VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

W. L. STEWART
VICE PRESIDENT
NUCLEAR OPERATIONS

February 20, 1987

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 87-025
E&C/NPW/
Docket Nos. 50-338
License Nos. NPF-4

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNIT 1
PROPOSED LICENSE AMENDMENT
FUEL ASSEMBLIES WITH ADVANCED CLADDING MATERIALS

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company requests an amendment, in the form of a license condition, to Operating License NPF-4 for North Anna Unit 1. We request that the proposed amendment be approved for implementation during the next refueling outage for Unit 1, which is currently scheduled for the second quarter of 1987.

The purpose of the amendment is to permit the use of two fuel assemblies containing advanced cladding materials in North Anna Unit 1. The proposed license condition is provided in Attachment 1. To support this change, Attachment 2 provides a safety evaluation of the impact of using the two fuel assemblies in North Anna Unit 1. Detailed technical information regarding the performance of this advanced cladding material has been transmitted to you by Westinghouse Electric Corporation via their letter dated February 5, 1987 (NS-NRC-87-3201, "Information on North Anna 1 Demonstration Assembly (Proprietary)").

This request has been reviewed by the Station Nuclear Safety and Operating Committee and the Safety Evaluation and Control staff. It has been determined that this request does not involve any unreviewed safety questions as defined in 10CFR50.59 or a significant hazards consideration as defined in 10CFR50.92.

We have evaluated this request in accordance with the criteria in 10CFR170.12. A voucher check in the amount of $150.00 is enclosed as an application fee.

Very truly yours,

W. L. Stewart

Add w/check
1/1 $150
#

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PDR ADOCK 05000338
P PDR

Attachments:

1. Proposed License Condition
2. Safety Evaluation

cc: U. S. Nuclear Regulatory Commission
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Mr. J. L. Caldwell
NRC Senior Resident Inspector
North Anna Power Station

Mr. Charles Price
Department of Health
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COMMONWEALTH OF VIRGINIA)
)
CITY OF RICHMOND)

The foregoing document was acknowledged before me, in and for the City and Commonwealth aforesaid, today by W. L. Stewart who is Vice President - Nuclear Operations, of Virginia Electric and Power Company. He is duly authorized to execute and file the aforegoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 20 day of February, 1987.

My Commission expires: February 25, 1990.

Vicki L. Hull
Notary Public

(SEAL)

ATTACHMENT 1

PROPOSED LICENSE CONDITION

It is proposed that the following condition be added to the North Anna Unit 1 license:

"Virginia Electric and Power Company may use two (2) fuel assemblies containing fuel rods clad with advanced zirconium base alloy cladding material as described in the licensee's submittal dated 02-20-87."

ATTACHMENT 2

SAFETY EVALUATION

INTRODUCTION

Virginia Electric and Power Company plans to insert two (2) Westinghouse fuel assemblies containing fuel rods clad with advanced cladding material (zirconium base alloy) into the North Anna Unit 1 Cycle 7 core which is scheduled to startup in the second quarter of 1987. The fuel assemblies will contain a number of fuel rods clad with a zirconium base alloy instead of Zircaloy-4 to obtain further confirmation of the alloy clad's improved corrosion performance at reactor conditions.

The fuel assemblies have removable top nozzles which allow access to all fuel rods for inspection. The fuel rods with the alloy cladding will contain nominally 95% dense UO_2 pellets, will have the same rod dimensions as other fuel rods in the core, will have Zircaloy-4 end plugs, and will be pressurized with helium.

PROPOSED LICENSE CHANGE

The North Anna Unit 1 Technical Specification 5.3.1 describes the reactor core as consisting of assemblies containing 264 fuel rods clad with Zircaloy-4. In order to allow for the insertion of fuel rods clad with a zirconium base alloy in the fuel assemblies, the following license condition is proposed:

> "Virginia Electric and Power Company may use two (2) fuel assemblies containing fuel rods clad with advanced zirconium base alloy cladding material as described in the licensee's submittal dated 02-20-87."

EVALUATION

Fuel rods clad with the zirconium base alloy clad have been irradiated in a foreign reactor at linear power levels up to 17 kw/ft and burnups greater than those planned for the North Anna fuel assemblies. Corrosion and hydriding data obtained on the alloy cladding were compared with reference Zircaloy-4 cladding of fuel rods irradiated as controls in the same test assemblies. Based on the irradiation results of the test assemblies in the foreign reactor, the zirconium base alloy waterside corrosion and hydriding will be less than that expected for Zircaloy-4 clad fuel rods. Irradiation results also showed lower clad irradiation growth ($\Delta L/L$) and creepdown for the zirconium alloy compared to Zircaloy-4. These irradiation results were considered in the design of the fuel rods with zirconium alloy clad in order to assure that all the current fuel rod design bases are satisfied for the planned irradiation life of the North Anna Unit 1 fuel assemblies.

The use of two assemblies with fuel rods clad with a zirconium base alloy will not result in any new accident since the two assemblies and their fuel rods will satisfy the same design bases (References 1 and 2) used for other assemblies in the fuel region.

For each reload core until discharge, the fuel assemblies will be specifically evaluated using standard methods (References 3 and 4), and the existing reload design and safety analysis limits will apply. This will include consideration in the core physics analysis of peaking factors and core average linear heat rate effects. Therefore, there will be no reduction in safety margin.

The irradiation data and design analysis provide sufficient evidence to support the determination that fuel rods with zirconium base alloy cladding will perform at least as well as fuel rods with Zircaloy-4 cladding.

References

1. Davidson, S. L., Iorii, J. A., "Reference Core Design Report - 17x17 Optimized Fuel Assembly," WCAP-9500-A, Volume 2, May 1982.

2. Letter from T. N. Anderson (Westinghouse) to J. R. Miller, Chief (NRC), NS-TNA-2366, Answer to Question 231.2 (4.2.1), dated January 12, 1981.

3. VEP-FRD-42 Revision 1-A, "Reload Nuclear Design Methodology," September 1986.

4. Miller, J. V., "Improved Analytical Models Used In Westinghouse Fuel Rod Design Computations," WCAP-8720, October 1976.

UNREVIEWED SAFETY QUESTION EVALUATION

The use of the two fuel assemblies containing rods with advanced cladding material in North Anna Unit 1 has been determined not to result in an unreviewed safety question as defined in 10 CFR 50.59. The basis for this determination is as follows:

1) The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analyses is not increased. The fuel assemblies with zirconium base alloy clad fuel rods meet the same fuel assembly and rod design bases as other fuel assemblies in the fuel region and the use of these fuel assemblies will not result in a change to existing reload design and safety analysis limits.

2) The possibility for an accident or malfunction of a different type than any evaluated in the safety analyses is not created since the fuel assemblies satisfy the current design bases. In addition, the use of the fuel assemblies does not involve any alterations to plant equipment or procedures which would introduce any new or unique operational modes or accident precursors.

3) The margin of safety as defined in the basis for any technical specification is not reduced since the fuel assemblies do not change the existing reload design and safety analysis limits. Therefore, the current UFSAR analyses remain bounding and there is no reduction in the margin of safety.

10 CFR 50.92 SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS

It has also been determined that the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92.

Specifically, the change does not:

1) Involve a significant increase in the probability or consequence of any accident or malfunction of equipment important to safety previously evaluated in the safety analyses. The fuel assemblies with zirconium base alloy clad fuel rods meet the same fuel assembly and rod design bases as other fuel assemblies in the fuel region, and the use of these fuel assemblies will not result in a change to existing reload design and safety analysis limits.

2) Create the possibility of a new or different type of accident than previously evaluated since the fuel assemblies satisfy the current design bases. In addition, use of the assemblies does not involve any alterations to plant equipment or procedures which would introduce any new or unique operational modes or accident precursors.

3) Involve a significant reduction in the margin of safety. The fuel assemblies do not change the existing reload design and safety analysis limits. Therefore, the current UFSAR analyses remain bounding and there is no reduction in the margin of safety.

We have also reviewed the examples of types of amendments which the NRC considers not likely to involve significant hazards consideration (51 FR 7744,

3/6/86) and found one that was directly applicable to the proposed change. Example (iii) states: "For a nuclear power reactor, a change resulting from a nuclear reactor core reloading, if no fuel assemblies significantly different from those found previously acceptable to the NRC for a previous core at the facility in question are involved. This assumes that no significant changes are made to the acceptance criteria for the technical specifications, that the analytical methods used to demonstrate conformance with the technical specifications and regulations are not significantly changed, and that the NRC has previously found such methods acceptable." The analyses show that the fuel assemblies containing rods with advanced cladding material meet the current design bases of other assemblies in the fuel region. The analytical methods used remain unchanged.