Southern Nuclear
Operating Company, Inc

SOUTHERN COMPANY
Energy to Serve Your World

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant Unit 1
SVEA-96 Optima2 Lead Use Fuel Assemblies

Ladies and Gentlemen:

This letter provides an information report describing the Unit 1 lead test assemblies (LTAs) for the Edwin I. Hatch Nuclear Plant (HNP). The NRC agreed in NRC letter dated September 23, 1981 that BWR utilities may irradiate lead test assemblies in their reactors as long as certain conditions are met. One of those conditions is that the utility provide the NRC with an information report describing the assemblies, a statement concerning the applicability of the NRC approved methods used to analyze those assemblies, the objectives of the LTA program, and any measurements that will be performed as part of the test program (Enclosure). To evaluate Westinghouse as a potential fuel supplier for Edwin I. Hatch Nuclear Plant (HNP), Southern Nuclear Operating Company (SNC) loaded four of their SVEA-96 Optima2 lead use assemblies (LUAs) into the HNP Unit 1 reactor as part of the Reload 24 fresh fuel batch. Even though Optima2 is a NRC licensed fuel design, the HNP Unit 1 assemblies are being treated as LUAs since only a limited number of them were part of the reload batch and they were placed in non-limiting core locations as required by HNP Technical Specification Section 4.2.1 for lead test assemblies.

This letter contains no NRC commitments. If you have any questions, please contact Jack Stringfellow at (205)992-7037.

Respectfully submitted,

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MJA/SYA/phr

Enclosure: SVEA-96 Optima2 Lead Use Fuel Assemblies for Edwin I. Hatch Nuclear Plant Unit 1

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Edwin I. Hatch Nuclear Plant
SVEA-96 Optima2 Lead Use Fuel Assemblies

Enclosure

SVEA-96 Optima2 Lead Use Fuel Assemblies for Edwin I. Hatch Nuclear Plant
Unit 1

Westinghouse Non Proprietary Class 3

NF-BSN-10-9
Revision 0

March 2010

Summary Report

SVEA-96 Optima2 Lead Use Fuel Assemblies for Edwin I. Hatch Nuclear Plant Unit 1

Westinghouse

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NF-BSN-10-9
Revision 0

Summary Report

SVEA-96 Optima2 Lead Use Fuel Assemblies for Edwin I. Hatch Nuclear Plant Unit 1

March 2010

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1 INTRODUCTION AND BACKGROUND

This summary describes the four SVEA-96 Optima2 Lead Use Assemblies (LUAs) for the Edwin I. Hatch Nuclear Plant Unit 1. Four SVEA-96 Optima2 LUAs will be loaded in Cycle 25 and will be discharged at the End of Cycle (EOC) 27. The objective of this LUA program is for Southern Nuclear Operating Company (SNC) to develop experience with Westinghouse as a possible alternate fuel vendor.

The SVEA-96 Optima2 assembly is designed as a reload assembly for BWR/3 through BWR/6 plants and for "D," "C," and "S" lattice cores. SVEA-96 Optima2 is a proven design with over ten years of operation in both European and domestic BWR reactors (i.e., more than five thousand assemblies have been in reactor operation).

As described in Reference 1, the Westinghouse U.S. NRC approved methods and codes (References 2 - 5) were used to demonstrate that all the design bases for nuclear fuel are met. The results of the steady-state, transient, and accident evaluations show that the SVEA-96 Optima2 LUAs can be adequately monitored with the GE14 reference assembly operating limits, e.g., Minimum Critical Power Ratio (MCPR), Maximum Average Planar Linear Heat Generation Rate (MAPLHGR), and Linear Heat Generation Rate (LHGR) limits.

An important condition for the evaluation of the design against the design bases is the assumption that the SVEA-96 Optima2 LUAs will not be treated as a unique fuel type in the plant Core Monitoring System (CMS). Input data as well as models in the CMS for the SVEA-96 Optima2 LUAs actually will be those that are valid for the GE14 reference assemblies.

The following general operational constraints apply to the SVEA-96 Optima2 LUAs:

- the LUAs shall not lead the core during normal operation
- the LUAs shall not lead the core during Anticipated Operational Occurrences (AOOs) and accidents
- the LUAs maximum rod average burnup shall not exceed 62 MWd/kgU

During steady-state operation, the LUAs shall not be operated with the core minimum margin to the LHGR, MAPLHGR, or MCPR limits. In addition, the total power of any LUA shall also be less than the maximum assembly power that is allowed for other fuel assemblies resident in the core. The margin to the MAPLHGR and LHGR limits for the LUAs shall be greater than the minimum allowed for other fuel assemblies resident in the core, and the SVEA-96 Optima2 LUAs will not lead the core during AOOs and accidents.

The average enrichment for the SVEA-96 Optima2 has been chosen to be 0.14 w/o ^{235}U lower than the average enrichment of the GE14 reference assemblies. Similarly, the SVEA-96 Optima2 design will have slightly higher gadolinia concentrations on the order of 0.5 to 3.0 w/o Gd_2O_3 relative to the GE14 reference assemblies. The SVEA-96 Optima2 assembly design yields slightly lower reactivity compared to the GE14 reference assembly. The lower reactivity for the SVEA-96 Optima2 assembly is a result of the lower enrichment and the higher gadolinia content compared to the GE14 reference assembly.

Three-dimensional calculations were performed to quantify the changes in bundle and nodal power when the GE14 reference assembly is replaced by the SVEA-96 Optima2 assembly. The effects from parameters such as the water-to-uranium ratio (manifested as a difference in void coefficient) or effects from other reactivity feedback mechanisms can be observed from the power distribution in these calculations. The SVEA-96 Optima2 will not be explicitly modeled in the CMS. The 3-D calculations

also provide the means for assessing the influence of the treatment of the SVEA-96 Optima2 assemblies in the CMS (i.e., the fact that the SVEA-96 Optima2 assemblies are treated as if they were GE14 assemblies).

The SVEA-96 Optima2 LUAs will be placed in a low power location in the core. The results show the SVEA-96 Optima2 LUAs operate at low power levels and have at least 29% margin to the maximum bundle and nodal power in the core. This large margin ensures that the LUAs cannot contribute to the predicted fuel in dryout under steady-state conditions or as the result of a design-basis transient. Therefore, the SLMCPR established for the resident fuel is valid with the SVEA-96 Optima2 LUAs installed.

As a result of the low power, the SVEA-96 Optima2 MCPR in Cycle 25 is much higher than the limiting MCPR in the core. The large margin to the MCPR in the core ensures that the SVEA-96 Optima2 bundle will not challenge the OLMCPR at rated or off-rated conditions. Furthermore, these large margins to the OLMCPR ensure the SVEA-96 Optima2 bundle will not reach the SLMCPR in case of an AOO or postulated accident.

Based upon the evaluations, it is concluded that the results reported in the Reload Licensing Analysis (RLA) for the reload will not have to be changed due to the introduction of four SVEA-96 Optima2 LUAs.

SNC will have an appropriate inspection plan commensurate with the LUA program's objectives, and any unexpected results will be communicated to the U.S. NRC in a timely manner.

2 SUMMARY

The evaluation performed for the introduction of the four SVEA-96 Optima2 LUAs shows:

- That the Shut Down Margin is improved when a GE14 reference assembly is replaced by a SVEA-96 Optima2 assembly, which is consistent with Westinghouse experience;
- The insertion of SVEA-96 Optima2 will have no adverse effect on the performance of the Standby Liquid Control System;
- The licensing basis for the spent fuel storage racks and the new fuel vault will not be invalidated by the insertion of SVEA-96 Optima2;
- That the Updated Final Safety Analysis Report (UFSAR) conclusions regarding postulated AOOs, accidents, and special events will not be invalidated by the insertion of SVEA-96 Optima2;
- The four SVEA-96 Optima2 LUAs can conservatively be monitored with the thermal limits for GE14 reference assembly;
- The maximum hydraulic lift loads on the LUA during normal operations and AOOs for SVEA-96 Optima2 fuel in the Hatch Unit 1 reactor are acceptable.

3 REFERENCES

1. NF-BSN-10-10, "Supplemental Licensing Report, SVEA-96 Optima2 Lead Use Assemblies for Edwin I. Hatch Nuclear Plant Unit 1" Revision 0, February 2010.

2. WCAP-15942-P-A, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors, Supplement 1 to CENP-287," March 2006.

3. CENPD-287-P-A, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors," July 1996.

4. CENPD-390-P-A, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors," December 2000.

5. CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactors Reload Fuel," July 1996.