD57-
Swing Charging Pump	See comments below	*2VBDG06H/BHD57-
Charging Pump Room Coolers	See comments below	*2VBFBC2D/BHJ33Z
Swing Charging Pump	See comments below	*2VBFBM5G/BHJ33Z
Motor Driven Auxiliary Feedwater Pumps	See comments below	*2VBDG10G/BIJ33- *2VBDG10J/BHD57-
Auxiliary Feedwater Pump Room Coolers	See comments below	*2VBFBG5D/BHJ33Z
Component Cooling Water Pumps	See comments below	*2VBDG04D/BHG27Z, BHF33F *2VBDG04H/BHD57- *2VBDG04F/BHG27Z

Notes: Refer to descriptive notes in above paragraph 5.a.(1).
(a) for additional information.

A fire in the Unit 2 fire area 2-20 could cause loss of Train "A" power distribution capabilities; however, no Train "B" power distribution system is in this area and the Train "B" shutdown components are enclosed within a 1-hour fire barrier. This meets the Appendix R Section III.G. requirements.

(k) Fire Area 56A, Diesel Generator Building

This fire area contains a Train A switchgear room and is separated from adjacent fire areas by 3-hour fire rated construction. An area smoke detection system is provided. Each individual switchgear in the area is protected by an automatic CO2 system which is activated by heat detectors located within each switchgear unit. Manual interior fire hose stations are provided. Only one shutdown train of equipment is located in this room. The separation and fire protection features provided for these areas meet Appendix R Section III.G.

(l) Fire Area 56C, Diesel Generator Building

This fire area contains a Train B switchgear room and is separated from adjacent fire areas by 3-hour fire rated construction. An area smoke detection system is provided. Each individual switchgear in the area is protected by an automatic CO2 system which is activated by heat detectors located within each switchgear unit. Manual interior fire hose stations are provided. Only one shutdown train of equipment is located in this area. This meets the separation and fire protection requirements of Appendix R Section III.G.

(m) Fire Area 72A, Service Water Intake Structure

The service water intake structure is a separate building well detached from the main plant. Fire area 72A contains the service water pumps for both units. The pump room is separated from the associated switchgear rooms by reinforced concrete walls. The doors between the pump room and each train switchgear room are nonfire-rated but are well separated. A smoke detection system is provided throughout the fire area and an automatic sprinkler system is provided for the service water pumps, area coverage over the pumps, in the pump strainer area, and in the cable area in the northeast corner of the pump room which should prevent damage to both switchgear rooms in the event of a fire. Manual interior hose stations and exterior yard hydrants are provided. One hour fire barrier enclosures are provided for electrical raceway were required. Non rated fire barriers are also provided between redundant pumps. The licensee has requested an exemption (Exemption No. 1-3) from the Appendix R Section III.G requirements for the enclosure of one train of redundant cables and equipment by a 1-hour fire barrier and the provision of total automatic fire suppression system coverage for the entire fire area. This

exemption is being reviewed and will be addressed by separate NRC correspondence.

The following cabling was inspected and verified to meet the separation and protection requirements of Appendix R Section III.G:

<u>Function</u>	<u>Train A Cable/Raceway</u>	<u>Train B Cable/Raceway</u>
Unit 1 Power & Control Feeds	1VADF02C/AHP118	*1VBDG02C/BHQ108
	1VADF02C/AHRC18	*1VBDG02C/BHRC48
	1VADF02Q/ADN139	*1VBDG02Q/BDN129
	1VADF02R/ADN140	
Unit 1 Service Water Pumps	1ZADK03B/AHRC03	*1ZBDL03B/BHRC45
	1ZADK03P/ADN142	*1ZBDL03P/BDN132
	1ZADK04B/AHRC03	*1ZBDL04B/BHRC48
	1ZADK04P/ADN143	*1ZBDL04P/BDN133
Unit 1 Service Water Pump Strainers	*1ZAFK-C3C/AHS127	*1ZBL-C3C/BHP093
	*1ZAFK-C3P/AEN007	*1ZBFL-C3P/BEN105
Unit 2 Power & Control Feeds	2VADF02C/AHP368	*2VBDG02C/BHS358
	2VADF02Q/ADN387	*2VBDG02Q/BDN379
Unit 2 Service Water Pumps	*2ZADK03P/ADN390	2ZBDL03P/BDN382
	*2ZADK04P/ADN391	2ZBDL04P/BDN383

Notes: Refer to descriptive notes in above paragraph 5.a.(1).(a) for additional information.

Within the areas inspected no violations or deviations were identified.

b. Associated Circuits of Concern

(1) General

The separation and protection requirements to Appendix R, apply not only to safe shutdown circuits but also to associated circuits that could prevent operation or cause maloperation of safe shutdown systems and equipment. The identification of these associated circuits of concern was performed for the Farley Nuclear Site in accordance with NRC Generic Letter 81-12 and subsequent NRC clarification. Associated circuits of concern are defined as those circuits that have a physical separation less

than that required by Section III.G.2 of Appendix R, and have one of the following:

- (a) A common power source (common bus) with the shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices; or
- (b) A connection to circuits of equipment whose spurious operation (spurious signal) would adversely affect the shutdown capability; or
- (c) A common enclosure with the shutdown cables, and
 - (Type 1) are not electrically protected by circuit breakers, fuses or similar devices, or
 - (Type 2) will allow propagation of the fire into the enclosure.

At Farley Nuclear Site, for Appendix R, circuits that are needed for shutdown operations and circuit as a result of fire induced failures, that could defeat shutdown operations are classified and protected the same as safe shutdown circuits.

(2) Associated Circuits by Common Power Supply (Common Bus)

Circuits and cables associated by common power supply are simply nonsafe shutdown cables whose fire-induced failure will cause the loss of a power source (bus, distribution panel, or MCC) that is necessary to support safe shutdown. This problem could exist for power, control, or instrumentation circuits. The problem of associated circuits of concern by common power supply is resolved by ensuring adequate electrical coordination between the safe shutdown power source supply breaker and the component feeder breaker or fuses.

In order to audit this concern at Farley Nuclear site, Electrical Distribution System Coordination Study Calculation No. 82, was reviewed and a sample selection of circuits were checked. The following are example of the components that were fed from or controlled by circuits that were reviewed during the inspection.

<u>Components</u>	<u>Time-current characteristic curve</u>
RHR Pumps	SK-E-135
CCW Pumps	SK-E-134
CC Pumps	SK-E-137
Service Water Pumps	SK-E-126

125V DC circuits on Sheet #83 in Calculation #82
 Panel 1B, 2B, 1E
 and 2E

Farley Nuclear Station has a requirement for reevaluation protective relay settings. This is an on going program with a maximum reevaluation interval of five years. This is acceptable.

The licensee in their Alternative Shutdown Capability submittal of July 1982 identified that the control power indicating lights on the control room Emergency Power Board (EPB) for 4160 volt switchgear buses 1F, 1G, and 2G are connected directly to a 125V DC distribution panel branch without a fuses. Fuses will be added during the next refueling outage in 1986. This modification is covered by Production Change Requests 85-1-3211 and 85-2-3212. The licensee stated that the modifications were scheduled exemptions which were approved as part of the items identified in the above submittal.

Exemption request No. 1-3 will be handled by separate correspondence. This requests concerns coordination between safe-shutdown circuits and associated nonsafe-shutdown circuits powered from 125 VDC Distribution Panels 1N, 2N, 1M and 2M. The safe-shutdown circuits from these panels provide control power for safe-shutdown breakers. The licensee states that a loss of breaker control power from a single effected panel will not interrupt the operation of the load powered by the breaker. A loss of power to one of the subject DC Distribution panels will not preclude any necessary controls and operation of safe-shutdown equipment. If necessary, manual operation of the affected subject breaker would be possible. A design change has been initiated to improve the breaker coordination.

IE Information Notice 85-09, Isolation Transfer Switches and Post-Fire Shutdown Capability, was issued January 31, 1985. This Notice identifies a potential problem concerning fuses in control circuits that are common for operation of equipment from the Control Room and Alternate Hot Shutdown area. A fire in the Control Room could cause these common fuses to blow before transfer is made to the Alternate Hot Shutdown area. If the control circuit is needed at the Alternate Shutdown area to energize a piece of equipment and if the fuse(s) blew before transfer, equipment would not be operable without replacing the blown fuse(s). The licensee stated that this is not a problem at Farley because design changes have been made to assure that redundant fuses or circuit breakers exist in at least one train of alternate shutdown system circuits. No exception to this statement were noted for the circuits that were reviewed. The licensee stated that as result of these design changes extensive analyses have been performed and that it had been concluded that Farley could shutdown to Appendix R requirements following a fire.

(3) Associated Circuits Causing Spurious Operation (Spurious Signals)

Circuits associated because of spurious operation are those that can, by fire-induced failures cause safe shutdown equipment or nonsafe shutdown equipment to malfunction in a way that defeats the function of safe shutdown systems or equipment. Examples include the uncontrolled opening or closing of valves, or of circuit breakers, due to fire-induced damage to nonsafe shutdown instrument and control circuits that affect the control circuit interlocks of the safe shutdown components.

The analysis of spurious operations considered equipment (safe shutdown and nonsafe shutdown) that could affect safe shutdown of the plant. The potential effects of associated circuits of concern were considered in the spurious operations analysis.

Redundancy between shutdown circuits with proper separation, protection, modification and/or analysis has been used by the licensee to resolve this concern. Also, electrical power was removed from many valves whose position is the same for safe-shutdown and normal operations. These valves have no automatic or manual realignment requirements for normal operations nor do they need to be repositioned for safe-shutdown. The electrical power was removed to eliminate any possibility of their operation as a result of induced spurious signals.

The Unit 2 high/low pressure interface electrically operated valves were reviewed for spurious signal concerns. These valves are the residual heat removal (RHR) isolation valves, normal and excess letdown valves, sampling system valves, pressurizer power operated relief valves (PORV) and the reactor head vent valves. The spurious operation of these valves were mitigated by valve redundancy, proper separation, protection, analysis, operator actions and flow restrictors installed in some reactor coolant system fluid lines. The licensee identified certain exemption associated with these valves in their February 1985 Appendix R Reevaluation. These exemption requests will be handled by separate correspondence.

(4) Associated Circuits by Common Enclosure

A circuit, whether safety-related or not, is classified as an associated circuit of concern if it shares a common enclosure (e.g., cable tray, conduit, panel or junction box) with an Appendix R, "Required Circuit", and, is not adequately protected by circuit breakers, fuses or similar devices, or could allow fire propagation into the Shared Common Enclosure.

At the Farley nuclear site, the concern was answered satisfactorily when a sample of circuits selected were all found to be electrically protected. Fire stops are installed whenever a cable

penetrates a fire area. In addition, the licensee's representative stated that non safety related circuits were never routed from one redundant train to another. During the physical plant review no exception to this statement were found.

(5) Damage Control Measures

Appendix R Sections III.G.1.b and III.L.5 require fire protection features to be provided for structures, systems and components important to safe shutdown and to be capable of limiting fire damage so that systems necessary to achieve and maintain cold shutdown are free of fire damage or can be repaired such that the equipment can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs are required to be readily available on site and procedures are to be in effect to implement such repairs.

The inspector reviewed portions of Farley's Abnormal Operating Procedure (AOP) 28.1, Fire in Cable Spreading Room. This procedure is used to bring the plant to hot standby and cold shutdown under abnormal conditions and provides for repair measures, if necessary, to affect cold shutdown.

The equipment for the repair measures identified by this procedure have been dedicated for this purpose and are located in the Electrical Maintenance Storage Area under lock and key. All of the equipment was audited to the procedure requirements and was found tagged to identify it to the applicable procedure section so that its location and use, in an emergency, could be readily determined. A walkdown for the designated routes for replacement of cables was made. The routes were found to be practicable and all areas were accessible for jumper installation and cable pulling.

Within the areas inspected no violations or deviations were identified.

c. Alternative Shutdown Capabilities

The inspectors reviewed operating personnel training, shift staffing and the licensee's use of operating and alternate shutdown procedures to determine if the requirements of Appendix R Section III.L were met.

(1) Personnel Training

The inspectors reviewed selected training records that pertained to Appendix R. In addition, the inspectors conducted interviews with operating personnel to determine consistency and adequacy of Appendix R classroom and on-the-job training. The results of the selected review of the Farley Appendix R training indicate it is satisfactory.

(2) Shift Staffing

The licensee demonstrated the minimum Technical Specification (TS) staffing level was adequate for Procedure FNP-1-AOP-28.1, Fire in the Cable Spreading Room. The inspector noted that administrative procedures allow Farley to operate at the TS minimum staffing level. However, this inspection confirmed that procedure FNP-1-AOP-28.1, can be performed with the TS minimum staffing level in an adequate amount of time.

(3) Appendix R Shutdown from outside the main control room.

(a) Fire in Cable Spreading Room, FNP-1-AOP-28.1 and FNP-2-AOP-28.1

The inspectors reviewed AOP-28.1 to verify that Appendix R Section III.L requirements listed below have been incorporated.

- Achieve and maintain hot standby conditions
- Achieve and maintain subcritical reactivity conditions in the reactor
- Provide decay heat removal capabilities
- Maintain reactor coolant inventory and steam generator inventory
- Achieve and maintain cold shutdown conditions
- Provide direct readings of process variables necessary to control the above conditions

(i) Procedure

The inspector noted several minor procedural errors during the review of AOP-28.1, which included instrument air alignment and boron concentration calculations. The errors were corrected and a revised procedure was issued before the inspection team left the site. In addition, the licensee made voluntary changes to reduce the manpower requirements of AOP-28.1. The current revision of AOP-28.1 is procedurally adequate.

(ii) Walk-through

The licensee demonstrated through the implementation of AOP-28.1 that the plant could be brought to hot standby within 40 minutes with TS minimum staffing level. To further demonstrate the adequacy of AOP-28.1, the

licensee performed an identical evolution on their plant simulator. Equipment was turned on at times that simulated the manual switching during the procedure walk-through. The simulator run demonstrated the conservatism in AOP-28.1. Through the use of the walk through and the simulator verification the licensee demonstrated the adequacy of AOP-28.1.

(iii) Communications

During the walk through of AOP-28.1 the licensee relied primarily upon runners for communication between the remote shutdown panel and plant operators. While this was adequate for the purposes of AOP-28.1, Farley has a communications study in progress. A further evaluation of Appendix R communications will be performed when this study is completed.

(b) Fire in the Main Control Room, FNP-1-AOP-28.2 and FNP-1-AOP-28.2

The procedure was issued during the inspection. The preliminary evaluation indicates the procedure is adequate. It will be reviewed in depth when the procedure addressed in below item 5.c.(5) are in compliance with applicable exemptions.

(4) Remote Shutdown Panel (RSP) Instrumentation

The following instrumentation was available to the RSP operator:

<u>Instrumentation</u>	<u>Location</u>
Pressurizer Level	RSP
Pressurizer Pressure	RSP
Hot leg temperature	RSP
Cold leg temperature	RSP
Steam generator level	RSP
Steam generator pressure	RSP
Flux (source and full range)	RSP Note 1
CST level	Local
RWST level	Local Note 2

This instrumentation appears to meet the minimum instrumentation guidelines of Information Notice 84-09 Attachment 1, Item IX.

Note 1: Flux monitoring system is currently not a TS item. The surveillance for the flux monitoring system is under the preventative maintenance program (PM Job No. NMI0048A-1)

Note 2: RWST local level indication calibration has been added to FNP-0-FHP-1.0, controlling procedure for refueling. STP-45.3 contains the specific calibration procedure.

(5) Non-alternative Shutdown fires

The procedures for non-alternative shutdown have been included in the Farley exemption request. The schedule reievew of these procedures will be based upon the final disposition of the appliable exemption requests.

Within the areas inspected no violations or deviations were identified.

6. Compliance with 10 CFR 50, Appendix R, Section III.J

Section III.J, requires that: "Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto."

The inspector(s) performed a walkdown inspection of the design and installation of the 8-hour emergency lighting units. The evaluation was based on licensee design drawings and Abnormal Operating Procedure FNP-1-AOP-28.1 "Fire In Cable Spreading Room."

The inspector determined that the 8-hour emergency lighting, installed to facilitate a safe shutdown of the plant as directed by AOP-28.1, is not adequate to fulfill the requirements of Appendix R.

- No 8-hour emergency lighting had been installed in the room containing Unit 2 hot shutdown panels "C" and "F".
- Several lights located in critical areas were mounted behind cable trays, piping, and other obstructions and could not be used as a light source. In some areas there were not enough emergency lights installed.

On October 4, 1984, the licensee received an exemption from NRC for schedule installation of portions of the alternate shutdown capability for Units 1 and 2. This exemption extends the deadlines for completion of portions of the alternate shutdown system until the end of the 1986 refueling outages for each unit.

The licensee stated that all fire related safe shutdown procedures will be finalized and in place at this time. The licensee also stated that the 8-hour emergency battery powered lights will be installed and functionally evaluated by the use of each safe shutdown operating procedure to verify that the lighting is adequate to perform each operational step called for in the procedure.

This area will be reinspected at a later date.

Within the areas inspected no violations or deviations were identified.

7. Compliance with 10 CFR 50, Appendix R, Section III.0, Oil Collection System

- a. The reactor coolant pump (RCP) shall be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system shall be so designed, engineered, and installed such that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake.

Such collection systems shall be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line shall be large enough to accommodate the largest potential oil leak.

A visual inspection of the Farley Nuclear Plant reactor coolant pump oil collection systems was not made during this inspection since both units were operating. A review was made of certain construction drawings to evaluate the design of the system. The oil collection systems modifications consisted of enclosures, catch basins, drip pans, drain lines and collection tanks, which appear to be in compliance with Appendix R.

To protect against an oil leak in the oil lift system, oil cooler and oil cooler piping, enclosures are provided isolating the pressurized oil components from the environment. Drip pans are provided under the upper and lower oil level controls, upper RTD conduit box and below the motor coupling. A catch basin is provided below the RCP motor and just outside the periphery of RCP/motor shaft coupling flanges. The flanged connections on the oil piping and oil cooler are provided with enclosures to prevent potential oil leakage problems.

Drain lines are provided from the drip pans and from the enclosures to a vented collection tank. Because of the high flash point characteristics of the oil, a flames arrestor is not provided in the vent line. The collection tank has a capacity of 300 gallons as compared to 265 gallons of oil in the lube oil system of each pump. A drain tank is provided for each reactor coolant pump oil collection system.

The individual reactor coolant pump oil collection systems are designed to withstand Safe Shutdown Earthquake.

The inspector reviewed documentation contained in Production Change Notice (PCN)-81-963 for Unit 1, and (PCN)-81-2007 for Unit 2, and verified that components of the systems were seismically qualified to remain functional following a design base seismic event.

Within the areas reviewed, no violations or deviations were identified.

8. Fire Brigade Drill

During this inspection, the inspectors witnessed an unannounced fire brigade drill. The intent of this drill was to establish a scenario which would cause the plant operators to evacuate the control room, implement abnormal operating procedure AOP-28.1 and regain control of the plant from the hot shutdown panel (see paragraph 5.c regarding the walk-through exercise of AOP-28.1).

The fire scenario was a fire in the Unit 1 cable spreading room, fire area 1-040 on Auxiliary Building elevation 139-0", in an overhead cable tray in the center of the room. In addition, the fire condition due to the heavy smoke conditions caused the visibility inside the room to be limited.

It should be noted that the fire brigade drill was terminated by the shift supervisor at the commencement of the walk-through of AOP-28.1. Therefore, the inspectors did not make a full assessment of the fire brigades capabilities to effectively execute proper manual firefighting techniques.

Six fire brigade members, in full protective clothing responded to the fire. Ten minutes after arrival of the fire brigade, the fire brigade leader gave the order for one member to don a piece of self contained breathing apparatus, gain access into the room and try to extinguish the fire with portable CO2 fire extinguisher. Fifteen minutes into the fire scenario the drill was terminated by the shift supervisor.

The fire brigade organization will be further evaluated during a subsequent NRC inspection.