

March 22, 2006

Mr. L. M. Stinson
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SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1, EXEMPTION FROM THE
REQUIREMENTS OF 10 CFR PART 50, APPENDIX R (TAC NO. MC5718)

Dear Mr. Stinson:

The Nuclear Regulatory Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* Part 50, Appendix R, for the Joseph M. Farley Nuclear Plant, Unit 1. This action is in response to your letter dated January 19, 2005, as supplemented by letters dated June 9 (two letters), and November 18, 2005, that requested exemptions from certain Appendix R requirements.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Robert E. Martin, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-348

Enclosure: Exemption

cc w/encl: See next page

Joseph M. Farley Nuclear Plant, Units 1 & 2

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
SOUTHERN NUCLEAR OPERATING COMPANY
JOSEPH M. FARLEY NUCLEAR POWER PLANT, UNIT 1
DOCKET NO. 50-348
EXEMPTION

1.0 BACKGROUND

The Southern Nuclear Operating Company (SNC, the licensee) is the holder of Renewed Facility Operating License No. NPF-2 which authorizes operation of Joseph M. Farley Nuclear Power Plant (FNP), Unit 1. The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of a pressurized-water reactor located in Houston County, Alabama.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," establishes fire protection features required to satisfy General Design Criterion 3, "Fire protection," of Appendix A to 10 CFR Part 50 with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. FNP, Unit 1 was licensed to operate prior to January 1, 1979. Therefore, FNP, Unit 1 is directly subject to Appendix R.

By letter dated January 19, 2005, as supplemented by letters dated June 9 (two letters) and November 18, 2005, SNC, the licensee for FNP, Unit 1, submitted a request for a permanent exemption from 10 CFR Appendix R, Section III.G.2, pertaining to FNP, Unit 1 (SNC letters NL-04-2357, NL-05-0937, NL-05-0960 and NL-05-1975, respectively).

Specifically, 10 CFR Appendix R, Section III.G.2, would require the use of a 1-hour rated fire barrier for protection of certain safe shutdown control circuits located in Fire Areas 1-013 and 1-042. In lieu of providing such 1-hour rated fire barriers, the licensee proposes the use of fire-rated electrical cable produced by Meggitt Safety System, Inc., (previously known as Whittaker Electronic Resources Unit of Whittaker Electronic Systems) for several cables in Fire Areas

1-013 and 1-042 associated with safe shutdown control circuits.

3.0 DISCUSSION

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. These special circumstances are described in 10 CFR 50.12(a)(2)(ii), in that the application of these regulations is not necessary to achieve the underlying purpose of the rule.

The underlying purpose of Appendix R, Section III.G, is to provide features capable of limiting fire damage so that: (1) one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and (2) systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

3.1 Overview of Approach Used by Licensee

For this specific fire protection application, SNC proposes plant modifications to use 1-hour fire-rated electrical cable in lieu of a 1-hour rated fire barrier as required by 10 CFR Part 50, Appendix R, Section III.G.2. Section III.G.2 of 10 CFR Part 50, Appendix R, provides fire protection requirements for electrical cables located within the same fire area whose failure could cause the maloperation of redundant trains of systems necessary to achieve and maintain hot shutdown conditions. These areas are required to have protection features such that one of the redundant trains will be free of fire damage in the event of a fire. One method, described in Section III.G.2, for ensuring compliance with this requirement is to enclose the cable and equipment and associated non-safety circuits of one redundant train in a 1-hour rated fire barrier. In addition, an area-wide automatic fire suppression and detection system shall be installed in the fire area.

A postulated fire in Fire Area 1-013 or 1-042 could cause loss of offsite power; both fire areas contain cable bus ducts from the startup transformers to both redundant trains of the 4 kilovolt (KV) Appendix R safe shutdown (SSD) busses. A postulated fire in either of these fire areas could also potentially impact the function of the Train B 4 KV Emergency Diesel Generator (EDG) 1B control circuitry. The majority of the Train A onsite electrical power system components required for Appendix R SSD are not located in Fire Area 1-013 or 1-042. The following Train A onsite power system related SSD circuits located in Fire Areas 1-013 and 1-042 will be protected by a 1-hour fire-rated electrical cable along with area-wide automatic fire suppression and detection:

1. Protection of control circuitry that could potentially disable the supply of the onsite power from the Train A 4KV EDGs 1-2A and 1-C, or disable supply of 7

Train A onsite power due to inadvertent loading of electronic switching system (ESS) loads onto EDG 1-C:

- a.) The control interlocks for the automatic alignment of the Train A Swing EDG 1C Incoming Breaker 1-DH07 or 2-DH07 to provide onsite AC power due to loss of offsite power to the shutdown buses.
 - b.) The control interlocks for the automatic alignment of the Train A Swing EDG 1-2A Incoming Breaker 1-DF08 or 2-DF08 to provide onsite AC power due to loss of offsite power to the shutdown buses.
 - c.) The control interlocks for the automatic alignment of Unit 1 600V Load Center 1D Breaker 1-ED13 or Unit 2 600V Load Center 2D Breaker 2-ED13 to MCC 1S (power to the Train A Swing EDG 1-2A auxiliaries) so that the MCC is aligned to the same DG 1-2A.
 - d.) The control interlocks from Unit 2 ESS Sequencer that blocks Unit 1 ESS Sequencer on a Unit 2 safety injection actuation signal (This signal is to prevent inadvertent loading of ESS loads on smaller DG 1C).
 - e.) The control interlock from Unit 1 ESS Sequencer that blocks Unit 2 ESS Sequencer on a Unit 1 safety injection actuation signal (This signal is to prevent inadvertent loading of ESS loads on smaller DG 1C).
2. Protection of the control circuitry that could potentially disable the operation of the 4KV power supply breakers to the Train A Component Cooling Water Pump 1C, Train A Charging Pump 1A, and Train A Motor-Driven Auxiliary Feed-Water Pump 1A.

3. Protection of the control circuitry that could potentially disable the operation of the 600V load center power supply breaker to Train A Pressurizer Heater Group 1A.

A 1-hour rated fire barrier as described in Section III.G.2 of 10 CFR Part 50, Appendix R is not provided. Instead, these credited Train A components will utilize fire-rated electrical cables (Mineral Insulated (MI) cables). This fire-rated electrical cable has been tested in accordance with American Society for Testing Materials (ASTM) E-119, "Standard Test Methods for Fire Tests of Building Construction Materials."

3.2 Technical Evaluation

3.2.1 Test Results

The NRC staff reviewed this issue with respect to determining that the fire-rated electrical cables would be capable of providing an equivalent level of protection as would be provided by a 1-hour rated fire barrier as required by 10 CFR part 50, Appendix R, Section III.G.2.

The licensee provided copies of the test report, "Appendix R, One-Hour Fire Resistive Control Cable Test," dated August 11, 2004, in its submittal. The cables in Farley, Unit 1 are used as control circuit applications and are rated at 125 volts direct-current (VDC). The licensee's report, listed above, includes the fire test performance results for 8 Conductor #12 AWG Meggitt Safety Systems electrical cable with factory splices and several support systems and attachment methods, when exposed to the ASTM E-119 time-temperature heating curve for a period of 1 hour.

3.2.2 Megger Testing

The fire-rated electrical cables at FNP were tested for use in low voltage control circuits. Megger Testing was conducted at 500 VDC , to obtain conductor-to-conductor and

conductor-to-ground insulation resistance values, before the fire test, during the fire test, and after the hose stream test. To ensure that the conductor-to-conductor and conductor-to-ground insulation resistance (IR) readings were obtained for all conductor combinations at the peak ASTM E-119 1-hour test temperature, the first test was extended for an additional 38 minutes and 12 seconds with the furnace temperature held as close as possible to 1700 degrees Fahrenheit until all IR values were recorded. Obtaining insulation resistance values during the fire test by the test method applied provided conservative test results that meet the fire Megger Testing requirements of GL 86-10, Supplement 1, for the FNP specific 1-hour rated control cable application. The NRC staff finds, based on the Megger Testing, that the insulation resistance values are acceptable for the specific application at FNP, Unit 1.

3.2.3 Minimum Insulation Resistance Value

The licensee completed a plant circuit-specific analysis and concluded that the control circuit protective devices will not trip during a fire event with an IR value of 5.7 mega-ohms/foot ($M\Omega/ft$). The minimum IR value recorded during the fire test was 0.8 $M\Omega$, and with 24.176 feet of cable inside the furnace, that equated to 19.3 $M\Omega/ft$. This far exceeds the FNP-specific minimum acceptance value of 5.7 $M\Omega/ft$.

The NRC staff concludes that, based on the information provided, the minimum IR value recorded during testing is acceptable for the specific application at FNP, Unit 1.

3.2.4 Mechanical Damage Protection

Rated 1-hour electrical cable raceway fire barriers are tested in a furnace and subject to a hose stream test that ensures the raceway and the barriers will stay in place following a fire exposure. The fire-rated electrical cables were tested in a furnace and subjected to a hose stream. Since the fire-rated electrical cables themselves are the barriers, any mechanical damage that occurs to the cables may cause the cables to fail. The licensee's letter dated

June 9, 2005, stated that the areas where the fire-rated electrical cables are routed are protected with area-wide automatic fire suppression and detection systems, as required by Appendix R Section III.G.2.c. In addition, the routing for each fire-rated electrical cable was established by plant walk-downs to protect against potential physical hazards. The licensee stated that the fire-rated electrical cables are also safety-related and will be installed to meet the FNP routing requirements for Class 1E cable protection from physical hazards. The fire-rated electrical cables are only routed in safety-related Class 1 structures, and all safety-related and nonsafety-related equipment and components in these structures are seismically supported.

The NRC staff concludes, based on the information provided, that there is adequate protection from mechanical damage to demonstrate equivalence to a raceway fire barrier system for the specific application at FNP, Unit 1.

3.2.5 Galvanized Supports

When in contact with galvanized supports, fire-resistive electrical cable produced by Meggitt Safety Systems, Inc. has been reported to experience degradation due to liquid metal embrittlement. This degradation occurs at the positions where the galvanized supports are in direct contact with the stainless steel cable jacket. Section 4, subsection j of Meggitt Safety Systems engineering document, "Unpacking, Inspection, Installation and Standard Practices for 8/C #12 AWG Si 2400 Fire-Rated Cable For J.M. Farley Nuclear Plant, Revision D," states that "Si Fire Cable may be routed in cable trays; Stainless steel trays are recommended. Cable should not be installed in galvanized trays and should NOT be in direct contact with galvanized or aluminum trays or structures."

The NRC staff concludes, based on the information provided in the engineering document, that the installation standard will adequately address the concern with galvanized supports for the specific application at FNP, Unit 1.

3.2.6 Defense-in-Depth

The following are the fire protection defense-in-depth objectives: 1) to prevent fires from starting; 2) to detect rapidly, control, and extinguish promptly those fires that do occur; and 3) to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant. The licensee stated that Fire Areas 1-013 and 1-042 are provided with area-wide automatic fire suppression and detection systems. The use of fire-rated electrical cables is a substitute for 1-hour rated fire barriers that are required by 10 CFR Part 50, Appendix R, and supports the third defense-in-depth objective. For this specific application, the licensee has demonstrated that the fire-rated electrical cables used are a suitable alternative to the 1-hour rated fire barrier as required by 10 CFR part 50, Appendix R.

4.0 CONCLUSION

The NRC staff concludes that, on the bases of the discussions in the sections above, for the specific application of this material, the licensee has adequately demonstrated that this fire-rated electrical cable will perform in an equivalent manner when compared to a rated barrier for this use. The NRC staff also concludes that the use of the MI cable for these purposes, meets the underlying purpose of Appendix R and, that, therefore special circumstances are present. Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Therefore, the Commission hereby grants Southern Nuclear Operating Company an exemption from the requirements to 10 CFR

Part 50, Appendix R, Section III.G.2, to the extent that it requires protection of cables of one redundant train of safe shutdown equipment by a 1-hour rated fire barrier, for Fire Areas 1-013 and 1-042. The fire-rated electrical cables provide an equivalent level of protection necessary to achieve the underlying purpose of the rule for Joseph M. Farley Nuclear Plant, Unit 1.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (71 FR 12219, March 9, 2006).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 22nd day of March 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Edwin M. Hackett, Acting Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation