ATTACHMENT 1

PROPOSED TECHNICAL SPECIFICATIONS CHANGES

NORTH ANNA UNITS 1 AND 2

REVISED PAGES FOR CURRENT

NORTH ANNA

TECHNICAL SPECIFICATIONS

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained for a maximum internal pressure of 45 psig and a temperature of 280°F.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4, except that substitutions of fuel rods by solid stainless steel or solid Zircaloy-4 filler rods may be made if justified by the cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.1 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4, except that substitutions of fuel rods by solid stainless steel or solid Zircaloy-4 filler rods may be made if justified by the cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.1 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 9957 ± 10 cubic feet at a nominal T_{avg} of 525°F.

CHANGE PAGES FOR

NORTH ANNA

MERITS TECHNICAL SPECIFICATIONS

4.0 DESIGN FEATURES (continued)

4.3 REACTOR CORE

(insert A) except that substitutions of fuel rods by solid stainless steel or solid Zircaloy-4 filler rods may be made if justified by the cycle specific reload analysis.

4.3.1 Fuel Assemblies

The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 144 inches ~~and contain a maximum total weight of 1780 grams uranium~~. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.3 weight percent U-235.

4.3.2 Control Rod Assemblies

The reactor core shall contain 48 full length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

(continued)

ATTACHMENT 2

DISCUSSION AND SAFETY EVALUATION

1.0 INTRODUCTION

The current operating philosophy at Virginia and Electric Power Company prohibits the use of fuel assemblies with known failed rods. Failed rods are defined as fuel rods having cladding defects allowing fission products to be released to the coolant. By replacing the failed rods with solid filler rods made from either stainless steel or Zircaloy-4 during a fuel assembly reconstitution campaign, the Company will be able to recover costs from fuel assemblies that are prematurely discharged because of the existence of failed rods.

The current Technical Specifications for each Unit preclude the use of solid filler rods. The Design Features Section of the North Anna Unit 1 and the North Anna Unit 2 Technical Specifications (Section 5.3.1 of each Unit's Technical Specifications) states that each fuel assembly will contain 264 fuel rods clad with Zircaloy-4.

The same Design Features Section also identifies a limit on the total weight of uranium in each fuel rod. Due to fuel pellet design improvements such as chamfered pellets with reduced dish size and a nominal density increase, the fuel weight may increase slightly. The actual rod uranium weight has no relational bearing on the power limits, power operating level, or decay heat rate. The areas of safety analysis involving fuel uranium weight have their own limits which are reflected in the UFSAR design bases and Technical Specifications.

The intent of this evaluation is to provide the justification and safety analysis for the license amendment allowing the use of filler rods in place of failed rods and removing the rod urainium weight limit.

2.0 CHANGE TO TECHNICAL SPECIFICATIONS

Section 5.3.1 of the North Anna Unit 1 and the North Anna Unit 2 Technical Specifications specifically states:

"The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 144 inches and contain a maximum total weight of 1780 grams uranium."

A proposed license amendment would alter the wording to read:

"The reactor core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4, except that substitutions of fuel rods by solid stainless steel or solid Zircaloy-4 filler rods may be made if justified by the cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 144 inches."

3.0 DISCUSSION OF CHANGES

3.1 Substitution of Fuel Rods With Filler Rods

Using solid filler rods in assemblies (herein referred to as reconstituted assemblies) in place of failed rods is no longer an uncommon practice. References 1, 2 and 3 denote similar license amendment submittals with regard to the use of filler rods. In 1985, thirty fuel assemblies were reconstituted at Virginia Power's Surry Power Station. To date, one full cycle using two of the reconstituted assemblies is complete. Post-cycle video inspections and ultrasonic test inspections of the reconstituted assemblies revealed no anomalies. Currently, in Surry 1 Cycle 10 and Surry 2 Cycle 10, a total of twenty-seven reconstituted fuel assemblies are in use. No anomalies in the measured power distribution parameters are present.

Reconstituted assemblies will be incorporated into core loading plans as normal assemblies, and combined in symmetric locations with assemblies with similar exposure history. In the initial core analysis for each reload, reconstituted assemblies will be explicitly modeled on a pin-by-pin basis to evaluate the effect on local power peaking and corewide reactivity parameters (i.e, critical boron concentration and boron coefficient). If the effect is significant, it will be reflected in all phases of design and safety analysis by either explicit calculations or additional uncertainties, as appropriate, to ensure that the assemblies are treated in a conservative manner.

Generic calculations have been performed to determine the impact of using reconstituted assemblies. These calculations indicate that there could be a minor change in local power peaking. Other effects are negligible. During a reconstitution campaign, failed rods will always be replaced with a filler rod. Once a decision is made by the nuclear design group as to which reconstituted assemblies will be used in a specific reload, the appropriate core physics models will be applied to reflect the actual geometry of the reconstituted assemblies in that reload cycle.

Access to the failed rods is gained by removal of either the top or lower end fittings. The removed end fitting will be reattached using a similar attachment design (e.g., locking cup thimble screws or insert lock tubes) which was used on the fitting when the assembly was originally manufactured. The mechanical design with respect to limits is evaluated on a reload basis. Our experience has shown that reconstitution with solid replacement filler rods will have little or no effect on the mechanical design limits or the assembly structural integrity. Assemblies which, for unforseen reasons, do not meet the minimum mechanical design requirements after reconstitution will not be considered for a reload.

3.2 Maximum Rod Uranium Weight Limit

Fuel rod design calculations use fuel and cladding dimensions as well as initial fuel density as input to predict operating performance. The individual fuel rod mass is not a direct input. Uncertainties in the evaluation are set to cover a range of densities and dimensions allowed by the manufacturing tolerances and specifications. Thus, fuel performance calculations should remain valid over the range of manufactured fuel rod weights.

Although a number of safety analyses are indirectly affected by the fuel weight, the analyses are more sensitive to the fuel configuration, length, enrichment, and physical design, which are also specified in the Technical Specifications. The Technical Specifications for each Unit limit power and power distribution, thus controlling the fission rate and rate of decay heat production. Fuel rod weight does not have any direct bearing on the power limits, power operating level, or decay heat rate. The composition of the fuel is closely monitored to assure acceptable fuel performance. The fuel weight changes that could be made as a result of eliminating the Technical Specification limit are not of sufficient magnitude to cause a significant difference in fuel performance. There are no expected observable changes in normal operation due to the noted fuel rod weight changes, and the remaining fuel parameters listed in the Technical Specifications are considered in the reload safety evaluation process (Reference 4).

Other Design Basis Events were examined to assess the effects of possible changes in fuel rod weight. Fuel rod weight will only change as a result of a specific change in the physical design which is addressed in the reload safety evaluation process or within the manufacturing tolerances. The small variations allowed by the fuel rod design tolerances are inherently accounted for in existing design calculation uncertainties. The fuel vendor manufacturing specifications on fuel density and pellet dimensions will continue to limit the amount of fuel in an individual rod. Changes in nuclear design resulting from fuel rod weight changes are controlled as discussed above. New and spent fuel criticality analyses are unaffected by the small variations in fuel assembly uranium mass (or fuel rod uranium mass). The fuel assembly fission product source term is insensitive to small variations in fuel mass; thus the effects of a fuel handling accident will remain bounded by existing analyses. Fuel handling equipment and procedures are not affected. Seismic and LOCA analyses contain sufficient conservatism to bound these weight changes. Other accident analyses are not affected by rod weight as a direct parameter, and the existing analyses remain bounding.

In consideration of the changes discussed in Sections 3.1 and 3.2, no changes are being made to any design or safety related limit. These limits will continue to be confirmed as part of the reload safety evaluation process.

4.0 SAFETY EVALUATION

In view of the considerations discussed in Section 3.0, Nuclear Analysis and Fuel concludes that replacing failed rods with solid stainless steel or Zircaloy-4 rods or removal of the rod uranium weight limit do not result in an unreviewed safety question, as defined in 10CFR50.59. Specifically:

(1) The probability or consequences of the UFSAR accidents remain unchanged. The reconstituted fuel assemblies meet essentially the same design requirements and satisfy the same design criteria as other assemblies with similar operating history. Use of reconstituted fuel assemblies will not result in a change

to existing safety criteria and design limits.

The deletion of the fuel rod uranium weight limit does not increase the probability or consequences of previously evaluated accidents. The variation in fuel rod weight that can occur without a Technical Specifications limit is small based on other fuel rod design constraints such as rod diameter, gap size, fuel density, and active fuel length; all of which provide some limit on the variation in rod weight. Additionally, variations allowed by the fuel rod design tolerances are accounted for in existing design uncertainties.

(2) No new accident or malfunction of a different type other than those evaluated previously is introduced by using reconstituted fuel assemblies. A single fuel assembly is moved at any one time, and the consequences of an accident are bounded by the fuel handling accident which is the most severe accident related to fuel manipulation. Additionally, reconstituted fuel assemblies are used the same as non-reconstituted fuel assemblies, and all design and interface requirements remain unchanged.

No new accident or malfunction of a different type other than those evaluated previously is introduced by eliminating the Technical Specifications limit on fuel rod uranium weight. All of the fuel contained in the fuel rod is similar to and designed to perform the same as previous fuel rods. This change is considered to be administrative in nature and does not create the possibility of a new or different kind of accident.

(3) The margin of safety as defined in the basis for any technical specification is not reduced by using reconstituted fuel. The safety and design limits will not be changed as a result of reconstituted fuel. All safety and design limits will continue to be confirmed as part of the reload safety evaluation process.

The margin of safety by eliminating the Technical Specification limit on rod uranium weight is maintained by adherence to other fuel related Technical Specification limits and UFSAR design bases. The deletion of the fuel rod weight limit in Section 5.3.1 of the North Anna Unit 1 and the North Anna Unit 2 Technical Specifications does not directly affect any safety system or the safety limits, thereby not affecting the plant margin of safety.

5.0 REFERENCES

1. Letter from W. L. Stewart (Virginia Electric and Power Company) to Mr. Harold R. Denton (NRC), "Virginia Power, Surry Power Station Unit Nos. 1 and 2, Proposed Technical Specification Changes," License Nos. DPR-32 and DPR-37, Docket Nos. 50-280 and 50-281, May 13, 1985.

2. Letter from D. A. Nauman (South Carolina Electric and Gas) to Mr. Harold R. Denton (NRC), "Virgil C. Summer Nuclear Station, Docket No. 50-395, Operating License No. NPF-12, Technical Specification Change, Design Features," December 9, 1986.

3. Letter from S. C. Hunsader (Commonwealth Edison) to Mr. Harold R. Denton (NRC), "Byron Station Units 1 and 2, Braidwood Station Units 1 and 2, Application For Amendment to Facility Operating License NPF-37 and NPF 60, Appendix A, Technical Specifications. NRC Docket Nos. 50-454 and 50-455, 50-456 and 50-457, January 6, 1987.

4. Virginia Electric and Power Company Topical Report "Reload Nuclear Design Methodology, VEP-FRD-42, Rev. 1-A, September 1986.

ATTACHMENT 3

10 CFR 50.92 EVALUATION

SIGNIFICANT HAZARDS EVALUATION

Virginia Power has reviewed these proposed amendments to the North Anna Unit 1 and North Anna Unit 2 Technical Specifications and determined that there is no significant hazards consideration as defined in 10CFR50.92(c) as a result of the amendments. Specifically:

(1) The probability or consequences of an accident previously evaluated does not significantly increase. The reconstituted fuel assemblies meet essentially the same design requirements and satisfy the same design criteria as other assemblies with similar operating history. Use of reconstituted fuel assemblies will not result in a change to existing safety criteria and design limits.

The deletion of the fuel rod uranium weight limit does not significantly increase the probability or consequences of previously evaluated accidents. The variation in fuel rod weight that can occur without a Technical Specifications limit is small based on other fuel rod design constraints such as rod diameter, gap size, fuel density, and active fuel length; all of which provide some limit on the variation in rod weight. Additionally, variations allowed by the fuel rod design tolerances are accounted for in existing design uncertainties

(2) The possibility of a new or different kind of accident from any accident previously evaluated is not created by using reconstituted fuel assemblies. A single fuel assembly is moved at any one time, and the consequences of an accident are bounded by the fuel handling accident which is the most severe accident related to fuel manipulation. Additionally, reconstituted fuel assemblies are used the same as non-reconstituted fuel assemblies, and all design and interface requirements remain unchanged.

The possibility of a new or different kind of accident from any accident previously evaluated is not created by eliminating the Technical Specifications limit on fuel rod uranium weight. All of the fuel contained in the fuel rod is similar to and designed to perform the same as previous fuel rods. This change is considered to be administrative in nature and does not create the possibility of a new or different kind of accident.

(3) The margin of safety is not significantly reduced by using reconstituted fuel. The safety and design limits will not be changed as a result of reconstituted fuel. All safety and design limits will continue to be confirmed as part of the reload safety evaluation process.

The margin of safety by eliminating the Technical Specification limit on rod uranium weight is not significantly reduced. Adherence to other fuel related Technical Specification limits and UFSAR design bases is maintained. The deletion of the fuel rod weight limit in Section 5.3.1 of the North Anna Unit 1 and the North Anna Unit 2 Technical Specifications does not directly affect any safety system or the safety limits, thereby not affecting the plant margin of safety.