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Southern Nuclear Operating Company
the southern electric system

Dave Morey
Vice President
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Docket Nos. 50-348
50-364

U. S.. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Joseph M. Farley Nuclear Plant
Fuel Reconstitution Technical Specification Amendment

Gentlemen:

Southern Nuclear Operating Company (SNC) proposes to amend the Farley Nuclear Plant Unit 1 and Unit 2 Technical Specifications to allow fuel reconstitution, to allow the use of ZIRLO™ clad fuel, and to remove unnecessary detailed descriptions of fuel and control rod assemblies. Southern Nuclear requests approval of the proposed amendment by June 1, 1994.

This amendment is a line item improvement based on the recommendations of Supplement 1 to Generic Letter 90-02, "Alternative Requirements for Fuel Assemblies in the Design Features Section of Technical Specifications" and NUREG-1431, "Standard Technical Specifications for Westinghouse Plants." The Technical Specification changes will allow reductions in future occupational radiation exposure and plant radiological release by allowing the removal of suspect rods and by reducing clad corrosion.

The proposed change to the Technical Specifications affects the description of fuel and control rod assemblies in Section 5.3. The change to the fuel assembly description will permit the limited substitution of zirconium alloy, zircaloy-4, ZIRLO™, or stainless steel filler rods for fuel rods in accordance with the NRC-approved applications of fuel rod configurations that have been analyzed with NRC Staff-approved methods. This change will allow timely removal of fuel rods that are found to be a probable source of future leakage. The change will also make provisions for the loading of lead test assemblies without requiring a specific Technical Specification change. This amendment also allows the use of ZIRLO™ clad fuel as an alternative to Zircaloy-4 clad fuel. The use of ZIRLO™ clad fuel was approved by NRC Staff Safety Evaluations issued on July 1, 1991 and October 9, 1991. It is our intent to use the ZIRLO™ clad fuel as lead test assemblies. Additionally, specific descriptions of the fuel and control rod assemblies contained in the Technical Specifications which are restrictive due to the unnecessary details are being deleted.

Enclosure 1 provides a description of the proposed changes and the bases for the change requests. Enclosure 2 provides the basis for a determination that the proposed changes do not involve significant hazards. Enclosure 3 contains the proposed changed Technical Specification pages in support of the amendment.

Southern Nuclear has determined that the proposed license amendment will not significantly affect the quality of the environment.

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In accordance with 10 CFR 50.91, the designated state official will be sent a copy of this letter and all enclosures.

If there are any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

D N Morey

D. N. Morey

REM/clt: 1390.DOC

Enclosures

cc: Mr. S. D. Ebneter
Mr. B. L. Siegel
Mr. T. M. Ross
Dr. D. E. Williamson

SWORN AND SUBSCRIBED BEFORE ME

THIS 16th DAY OF February 1993

Marsha Gayle Dow
Notary Public

My commission expires: November 1, 1997

Enclosure 1

Fuel Reconstitution,

ZIRLO™ Clad Fuel Rods, and

Removal of Detailed Fuel Assembly Descriptions

Technical Specification Amendment

Bases for Proposed Changes

Fuel Reconstitution Technical Specification Amendment

Basis for Proposed Change

Proposed Change

The proposed change will add the following three sentences to the end of Specification 5.3.1, "Limited substitutions of zirconium alloy, zircaloy-4, ZIRLO™, or stainless steel filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff-approved codes and methods, and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions."

Basis

Reload fuel for the Farley Nuclear Plant consists of fuel elements with top nozzles that allow for reconstitution. This design feature will allow removal of individual fuel rods from the assembly if they are found to be damaged or have the potential for clad breach in subsequent cycles. This would allow the fuel assemblies to be reused without the associated radiological consequences of leakage from damaged fuel rods. In such cases, the removed fuel rod may be replaced with a zirconium alloy, zircaloy-4, ZIRLO ™, or stainless steel filler rod. This Technical Specification change recognizes the acceptability of the use of reconstituted fuel assemblies provided that they are in accordance with NRC Staff-approved applications of fuel rod configurations; are analyzed with applicable NRC Staff-approved methodologies; and are shown to comply with all fuel safety design bases. The change will allow the use of reconstituted assemblies and lead test assemblies without requiring specific technical specification changes.

The NRC indicated licensees may propose such changes to their Technical Specifications in Generic Letter 90-02. This proposed change is a line item improvement in accordance with the guidance of Supplement 1 to Generic Letter 90-02.

ZIRLO™ Clad Fuel Rods Technical Specification Amendment

Basis for Proposed Change

Proposed Change

In order to allow for the use of fuel rods clad with the advance zirconium alloy cladding material ZIRLO™ into Farley reload core designs, ZIRLO™, zirconium alloy, and zircaloy-4 will be listed as acceptable cladding.

Basis

In order to implement a long-term fuel management strategy planned by Southern Nuclear for Farley Nuclear Plant Units 1 and 2, Westinghouse VANTAGE 5 fuel assemblies containing fuel rods clad with the advanced zirconium alloy cladding material ZIRLO™ will be utilized in Farley reload core designs. This long-term strategy includes the implementation of high-energy, 18-month fuel cycles with high capacity factors, low leakage loading patterns, and extended fuel burnups.

The use of ZIRLO™ clad fuel, with a restriction on rod-average burnup level, was approved in Safety Evaluations issued by the NRC Staff on July 1, 1991 and October 9, 1991.

This amendment will allow the use of Westinghouse VANTAGE 5 fuel assemblies containing fuel rods clad with ZIRLO™ as lead test assemblies in Farley Unit 2, beginning with Cycle 11, which is scheduled for startup in the second quarter of 1995.

Removal of Detailed Fuel Assembly Descriptions

Basis for Proposed Change

Proposed Change

The proposed change will remove the lined out portions of Technical Specification 5.3 and insert the ***bold, italicized*** portions:

> 5.3.1 The reactor ~~core~~ shall contain 157 fuel assemblies ~~with each fuel assembly containing 264 fuel rods clad with Zircaloy-4~~. ***Each assembly shall consist of a matrix of zirconium alloy, zircaloy-4, or ZIRLO™ fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material.*** ~~Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum nominal enrichment of 3.15 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum nominal enrichment of 4.25 weight percent U-235 for Westinghouse LOPAR fuel and a maximum nominal enrichment of 5.0 weight percent U-235 for Westinghouse OFA and VANTAGE 5 fuel. Westinghouse OFA and VANTAGE 5 fuel with maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that the requirements of specifications 5.6.1.1.c and 5.6.1.2.c are met. Westinghouse LOPAR fuel does not require integral burnable absorbers.~~
>
> 5.3.2 The reactor core shall contain 48 ~~full length and no part length~~ control rod assemblies. ~~The full length control rod assemblies shall contain a nominal 142 inches of absorber material.~~ The ~~nominal values of absorber~~ ***control*** material shall be ~~80 percent~~ silver, ~~15 percent~~ indium and ~~5 percent~~ cadmium ***as approved by the NRC***. ~~All control rods shall be clad with stainless steel tubing.~~

Basis

Over the life of the Farley Nuclear Plant, various types of fuel have been used. These types include Westinghouse OFA, LOPAR, and VANTAGE 5. With the use of each type, a specific requirement has been added to Technical Specification 5.3.1, Fuel Assemblies. As a result, each time a new fuel type is used, e.g., LOPAR or VANTAGE 5, a revised Technical Specification and a 10 CFR 50.92 evaluation are required in addition to the 10 CFR 50.59 evaluation, the 10 CFR 50.46 evaluations, and the revisions to the Final Safety Analysis Report. As a result, significant resources, both Southern Nuclear and NRC, are expended without a corresponding increase in safety margin.

As a result, Southern Nuclear is proposing to remove the overly detailed descriptions of fuel and control rod assemblies in the Technical Specifications. Any modifications to the fuel assembly design will continue to receive evaluations including a 10 CFR 50.59 evaluation, and , if necessary, 10 CFR 50.46 evaluations and Final Safety Analysis Report revisions.

Enclosure 2

Fuel Reconstitution Technical Specification Amendment

ZIRLO™ Clad Fuel Rods Technical Specification Amendment

Significant Hazards Evaluation

Technical Specification Amendment Concerning
Fuel Reconstitution,
ZIRLO™ Clad Fuel Rods, and
Removal of Detailed Fuel Assembly Descriptions

Significant Hazards Evaluation

Pursuant to 10 CFR 50.92, Southern Nuclear Operating Company (SNC) has evaluated the attached proposed amendment to the Farley Nuclear Plant Units 1 and 2 Technical Specifications and has determined that operation of the facility in accordance with the proposed amendment would not involve significant hazards considerations.

Background

Section 5.3.1 of the Technical Specifications provides a description of the fuel assemblies used for Farley Nuclear Plant. It is desirable to have the flexibility to remove individual fuel rods from a fuel assembly, either between or during refueling outages, if it is determined that the fuel rod is damaged or is a probable source of future leakage. Such flexibility would result in reductions of both occupational radiation exposure and plant radiological releases. The proposed revision to the Technical Specification will allow replacement with a zirconium alloy, zircaloy-4, ZIRLO™, or stainless steel filler rod. The change also allows the use of lead test assemblies without requiring a specific Technical Specification revision.

The proposed change is in accordance with the proposed line item Technical Specification improvement contained in NRC Generic Letter 90-02, Supplement 1.

Southern Nuclear also plans to incorporate Westinghouse VANTAGE 5 fuel assemblies containing fuel rods clad with the advanced zirconium alloy cladding material ZIRLO™ into Farley reload core designs. This will involve a change to the Technical Specifications Design Features section 5.3.1 to allow the use of ZIRLO™.

Additionally, over the life of the Farley Nuclear Plant, various types of fuel have been used. These types include Westinghouse OFA, LOPAR, an VANTAGE 5. With the use of each type, a specific requirement has been added to Technical Specification 5.3.1, Fuel Assemblies. As a result, each time a new fuel type is used, e.g., LOPAR or VANTAGE 5, a revised Technical Specification and a 10 CFR 50.92 evaluation are required in addition to the 10 CFR 50.59 evaluation, the 10 CFR 50.46 evaluations, and the revisions to the Final Safety Analysis Report. As a result, significant resources, both Southern Nuclear and NRC, are expended without a corresponding increase in safety.

Analysis

The Technical Specifications do not prohibit the reuse of fuel assemblies that have a leaking fuel rod. However, good operating practice requires that a leaking fuel assembly be reconstituted by removing the leaking fuel rod. The proposed change to the Technical Specifications will provide the requirements under which such reconstitution can be performed without requiring a specific license amendment for each case.

The proposed amendment will set forth the condition under which stainless steel or zirconium filler rods can be used in place of the rods described in Specification 5.3.1. The specification will require analysis using NRC-approved methods and the use of NRC-approved applications of fuel rod configurations. These specifications will ensure that all of the fuel configurations are consistent with previously approved designs and are within existing acceptance limits.

The information required to support the licensing basis for the use of the ZIRLO™ clad fuel rods is given in WCAP-12610. This WCAP serves as a reference core design report for a fuel assembly design using ZIRLO™ clad fuel rods. It presents the information necessary to support the licensing basis for the use of fuel assemblies containing ZIRLO™ clad fuel rods for fuel reload regions. It includes mechanical, nuclear, thermal-hydraulic, accident and radiological evaluations. It also includes appendices to document ZIRLO™ material properties, support fuel rod performance, and to provide LOCA models and evaluations. WCAP-12610 was approved in NRC Safety Evaluations issued on July 1, 1991 and October 9, 1991. These Safety Evaluations approved the use of VANTAGE+ fuel design, i.e., ZIRLO™ clad fuel, described in WCAP-12610 and found it acceptable for up to a rod-average burnup level of 60,000 MWD/MTU.

Section 5.3 of the Technical Specifications provides a detailed description of the fuel and control rod assemblies used for Farley Nuclear Plant. It is desirable to have the flexibility to use various types of fuel which are similar in physical design to the initial core loading without requiring an amendment to the Technical Specifications. The requirement for a Technical Specification amendment and associated 10 CFR 50.92 evaluation is burdensome without a corresponding increase in safety. As a result, the Farley Technical Specifications will be similar to NUREG-1431, Standard Technical Specifications, Westinghouse Plants.

Any modifications to the fuel or control rod assembly design will continue to receive evaluations including a 10 CFR 50.59 evaluation, and , if necessary, 10 CFR 50.46 evaluations and Final Safety Analysis Report revisions.

Results

The safety analyses to be performed for each reload cycle will include any effects associated with the use of filler rods in reconstituted fuel assemblies, the use of ZIRLO™ clad fuel, and changes in the fuel or control rod assemblies, and will be performed with the NRC-approved methods that are applicable to the reconstituted fuel assemblies. The effects of the proposed change have been evaluated using the criteria of 10 CFR 50.92 and the results are listed below:

1. The proposed change to the Technical Specifications allowing reconstitution will not involve a significant increase in the probability or consequences of an accident previously evaluated because it will not result in a change to any of the process variables that might initiate an accident or affect the radiological release for an accident. The operating limits will not be changed and the analysis methods to demonstrate operation within the limits will remain in accordance with NRC-approved methodology. Other than the changes to the fuel assemblies, there are no physical changes to the plant associated with this Technical Specification change. The consequences of an accident previously evaluated will not be increased because the safety analysis to be performed for each cycle will continue to demonstrate compliance with all fuel safety design bases. The ability to remove potentially leaking fuel rods should result in a reduction in the radiological consequences of any transients or accidents.

   The probability or consequences of an accident previously evaluated are not significantly increased with the use of ZIRLO™ cladding. The VANTAGE 5 fuel assemblies containing ZIRLO™ clad fuel rods meet the same fuel assembly and fuel rod design bases as other VANTAGE 5 fuel assemblies. In addition, the 10 CFR 50.46 criteria will be applied to the ZIRLO™ clad fuel rods. The use of these fuel assemblies will not result in a change to the proposed Farley VANTAGE 5 reload design and safety analysis limits. Since the original

design criteria are being met, the ZIRLO™ clad fuel rods will not be an initiator for any new accident. The ZIRLO™ clad material is similar in chemical composition and has similar physical and mechanical properties as that of zircaloy-4. Thus, the cladding integrity is maintained and the structural integrity of the fuel assembly is not affected. The ZIRLO™ clad fuel rod improves corrosion performance and dimensional stability. No concerns have been identified with respect to the use of an assembly containing a combination of both zircaloy-4 and selected ZIRLO™ clad fuel rods. Since the dose predictions in the Farley safety analyses are not sensitive to the fuel rod cladding material used, the radiological consequences of accidents previously evaluated in the Farley safety analyses remains valid. Therefore, the probability or consequences of an accident previously evaluated are not significantly increased.

The proposed removal of detailed descriptions of fuel and control rod assemblies will not involve a significant increase in the probability or consequences of an accident previously evaluated because it will not result in a change to any of the process variables that might initiate an accident. The operating limits will not be changed and the analysis methods to demonstrate operation within the limits will remain in accordance with NRC-approved methodology. The consequences of an accident previously evaluated will not be increased because the safety analysis to be performed for each cycle will continue to demonstrate compliance with all fuel safety design bases.

2. This change to the Technical Specifications allowing reconstitution will not create the possibility of a new or different kind of accident from any accident previously evaluated because it will only affect the assembly configuration and will be limited to NRC-approved applications of fuel rod configurations. The other aspects of plant design, operation, limitations and responses to events will remain unchanged.

   The possibility for a new or different kind of accident from any accident previously evaluated is not created by the use of ZIRLO™ cladding since the VANTAGE 5 fuel assemblies containing ZIRLO™ clad fuel rods will [illegible] by the same design bases as that used for other VANTAGE 5 fuel assemblies. All design and performance criteria will continue to be met and no new single failure mechanisms have been defined. In addition, the use of these fuel assemblies does not involve any alterations to plant equipment or procedures that would introduce any new or unique operational modes or accident precursors. Therefore, the possibility for a new or different kind of accident from any accident previously evaluated is not created.

   The removal of detailed descriptions of fuel and control rod assemblies will not create the possibility of a new or different kind of accident from any accident previously evaluated because they will be limited to NRC-approved applications of fuel rod configurations. The other aspects of plant design, operation, limitations and responses to events will remain unchanged.

3. The use of zirconium alloy, zircaloy-4, ZIRLO™, or stainless steel filler rods in fuel assemblies will not involve a significant reduction in a margin of safety because analyses using NRC-approved methods will be performed for each configuration to demonstrate continued operation within the limits that assure acceptable plant response to accidents and transients. These analyses will be performed using NRC-approved methods that have been approved for application to the fuel configuration.

The margin of safety is not significantly reduced by the use of ZIRLO™ clad since the VANTAGE 5 fuel assemblies containing ZIRLO™ clad fuel rods do not change the proposed Farley VANTAGE 5 reload design and safety analysis limits. The use of these fuel assemblies will take into consideration the normal core operating conditions allowed for in the Technical Specifications. For each cycle reload core, the fuel assemblies will be evaluated using NRC Staff-approved reload design methods. This will include consideration of the core physics analysis peaking factors and core average linear heat rate effects. Therefore, the margin of safety as defined in the bases to the Farley Technical Specifications and VANTAGE 5 Licensing Amendment Request is not significantly reduced.

The removal of detailed descriptions of fuel assemblies will not involve a significant reduction in a margin of safety because analyses using NRC-approved methods will be performed for each configuration to demonstrate continued operation within the limits that assure acceptable plant response to accidents and transients. These analyses will be performed using NRC-approved methods that have been approved for application to the fuel configuration.

Conclusion

On the basis of the preceding evaluation, Southern Nuclear has determined that the proposed change to the Technical Specifications does not involve a significant increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any previously evaluated or involve a significant reduction in a margin of safety. Therefore, Southern Nuclear concludes that the proposed change meets the requirements of 10 CFR 50.92(c) and does not involve a significant hazards consideration