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PORTLAND GENERAL ELECTRIC COMPANY
EUGENE WATER & ELECTRIC BOARD
AND
PACIFIC POWER & LIGHT COMPANY

TROJAN NUCLEAR PLANT

Operating License NPF-1
Docket 50-344
License Change Application 61

This License Change Application regards a waiver of Specification 5.3.1 of Appendix A to Operating License NPF-1 for the Trojan Nuclear Plant.

PORTLAND GENERAL ELECTRIC COMPANY

By C. Goodwin, Jr.
C. Goodwin, Jr.
Assistant Vice President
Thermal Plant Operation and Maintenance

Subscribed and sworn to before me this 12th day of May 1980.

Carole A. Hodgdon
Notary Public of Oregon

My Commission Expires: August 9, 1983

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LICENSE CHANGE APPLICATION 61

Add the following License Condition to Operating License NPF-1 for the Trojan Nuclear Plant:

Fuel Assemblies

"The requirements of Technical Specification 5.3.1 that each fuel assembly contain 264 fuel rods are waived in that for those fuel assemblies opposite baffle corners and that are subject to cross flow (baffle jetting), the outer Zircaloy-4 clad fuel rods may be replaced with dummy stainless steel rods in the area of impingement. This waiver is subject to a maximum of three rods per assembly and two assemblies in the core for the third and subsequent two fuel cycles."

REASON FOR CHANGE

During fuel inspection, significant degradation of one fuel rod in two separate fuel assemblies was discovered. One fuel assembly was located on the outside of the core adjacent to a baffle corner during the last (second) cycle of operation. The other fuel assembly was located on the outside of the core adjacent to a baffle corner during the first cycle of operation and then moved to an inside position during the last cycle. The method of failure is vibration of the fuel rod caused by impingement of cross flow through the baffle joint at the corner. A description of the incident is provided in Licensee Event Report (LER) 80-06. Permanent corrective action is being evaluated, but in any case cannot be taken during the current refueling outage. Temporary corrective action for Cycle 3 operation involves replacement of three fuel rods with a blank stainless steel rod in each of two assemblies on the outside of the core adjacent to the baffle corners where jet impingement induced fuel damage has occurred. The stainless steel rods have sufficient stiffness and errosion resistance to withstand the cross flow through the baffle corner joint. Technical Specification 5.3.1 requires 193 fuel assemblies in the core with 264 Zircaloy-4 clad fuel rods. A license condition is needed to permit six fuel rods to be replaced with six dummy stainless steel rods.

SAFETY/ENVIRONMENTAL EVALUATION

The proposed modification consists of replacing three fuel pins in each of the two fuel assemblies to be loaded adjacent to the inside baffle corners where baffle jetting-induced failures were observed. The fuel pins will be replaced with solid stainless steel rods of the same length and diameter as the active fuel pins.

A. Likelihood of Further Damage to Modified Peripheral Assemblies

The mechanisms for baffle jetting-induced fuel damage have been studied by Westinghouse. Their analytical models, as substantiated by the instances to date of such fuel damage, indicate that potential damage is restricted to the three fuel pins adjacent to the gap between baffle plates. No instances have been observed, for a baffle of the Trojan configuration, of damage to other fuel rods than those adjacent to the gap. Therefore, it is acceptable to replace only the three rods nearest the gap with dummy rods. Replacing the most susceptible fuel rod (the one most nearly aligned with the baffle plate gap) with a dummy rod will preclude the possibility of further baffle jetting-induced damage at that rod location during Cycle 3. Replacement of the adjacent rods ensures that the central rod does not impinge on fuel rods during any jetting-induced vibratory motion. Furthermore, the increased stiffness of the stainless steel dummy rods compared with normal fuel rods will tend to reduce the amplitude of the vibration induced by baffle jetting, thereby reducing the likelihood of propagation of damage to adjacent rods.

B. Effect on Core Performance, Technical Specification Limits and FSAR Accident Analyses

The Cycle 3 core loading pattern is being developed to provide the required cycle energy output consistent with the presence of the two modified peripheral assemblies. The affect of the presence of the dummy fuel rods on core performance and thermal limits will be addressed prior to Cycle 3 startup as part of the Westinghouse and PGE Cycle 3 Reload Safety Evaluation. Because of their peripheral location, the presence of the modified assemblies is not expected to have a significant impact on nuclear or thermal limits. That is, the original fuel design envelope will bound the perturbations in pin and assembly power, coolant enthalpy rise and radial flux tilt induced by the presence of the dummy fuel rods. Therefore, existing Technical Specification limits will not be exceeded and all applicable FSAR safety analyses will remain valid.

In the design of the fuel assembly skeleton, the individual fuel rods are held in place axially by spring friction at each grid. Differences that may occur in the axial growth of the dummy fuel rods compared with that of the normal fuel rods are accommodated by axial slip at the grids. This assures the dummy rods will not tend to bow and thereby alter adjacent flow channel areas. Hence, coolant flow rates in the neighborhood of the dummy rods will be unaffected. Replacing an active fuel rod with a dummy rod has the effect of causing a small local flux increase with a redistribution of power to the adjacent fuel pins. However, since the dummy rods are in low power peripheral assemblies, there is no possibility that the proposed modification could reduce the core margin to DNB.

C. Effect on Fuel Assembly Structure Integrity

The structural response of a fuel assembly is dominated by the skeleton design with the axial loads taken by the guide thimbles rather than the fuel rods. The overall impact of replacing three of the 264 rods with dummy rods on the capability of the assembly to withstand normal operating, accident, seismic or refueling loads is therefore negligible. Since the dummy rods are axially stiffer than the normal rods, flow-induced vibration around the dummy rods within modified assemblies will be less than with the original rods in place.

D. Effect on Technical Specifications and FSAR

Technical Specification (Appendix A) 5.3.1 describes the core as containing 193 assemblies each with 264 Zircaloy-4 clad fuel rods. Use of assemblies with less than 264 fuel rods requires an amendment to or waiver of Specification 5.3.1 as discussed above. Being descriptive in nature, the Design Feature Specifications have no specific bases and thus the Bases for Technical Specifications are unaffected.

Mechanical design of fuel is described in FSAR Section 4.2.1, Nuclear Design in Section 4.3, and Thermal Hydraulic Design in Section 4.4. The effects of stainless steel dummy rods are expected to be minimal and within the tolerances and allowances accounted for in the safety analysis report. Areas of performance and analysis most likely to be affected are discussed above. The mechanical design is essentially identical and the effects on nuclear and thermal hydraulic design will be accounted for in the fuel management program and reload safety analyses and no changes are required to the FSAR.

SCHEDULE CONSIDERATIONS

Prompt review and approval of this LCA is requested in order to avoid an impact on the refueling-maintenance outage schedule and allow resumption of power operation on June 28, 1980.

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