



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20585-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 211 TO FACILITY OPERATING LICENSE NO. DPR-53
BALTIMORE GAS AND ELECTRIC COMPANY
CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-317

1.0 INTRODUCTION

By letter dated December 21, 1995, the Baltimore Gas and Electric Company (BGE licensee) submitted a request for changes to the Calvert Cliffs Nuclear Power Plant, Unit No. 1, Technical Specifications (TSs). The requested changes would allow the use of cladding materials other than Zircaloy or ZIRLO. A Temporary Exemption was issued on November 28, 1995, (60 FR 62483) approving the loading of four (4) lead fuel assemblies (LFAs) into the Unit No. 1 reactor vessel during cycles 13, 14, and 15. The technical basis for the Exemption, which is the same basis for the requested TS amendment, was provided in the BGE submittal dated July 13, 1995. The submittal addressed the safety significance of operating with 4 LFAs in Calvert Cliffs Nuclear Power Plant, Unit No. 1, reactor vessel during cycles 13, 14, and 15.

Specifically, BGE proposes to add a statement to TS 5.2.1, "Fuel Assemblies," indicating, for Cycles 13, 14, and 15 only, advanced cladding material may be used in 4 lead test assemblies (referred to as LFAs in this evaluation) as described in a approved Temporary Exemption dated November 28, 1995.

The 4 LFAs with advanced cladding material are part of a demonstration program. The purpose of the demonstration program is to explore new cladding compositions that may be more corrosion resistant and improve cladding performance for extended irradiation resulting in high burnups.

2.0 EVALUATION

Currently, there is a trend in the nuclear industry towards longer fuel cycles and thus increased fuel discharge burnups. Commercially used fuel cladding material is not adequate to provide the necessary operational flexibility and performance margins that the longer cycles and higher burnups require. BGE (through ABB-Combustion Engineering Nuclear Operations) has developed optimized low-tin Zircaloy-4 for improved material properties which should meet the needs stated above. The same type of assemblies have been loaded into the Palo Verde, Unit No. 1, reactor vessel and have achieved a final burnup of 53 GWD/MTU. This evaluation is based on the 4 LFAs not exceeding the Calvert Cliffs, Unit No. 1 current approved burnup limit of 60 GWD/MTU.

To enhance the corrosion database on advanced cladding alloys, the optimum mix of enhanced corrosion resistance, acceptable mechanical properties, and ease of fabrication need to be determined. To address these issues, the BGE demonstration program will include fuel rods with 5 advanced cladding alloys to be irradiated in the 4 LFAs which BGE proposes to include in the Calvert Cliffs Nuclear Power Plant, Unit No. 1, batch R reload fuel for cycles 13, 14, and 15.

In general there are two criteria governing the use of LFAs: (1) the total number of LFAs in one core should be limited, and (2) the LFAs should not be loaded in limiting positions.

The July 13, 1995, submittal included proprietary and nonproprietary reports, CEN 425-P, Rev. 3-P, and CEN 415-P, Rev. 3-NP, respectively, dated May 1995, "Safety Evaluation Report For the Use of Advanced Zirconium - Based Cladding Materials in Calvert Cliffs Unit 1 Batch R Lead Fuel Assemblies." The reports provided detailed analysis of the advanced alloy cladding chemical, mechanical, and other material properties. In addition, detailed analysis of the behavior of the LFAs during postulated accident conditions, transient conditions, and normal operational conditions were provided in the reports.

BGE has determined that the results of testing and evaluations detailed in the reports support the safety of the planned irradiations of the 4 LFAs during the power operation of Unit No. 1. The predicted chemical, mechanical, and material properties of the LFAs fall within the range of the properties of the Zircaloy-4 clad fuel currently in the Unit No. 1 reactor vessel. In addition, the fuel rods in the LFAs containing the special cladding alloys are identical in design and dimension to the control fuel rods used in the LFAs. All of the fuel rods in the LFAs contain uranium or uranium-erbium fuel pellets of the same enrichment.

The LFAs will be placed in non-limiting locations in the core with the a 5 percent safety margin to power peaking for each of the LFAs. The supporting analysis indicates that, since these assemblies will not be in a limiting location, the placement scheme and the similarity of the advanced alloys to zircaloy-4 will assure that the behavior of the fuel rods with these alloys is bounded by the fuel performance and safety analyses performed for the zircaloy-4 clad fuel rods currently in the Unit No. 1 core.

The NRC staff has determined that BGE has provided adequate assurance that the proposed use of the 4 LFAs in the Calvert Cliffs Nuclear Power Plant, Unit No. 1, reactor vessel during cycles 13, 14, and 15 will not result in any new operational or safety considerations. This determination, based on the details provided above, assures that the BGE demonstration program will include a limited number of LFAs, the LFAs will be loaded in non-limiting locations, and the behavior of the LFAs is bounded by the fuel performance and safety analysis performed for the zircaloy-4 clad fuel rods which will be in the Unit No. 1 reactor vessel during cycles 13, 14, and 15. Therefore, the proposed TS change for Calvert Cliffs Nuclear Power Plant Unit No. 1, cycles 13, 14, and 15, is acceptable. TS 5.2.1 will be changed to indicate

that advanced cladding material may be used in four test assemblies as described in the approved Temporary Exemption dated November 28, 1995, for cycles 13, 14, and 15.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on November 9, 1995 (60 FR 56622). Accordingly, based upon the environmental assessment, the staff has determined that the issuance of the amendment will not have a significant effect on the quality of the human environment.

5.0 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security nor to the health and safety of the public.

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