



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE DPR-38,  
AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE DPR-47,  
AND AMENDMENT NO. 220 TO FACILITY OPERATING LICENSE DPR-55

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS 1, 2 AND 3

DOCKET NOS. 50-269, 50-270 AND 50-287

1.0 INTRODUCTION

By letter dated February 5, 1997, Duke Power Company (the licensee), submitted a request for changes to the Oconee Nuclear Station (ONS) Units 1, 2, and 3, Technical Specifications (TS). The requested changes would reflect replacement of the existing source and intermediate range nuclear instrumentation (NI) with a new source range and wide range nuclear instrumentation system that provides more channels and continuous coverage from the Source Range to above the Power Range.

This would be accomplished by incorporating the following TS changes: (1) the various references to Intermediate Range of nuclear instrumentation would be eliminated and replaced with reference to Wide Range instrumentation; (2) the Total Number of Channels that are available would be increased from 2 to 4 and the Minimum Channels that are required to be Operable would be increased from 1 to 2 in Table 3.5.1-1 for both the Source and Wide Range NI; (3) changing the minimum power level specified in Note (c) of Table 3.5.1-1 from  $10^{-10}$  amps on the intermediate range instrument channels to  $4 \times 10^{-4}\%$  rated power on the wide range instrument channels; and (4) adding entries to Table 3.5.6-1 that specify the Wide Range Nuclear Instrumentation, the number of Required Operable Channels, reference to a new Action Statement, and Applicability.

2.0 BACKGROUND

The purpose of the NI system is to provide the reactor operator with neutron flux indication over the full operating range of the reactor and to provide reactor power inputs to the Reactor Protection System and the Integrated Control System. The original ONS NI design consisted of nine channels divided into three ranges of sensitivity: two source ranges (designated NI-1 & 2), two intermediate ranges (NI-3 & 4), and five power ranges (NI-5 through 9).

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The three ranges were combined to provide continuous measurement and indication of reactor power from <1 counts per second (CPS) up to 125 percent of rated power with a minimum of one decade of overlapping indication with the next higher range. However, the licensee determined that this system did not meet the requirements of Regulatory Guide (RG) 1.97, requiring the design of a new system.

During the development of the NI modification, the licensee decided to upgrade both channels of source range NI and both channels of intermediate range NI by using full range fission chamber detectors manufactured by Gamma-Metrics. As a result, the new system consists of four neutron flux detectors that provide input to four source range channels (designated as Source Range NI-1,2,3,4) and four wide range instrument channels (designated as Wide Range NI-1,2,3,4). The modification did not affect the power range detectors or instrumentation.

The new NI is designed to meet the qualification requirements of RG 1.97, which is defined as a Category 1, Type B variable. This variable requires redundant instrumentation that is seismically and environmentally qualified, electrically independent, physically separated, and powered from safety-related power sources. Also, at least one channel should be displayed on a direct reading indication or recording device, and be capable of monitoring flux in the range of 1E-6 percent up to 100 percent of full power. The licensee has determined that the new wide range NI system meets all of this criteria. The licensee has also determined that the error associated with the new detector's signal accuracy is relatively small. The testing that has been performed was designed to ensure that the actual response of the new detectors would be as expected. The response of the new detectors correlated almost perfectly with the output of the original detectors over each of the three original ranges.

The original source and intermediate range channels provided signal inputs to the Integrated Control System (ICS), as does the new system. However, the new system uses a simpler startup rate inhibit signal set at 2 decades per minute to prevent control rod withdrawal that is in effect at all times, rather than a startup rate inhibit signal that is dependent on power level that was used in the original system. The new inhibit signal is generated by the wide range NI; whereas, the signal for the original system was generated by the source and intermediate instruments. The power range channels continue to provide inputs to the reactor protection system needed to mitigate overpower transients resulting from control rod withdrawal accidents. As a result, the licensee has determined that the new system does not affect the ability of the Reactor Protection System to properly maintain reactor thermal power in compliance with the TS.

During startup, verification of overlap using the new NI is accomplished by comparing the Source and Wide Range indications in the same manner that was used for the Source and Intermediate channels.

### 3.0 EVALUATION

To implement the design change described above, the licensee proposed the following TS changes:

- a) TS 3.1.9.2 and associated Bases: reference to generation of the rod withdrawal hold (i.e., the signal that inhibits rod withdrawal) would be changed from "both the source and intermediate ranges" to "the wide range" since the signal is now generated by the Wide Range NI.
- b) TS 3.5.1.5 and associated Bases would be changed to require overlap to be measured between the source and wide range instruments rather than the source and intermediate instruments.
- c) Table 3.5.1-1 would be changed to show that the total number of wide range channels is 4 (rather than 2 intermediate range channels) and the minimum number of channels that are required to be operable would be changed from 1 to 2. Similarly, the total number of source range channels would be changed from 2 to 4 and the minimum number of operable channels would be changed from 1 to 2. These changes are more restrictive and consistent with NUREG-1430, Revision 1, Babcock and Wilcox Improved Standard TS (STS). In addition, Note (c) would be changed to reflect the new criteria that if 2 of the 4 wide range instrument channels are greater than  $4 \times 10^{-4}$ % rated power, hot shutdown is not required. This power is equivalent, with conservatism, to the present intermediate range specification of  $10^{-10}$  amps.
- d) Table 3.5.6-1: In response to a RG 1.97 commitment, the Wide Range Nuclear Instrumentation would be added to the instrumentation required for accident monitoring. The table would specify that 2 of the 4 channels are required to be operable. Action 5 would be added which would be applicable above the Hot Shutdown condition. Action 5 would require that if 3 channels are inoperable, at least one shall be restored to operable status within 30 days or a report to the NRC must be submitted within 14 days. The report must contain the information stated in Action 5. In addition, if 4 channels are inoperable, at least one must be restored within 7 days or the unit placed in the Hot Shutdown condition within an additional 12 hours. These proposed changes are consistent with the STS.
- e) Table 4.1-1 would be changed to reflect that the surveillance requirements apply to the Wide Range instrumentation rather than the Intermediate Range instrumentation.

The changes to the NI TS described by the licensee in this TS submittal have been reviewed by the staff and found to be acceptable in that they adequately reflect the design change and requirements for monitoring neutron flux for all reactor conditions from low in the source range to above the top of the power range. Also, there has been no loss of reactor protection capability or functionality resulting from the conversion from the Source and Intermediate range NI to the Source and Wide Range NI and they are consistent with the STS.

In addition, discussions with the licensee and the Resident Inspector staff has determined that the operators find the system to be an improvement over the system it replaced and fully capable of providing the desired response during reactor operation.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and the surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (62 FR 8796 dated February 26, 1997). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: March 31, 1997