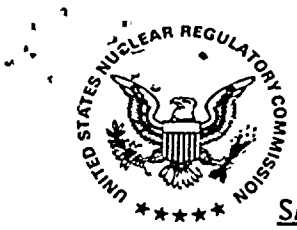

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 212 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO.227TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO.185 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

DOCKET NOS. 50-259, 50-260, AND 50-296

1.0 INTRODUCTION

By letter dated March 25, 1993, the Tennessee Valley Authority (TVA) submitted a request for an amendment to Browns Ferry Nuclear Plant, Units 1, 2 and 3, Appendix A of Operating Licenses No. DPR-33, DPR-52 and DPR-68 in accordance with 10 CFR 50.90 (Reference 1). On April 4, 1994, TVA submitted a new amendment request that superseded the March 25, 1993, submittal (Reference 2). In the April 4, 1994, letter, TVA proposed Technical Specification (TS) changes for eliminating the main steamline high radiation monitor (MSRM) signal from initiating the following: 1) reactor scram, 2) main steamline isolation valve closure, 3) main steamline drain valves closure, and 4) reactor recirculation sample line valve closure. TVA stated that these changes will reduce scram frequency, maintain availability of the condenser heat sink, eliminate the potential for trips due to hydrogen water chemistry, and increase operator control over radioactive releases.

TVA also stated that the MSRM functions are not required to ensure compliance with the offsite radiation release guidelines of 10 CFR Part 100.

2.0 BACKGROUND

The MSRMs provide an early indication of gross fuel failure. When a high radiation level equal to 3 times the normal background level for full power is detected, a reactor scram is initiated to reduce the continued failure of fuel cladding. This same high radiation condition also signals the primary containment isolation system (PCIS) to initiate containment isolation to prevent the release of fission products. The main steamline isolation valves (MSIVs) are part of the PCIS and are signaled to close when a high level of radiation is detected by the MSRMs. The reactor scram and PCIS trip setting is high enough above normal background radiation levels to prevent spurious trips yet low enough to promptly detect gross failure in the fuel cladding. The MSRM alarm setpoint is 1.5 times background based on normal full power background radiation levels.

ENCLOSURE 4

3.0 EVALUATION

TVA proposed an amendment for Browns Ferry Nuclear Plant Units 1, 2 and 3 to revise TS Sections 3.1/4.1, 3.2/4.2, 3.7/4.7, and 3.8/4.8 by eliminating the main steamline high radiation signal as detected by the MSRM from initiating the following: 1) reactor scram, 2) MSIV closure, 3) main steamline drain valves closure, and 4) reactor recirculation sample line valve closure. The main condenser mechanical vacuum pump isolation and trip function will remain, but is eliminated from the TS. Corresponding changes to the TS Bases are included in the amendment.

The proposed change also eliminates the TS requirements for MSRM calibration and functional testing.

The MSRM alarm function will be maintained with a setpoint of 1.5 times normal full power background. This alarm function along with indication from other radiation monitors provides information to the operator for taking corrective action as necessary to reduce radiation activity releases or shut down the plant.

The above proposed changes are in accordance with the General Electric Topical Report, NEDO-31400, "Safety Evaluation for Eliminating The Boiling Water Reactor Main Steamline Radiation Monitor," dated May 1987, prepared for the Boiling Water Reactor Owners's Group (BWROG). The purpose of this report was to demonstrate that the reactor vessel isolation function and scram function of the MSRM are not required to ensure compliance with the radiation dose guidelines of 10 CFR Part 100 for a control rod drop accident (CRDA). In addition, the report demonstrated that use of the offgas treatment system provides significant holdup time for radionuclides, and is an acceptable method of controlling unexpected radioactivity releases. This report concluded that elimination of the MSIV closure function and scram function of the MSRM, in conjunction with proper use of an augmented offgas system, results in offsite radiological exposures that are a small fraction of 10 CFR Part 100 guidelines, even when utilizing very conservative source terms (Reference 3).

The staff Safety Evaluation Report (SER) dated May 15, 1991 (Reference 10) accepted NEDO-31400 for use as a reference in licensee applications to eliminate the MSRM reactor scram and MSIV closure, provided that:

1. Assumptions with regard to input values (including power per assembly, Chi/Q, and decay times) that are made in the generic analysis bound those for the specific plant.

2. There is sufficient evidence (such as implemented or proposed operating procedures or equivalent commitments) to provide reasonable assurance that increased significant levels of radioactivity in the main steamlines would be controlled expeditiously to limit both occupational doses and environmental releases.

3. The MSRM and offgas radiation monitor alarm setpoints are set to 1.5 times the normal N-16 background dose rate at the monitoring locations, and commitments are made to promptly sample the reactor coolant for contamination levels if the MSRM or offgas radiation monitors, or both, exceed their alarm setpoints.

The licensee responded to the above conditions as follows:

R1 A comparison was performed by the licensee of the key analysis input values in NEDO-31400 to the values committed to in the Browns Ferry FSAR. The input values compared were: power (mw/rod), number of failed fuel rods, length of operation, normal and meltdown releases, CHI/Q at ground and elevated, and holdup (delay time). The licensee determined that the assumptions made in the generic analysis exceeded those values committed to in the FSAR; therefore, they bound the Browns Ferry licensing basis.

R2 The licensee stated that they have procedures in place which address the operator actions required in the event of high radiation in the main steam line. The staff requested that the licensee identify these procedures and send copies of those pages that address the applicable operator actions. TVA submitted the alarm response procedure (ARP) for Unit 2 for the main steam radiation high alarm which includes operator action (Reference 11) and the surveillance instruction (SI) for monitoring airborne effluent release rate (Reference 12). The SI was revised to include radiation release requirements removed from the TS and placed in the Offsite Dose Calculation Manual (ODCM). TVA also submitted chemical instructions (CI) for determining fuel performance and isotopic trends which provide information on fuel integrity (Reference 13).

The staff's review of the above ARP determined that the ARP makes reference to the above SI, other offgas and stack gas radiation recorders, and the wide range gaseous effluent radiation monitor, and directs the operators to take appropriate action to reduce activity or shut down the plant as necessary.

R3 The MSRM will be set to alarm at 1.5 times normal full-power background which includes the nitrogen-16 contribution. Browns Ferry has procedures for controlling the offgas monitor setpoints as part of the ODCM which implements 10 CFR Part 50, Appendix I requirements. An ARP requires prompt sampling of the reactor coolant to determine possible contamination levels and the need for additional corrective action if the MSRM or offgas radiation monitors or both exceed their alarm setpoints.

Elimination of the following MSRM functions are not covered by NEDO-31400: 1) main steamline drain valve (MSLDV) closure, 2) reactor recirculation sample line (RRSL) isolation, and 3) mechanical vacuum pump (MVP) trip and isolation. These functions are discussed below.

MSLDV CLOSURE

The three-inch main steamline drain header at Browns Ferry discharges directly to the condenser. Since the NEDO-31400 analysis and the additional Browns Ferry specific offsite dose calculation is based upon the entire CRDA source term being instantaneously deposited into the condenser via the 24" main steamlines, the main steamline drains cannot increase the source term in the condenser nor create an additional release path if they are not isolated. Therefore, their closure requirement on receipt of a MSRM signal can be eliminated from the TS.

RRSL CLOSURE

The RRSL currently receives a primary containment isolation signal (PCIS) for the following conditions: 1) low-low-low reactor water level; 2) MSRM high radiation; 3) high main steamline flow; 4) high main steamline temperature; and 5) low main steamline pressure. TVA provided an analysis for removing the MSRM signal from the RRSL isolation following a CRDA as follows.

The 3 RRSLs are connected to the discharge of the reactor recirculation pumps and are normally closed, unless the normal sample paths from the reactor water cleanup (RWCU) demineralizers are out of service. The RRSLs are connected to the same sample station as the RWCU system. The sample station is protected from over-pressurization by non-safety related over pressure protection devices. If the non-safety related over pressure protection devices fail following a CRDA, over-pressure of the sample station piping or instruments can occur producing a continuous blowdown of reactor coolant into the reactor building. Although TVA considers this scenario very improbable, an analysis was performed of the consequences of such an event. This analysis showed that the fission products released to the reactor building through a RRSL break following a CRDA would initiate isolation of secondary containment, and would start the standby gas treatment system (SGTS) on high radiation in the reactor building exhaust ducts. The SGTS releases are modeled from the plant stack and the resulting offsite doses from the above postulated RRSL release path are well below the 10 CFR 100 limits. Based on this analysis, the licensee stated that the RRSL isolation function of the MSRM is not required to mitigate a CRDA and can, therefore, be eliminated from the plant TS.

MVP TRIP AND ISOLATION

The NEDO-31400 CRDA analysis assumed the MSIVs did not isolate, but did assume a MVP trip and isolation; therefore, the MSRM initiation of MVP trip and isolation will remain functional. However, this function does not meet any of the four criteria for inclusion in the TS as described in the NRC "Final Policy Statement on Technical Specifications" (Reference 13). The MVP isolation and trip function will be described in plant procedures controlled by 10 CFR 50.59 change process. TVA has performed an additional conservative analysis of offsite releases using the same assumptions and input parameters as those in NEDO-31400, except that the MVP is assumed to continue to operate, rather than to trip and isolate. This analysis showed that the resulting offsite doses are still within the required 10 CFR Part 100 limits, and therefore, the MVP trip and isolation on receipt of a signal from the MSRM can be removed from the TS.

The staff has reviewed the results of the various analyses for offsite dose releases from elimination of the MSRM high radiation signal for reactor scram, MSIV closure, MSLDV closure, RRSL valve closure and MVP trip and isolation from the TS. Based on that review, the staff concludes that the resulting doses are within acceptable limits as defined in the requirements of 10 CFR Part 100, and the proposed TS changes are therefore, acceptable.

3.0 STATE CONSULTATION

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

4.0 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 changes the Surveillance Requirements and Bases. 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 (59 FR 29636). 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.

5.0 CONCLUSION

The Commission has concluded, based upon 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

REFERENCES

1. Letter from O.J. Zerinque, Vice President BFN, TVA, to NRC "Browns Ferry Nuclear Plant (BFN) - Technical Specification (TS) No. 322," dated March 25, 1993.

2. Letter from Pedro Salas, Manager of Site Licensing, TVA to NRC "Browns Ferry Nuclear Plant (BFN) - Technical Specification (TS) No. 322, Revision 1 - Elimination of Main Steamline Radiation Monitor Scram and Isolation Function," dated April 4, 1994.

3. General Electric Topical Report NEDO-31400 "Safety Evaluation of Eliminating the Boiling Water Reactor Main Steamline Isolation Valve Closure Function and Scram Function of the Main Steamline Radiation Monitor," May 1987.

4. Letter From Robert F. Janeck, BWROG, to NRC transmitting NEDO-31400, dated July 9, 1987.

5. Letter from L. Cunningham, NRC, to D. Grace, BWROG, "Resolution of Outstanding Issues Relative to Topical Report NEDO-31400," dated September 6, 1988.

6. Letter from D. Grace, BWROG, to L. Cunningham, NRC, "Response to NRC Questions on NEDO-31400, dated April 4, 1989.

7. Letter from S. Stark, GE, to L. Cunningham, NRC, "Additional Information Pertaining to NRC Review of NEDO-31400," dated August 24, 1989.

8. Letter from S. Floyd, BWROG, to L. Cunningham, NRC, "Additional Information Pertaining to NRC Review of NEDO-31400: Operator Action on MSLRM Alarm," dated October 30, 1989.

9. Letter from S. Floyd, BWROG, to L. Cunningham, NRC, "Response to Action Items from March 22, 1990 NRC/BWROG Meeting," dated April 19, 1990.

10. Letter from A. Thadani, NRC, to G.J. Beck, BWROG, "Acceptance for Referencing of Licensing Topical Report NEDO-31400," dated May 15, 1991.

11. Browns Ferry Alarm Response, Panel 9-3, page 8, Maim Steamline Radiation High, Unit 2.

12. BFN Surveillance Instruction O-SI-4.8.B.1.a.1 Airborne Effluent Release Rate, Revision 23, dated November 17, 1993.

13. BFN Chemical Instruction CI-705 Fuel Performance and Isotopic Trends, Revision 7, dated August 10, 1993.

14. Policy Issue for The Commissioners from James M. Taylor, EDO, SECY-93-067, "Final Policy Statement on Technical Specifications Improvements," dated March 17, 1993.

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