CENTRAL FILES

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 1217
ATLANTA, GEORGIA 30303

MAY 31 1978

In Reply Refer To:
RII:JPO
50-369, 50-370
50-269, 50-270
50-287

Duke Power Company
Attn: Mr. William O. Parker, Jr.
Vice President, Steam Production
P. O. Box 2178
422 South Church Street
Charlotte, North Carolina 28242

Gentlemen:

The enclosed Circular 78-08 is forwarded to you for information. If there are any questions related to your understanding of the suggested actions, please contact this office.

Sincerely,

for James P. O'Reilly
Director

Enclosure:
1. IE Circular 78-08
2. List of IE Circulars
Issued in 1978

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cc w/encl:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D. C. 20555

May 31, 1978

IE Circular 78-08

ENVIRONMENTAL QUALIFICATION OF SAFETY-RELATED ELECTRICAL EQUIPMENT AT NUCLEAR POWER PLANTS

The NRC staff initiated a series of actions to confirm the environmental qualification of electrical equipment required to perform a safety function under postulated accident conditions. These actions are summarized in the Commission's April 13, 1978 Order in response to a petition from the Union of Concerned Scientists. Information obtained from recent licensee equipment tests and evaluations have indicated potential problems in qualification of installed equipment. As a result, the NRC expanded these actions to include an environmental review of safety-related electrical equipment at selected older plants.1 This review did not identify generic qualification deficiencies. However, as a result of IE Bulletins and the aforementioned testing to confirm qualification, specific deficiencies were identified. Poor installation practices, inadequate consideration of subcomponents and omission of certain environmental parameters in the design are examples of such deficiences. In addition, the documentation of qualification was found to be inadequate in many cases and the initial response to some licensees indicated a lack of detailed knowledge of the quality of installed equipment.

The purpose of this Circular is to bring to your attention such deficiencies and to highlight the important lessons learned. In its April 13, 1978 Order, the Commission indicated that

> "In order to fulfill its regulatory obligations, NRC is dependent upon all of its licensees for accurate and timely information. Since licensees are directly in control of plant design, construction, operation and maintenance, they are the first line of defense to ensure the safety of the public. NRC's role is one primarily of review and audit of licensee activities, recognizing that limited resources preclude 100 percent inspection.
>
> Furthermore, the Commission notes that some of the licensee's initial responses indicate a lack on their part of detailed knowledge of the quality of installed plant equipment. Licensees must have this detailed understanding of their own plants in order to meet their obligations for public safety by ensuring a

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[redacted]

sound basis for making assessments of plant safety. The NRC establishes general safety criteria, sets specific requirements for many aspects of reactor design and operation, and ensures compliance with these criteria and requirements by independent audit. While, in the Commission's view, these activities play a vital role in ensuring safe plant operation, they are not a substitute for licensee safety reviews. The licensees must be knowledgeable and vigilent and must take more initiative in ferreting out details of potential plant weaknesses."

As part of this obligation, you should examine installed safety-related electrical equipment, and ensure appropriate documentation of its qualification to function under postulated accident conditions. Specific guidance on the subject of environmental qualification can be found in IEEE 323-1971 and 1974, as augmented by Regulatory Guide 1.89.

Examples of specific deficiencies identified in information provided by licensees are as follows:

1. Connectors: Responses to IE Bulletins 77-05 and 77-05A revealed in certain instances a lack of qualification data for environmental parameters and inadequate design of connectors for postulated accident conditions. 2

2. Penetrations: A failed penetration prompted issuance of IE Bulletin 77-06. Responses to this bulletin showed adequate documentation for the qualification of the penetration assembly was not readily available in some cases.2 In one instance, the electrical connections of the penetrations were not qualified in conjunction with the penetration assembly,3 which demonstrates a lack of consideration for qualification of interfacing components.

3. Terminal blocks: Because of unprotected terminal blocks in penetration areas inside containment of Haddam Neck, Bulletin 78-02 was issued. These unprotected blocks were replaced with blocks designed to function in the LOCA and main steam line break environments.4 Responses to the Bulletin revealed two other facilities, Yankee Rowe and Ginna, with such unprotected blocks.5,6 Other terminal blocks were found to be inadequately qualified due to poor design or installation practices, even though they were in enclosures.7,8,9 and 10

LISTING OF IE CIRCULARS ISSUED IN 1978

Circular No.	Subject	Date of Issue	Issued To
78-01	Loss of Well Logging Source	4/5/78	All Holders of Well Logging Source Licenses
78-02	Proper Lubricating Oil for Terry Turbines	4/20/78	All Holders of Reactor OLs or CPs
78-03	Packaging Greater Than Type A Quantities of Few Specific Activity Radioactive Material for Transport	5/12/78	All Holders of Reactor OLs, CPs, Fuel Cycle, Priority I Material and Waste Disposal Licenses
78-04	Installation Errors that Could Prevent Closing of Fire Doors	5/15/78	All Holders of Reactor OLs or CPs
78-05	Inadvertent Safety Injection During Cooldown	5/23/78	All Holders of Reactor OLs or CPs
78-06	Potential Common Mode Flooding of ECCS Equipment Rooms at BWR Facilities	5/25/78	All Holders of Reactor OLs or CPs
78-07	Damaged Components On a Bergen-Paterson Series 25000 Hydraulic Test Stand	5/31/78	All Holders of Reactor OLs or CPs

1. "Short Term Safety Assessment on the Environmental Qualifications of Safety-Related Electrical Equipment of SEP Operating Reactors," May 1978, enclosure to staff memorandum to Commission, dated May 12, 1978 and issued as NUREG Report 0458.

2. "NRC Staff Report on Union of Concerned Scientists' Petition for Emergency and Remedial Action," December 15, 1977, enclosure to staff memorandum to Commission, dated December 15, 1977.

3. Letter from Consumers Power Company to NRC dated April 6, 1978, including, "Summary of Qualifications of Electrical Penetration Assembly Connectors for the Palisades Plant," Docket No. 50-255.

4. NRC Summary of January 29, 1978 meeting on "Environmental Qualification of Terminal Blocks and Replacement of Terminal Blocks, Haddam Neck Plant," Docket No. 50-213, dated January 30, 1978.

5. NRC Summary of February 1, 1978 meeting, Yankee Rowe Nuclear Power Station (terminal blocks), Docket No. 50-29, dated February 3, 1978.

6. NRC Summary of February 1, 1978 meeting on "Environmental Qualification of Terminal Blocks and Replacement of Terminal Blocks," R. E. Ginna Nuclear Plant, Docket No. 50-244 dated February 2, 1978.

7. Letter from Connecticut Yankee Atomic Power Company to NRC, dated March 29, 1978, including "Haddam Neck Plant Summary of Environmental Qualification Test Program, Terminal Block/Box Combinations," Docket No. 50-213.

8. Letter from Consumers Power Company to NRC, dated April 12, 1978, including information on terminal blocks at Palisades, Docket No. 50-255.

9. Letter from Indiana & Michigan Power Company to NRC, dated March 22, 1978 regarding terminal blocks at D. C. Cook Unit No. 2, Docket No. 50-316.

10. Letter from Indiana & Michigan Power Company to NRC, dated April 21, 1978, regarding terminations at D. C. Cook Unit Nos. 1 and 2, Docket Nos. 50-315 and 50-316.

11. Staff memorandum, "Status of Monticello Electrical Splice Upgrade," dated May 10, 1978, Docket No. 50-263.

12. Letter from Consumers Power Company to NRC, "Environmental Qualifica-

13. Letter from Consumers Power Company to NRC, "Environmental Qualification for Palisades," dated February 24, 1978, Docket No. 50-255.

14. Letter from Westinghouse to E. G. Case, dated April 26, 1978, regarding environmental qualification status for D. C. Cook Unit 2, Docket No. 50-316.

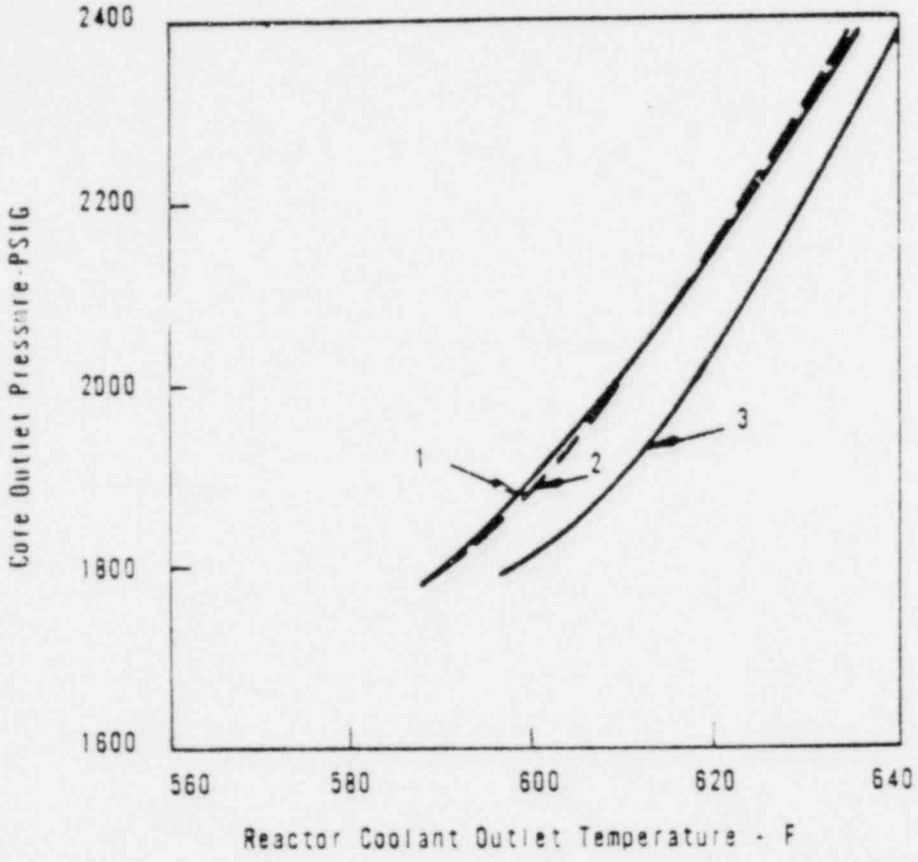
Table 4.1-2
MINIMUM EQUIPMENT TEST FREQUENCY

Item	Test	Frequency
1. Control Rod Movement(1)	Movement of Each Rod	Bi-Weekly
2. Pressurizer Safety Valves	Setpoint	50% Annually
3. Main Steam Safety Valves	Setpoint	25% Annually
4. Refueling System Interlocks	Functional	Prior to Refueling
5. Main Steam Stop Valves(1)	Movement of Each Stop Valve	Monthly
6. Reactor Coolant System(2) Leakage	Evaluate	Daily
7. Condenser Cooling Water System Gravity Flow Test	Functional	Annually
8. High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9. Spent Fuel Cooling System	Functional	Prior to Refueling
10. Hydraulic Snubbers on Safety-Related Systems	Visual Inspection	Annually
11. High Pressure and Low(3) Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
12. Reactor Coolant System Flow	Validate Flow to be at least: Unit 1 141.30×10^6 lb/hr Unit 2 143.8×10^6 lb/hr Unit 3 141.30×10^6 lb/hr	Once Per Fuel Cycle

(1) Applicable only when the reactor is critical

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.



CURVE	REACTOR COOLANT FLOW (GPM)	POWER	PUMPS OPERATING (TYPE OF LIMIT)
1	374880 (100%)	112%	Four Pump (DNBR Limited)
2	280035 (74.7%)	86.7%	Three Pump (DNBR Limited)
3	183690 (49%)	59.0%	One Pump in Each Loop (Quality Limited)

CORE PROTECTION SAFETY LIM
UNIT 2

OCONEE NUCLEAR STATION

Figure 2.1-3B

Table 2.3-1B
Unit 2

Reactor Protective System Trip Setting Limits

RPS Segment	Four Reactor Coolant Pumps Operating (Operating Power -100% Rated)	Three Reactor Coolant Pumps Operating (Operating Power -75% Rated)	Two Reactor Coolant Pumps Operating in A Single Loop (Operating Power -46% Rated)	One Reactor Coolant Pump Operating in Each Loop (Operating -49% Rated)	Shutdown Bypass
1. Nuclear Power Max. (% Rated)	105.5	105.5	105.5	105.5	5.0(3)
2. Nuclear Power Max. Based on Flow (2) and Imbalance, (% Rated)	1.055 times flow minus reduction due to imbalance	1.055 times flow minus reduction due to imbalance	0.949 times flow minus reduction due to imbalance	1.055 times flow minus reduction due to imbalance	Bypassed
3. Nuclear Power Max. Based on Pump Monitors, (% Rated)	NA	NA	55% (5) (6)	55%	Bypassed
4. High Reactor Coolant System Pressure, psig, Max.	2355	2355	2355	2355	1720(4)
5. Low Reactor Coolant System Pressure, psig, Min.	1800	1800	1800	1800	Bypassed
6. Variable Low Reactor Coolant System Pressure psig, Min.	$(11.14\ T_{out} - 4706)$(1)	$(11.14\ T_{out} - 4706)$(1)	$(11.14\ T_{out} - 4706)$(1)	$(11.14\ T_{out} - 4706)$(1)	Bypassed
7. Reactor Coolant Temp. F., Max.	619	619	619 (6)	619	619
8. High Reactor Building Pressure, psig, Max.	4	4	4	4	4

(1) T_{out} is in degrees Fahrenheit (^{o}F).

(2) Reactor Coolant System Flow, %.

(3) Administratively controlled reduction set only during reactor shutdown.

(4) Automatically set when other segments of the RPS are bypassed.

(5) Reactor power level trip set point produced by pump contact monitor reset to 55.0%.

(6) Specification 3.1.8 applies. Trip one of the two protection channels receiving outlet temperature information from sensors in the idle loop.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: July 29, 1977