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

Operating License NPF-1
Docket 50-344
License Change Application 204

This License Change Application (LCA) 204 requesting amendment to Operating License NPF-1 to reflect the change of nuclear fuel supplier.

PORTLAND GENERAL ELECTRIC COMPANY

By ______________________
T. D. Walt
General Manager
Technical Functions

Subscribed and sworn to before me this 24th day of December, 1990.

____
Notary Public of Oregon

My Commission Expires: March 02, 1994

Reason for Change

The change of nuclear fuel supplier for the Trojan Nuclear Plant provides advanced fuel design features, improved access to the vendor's analyses, and reduced cost. Operation with this fuel supplier change results in increased neutron efficiency and enables Trojan to remain an economic source of power.

The changes that are the subject of this License Change Application (LCA) can be broken into three areas: (1) the physical changes associated with the Mark-BW fuel assembly design provided by Babcock and Wilcox (B&W); (2) the changes to analytical methods and models used to support Mark-BW Fuel; and (3) changes to Trojan Technical Specifications (TTS) which provide assurance that limitations on the conditions of Plant operation are enveloped by the fuel design and analyses. Together these changes support Trojan Plant operation with Mark-BW Fuel for Cycle 14 and beyond. Reasons for the changes within these three areas are provided below.

The physical changes associated with nuclear fuel are based on the experience and techniques available to the fuel supplier. To ensure compatibility with the existing nuclear fuel of Trojan, the Mark-BW nuclear fuel assembly has the same external physical dimensions. External differences include: Zircaloy grids in the active fuel region, different top and bottom nozzles, a different method of support structure fastening, fuel rods placed on the bottom nozzles, and slightly different fuel rod end plugs. Zircaloy grids provide improved neutron economy and hence lower fuel costs than Inconel grids used in the existing fuel. The different top and bottom nozzles provide the same functions as the existing fuel's top and bottom nozzles. Additionally, the design of the Mark-BW bottom nozzle helps trap potential loose objects or debris that could cause fuel damage. The support structure still consists of 24 thimble tubes and a central instrument tube which are fastened to the nozzles and grids using B&W techniques which are different than those of the existing fuel assemblies. The Mark-BW design retains the ability to reconstitute fuel for improved fuel reliability. The Mark-BW design also reduces the amount of fuel rod bowing based on grid spacer design features that reduce grid-to-fuel pin binding potential. The rods-on-bottom design provides a slight reduction in coolant pressure drop. Rod end plugs retain the low-flow resistance design, and fuel rod diameter remains unchanged. Due to the bottom nozzle debris trapping capability and the Zircaloy grids, a slight increase (less than 3 percent) in overall pressure drop across the fuel assembly occurs with the Mark-BW fuel.

Internally, the fuel rod clad is slightly thicker and hence the fuel pellet diameter is slightly smaller. This change provides additional margin for assuring fuel reliability. The other notable change internal to the fuel rod is the location of plenums and springs on the top and bottom of the fuel which is intended to reduce cladding stress that may occur if pellet/clad lockup occurs. The features of Mark-BW fuel are described in BAW-10172P, "Mark-BW Mechanical Design Report", dated July 1988.

The shutdown margin is reduced from 1.6 percent to 1.3 percent for MODES 1, 2, and 3 to allow for longer operating cycles. This change was originally intended to be submitted separately (based on a Westinghouse analysis) but has been included with this LCA to reflect the analysis input values used by B&W. Also, the thimble plugs are not required; this will speed refueling because the thimble plugs can either be in a fuel assembly or not.

The reason for the changes in the analytical methods and models supporting the use of Mark-BW fuel are described in general in Topical Report BAW-10163P-A, June 1989, "Core Operating Limit Methodology for Westinghouse Designed PWRs".

Trojan-specific topical reports for changing to Mark-BW fuel have been previously submitted in the following Portland General Electric Company (PGE) letters to the Nuclear Regulatory Commission (NRC): Topical Report BAW-10176, "Mark-BW Reload Safety Analysis for Trojan", dated April 7, 1990, and Topical Report BAW-10178P, "Mark-BW Thermal-Hydraulic Applications for the Trojan Nuclear Plant", dated April 25, 1990. Topical Report BAW-10177, "Mark-BW Reload LOCA Analysis for the Trojan Plant" is under review as of the date of this LCA. Changes in the analytical methods and models are based on different vendor techniques and approaches used to perform these analyses. The nature of the reanalysis is confirmatory to the results of the existing analyses since the changes involved are small and have not caused significant changes to Plant operation under normal or accident conditions. In addition to the changes in the analytical methods and models, some of the input parameters such as Reactor Coolant System flow have been changed. As such, a direct comparison between the two analyses for any given event does not isolate the effect of a single change. The changes in the results of the analysis are small, which supports the confirmatory nature of the analysis.

The changes in the TTS incorporates the Core Operating Limits Report (COLR) to minimize the need for cycle dependent changes related to core reload evaluations. NRC Generic Letter 88-16 provided guidance for preparation of a license amendment request to modify Technical Specifications that have cycle-specific parameter limits. The TTS changes utilize Generic Letter 88-16 guidance to incorporate the COLR as an NRC-approved methodology for establishing TTS limits associated with reactor physics parameters that generally change with each reload core. Other TTS changes are related to methods of evaluating the incore flux detector measurements.

In summary, the reasons for these changes are (1) to improve fuel efficiency and thereby fuel economy, (2) to enhance fuel design promoting fuel reliability and increasing the margin to fuel damage, (3) to employ different analytical methods and models in the fuel design and performance evaluations based on a different fuel supplier, and (4) to incorporate the COLR into the TTS so that cycle-specific reactor physics parameters values used in TTS limits will not require changes to the TTS, thus reducing administrative work load.

Description of Change

The use of Mark-BW nuclear fuel involves physical changes in nuclear fuel assembly design, changes in the analytical methods and models used in evaluating Plant responses, and changes to the Trojan Technical Specifications (TTS). The Mark-BW fuel assemblies are designed to be fully compatible with Westinghouse standard lattice fuel assemblies which comprise the balance of the core.

The physical changes involved with use of Mark-BW nuclear fuel assemblies are as follows:

1. The Mark-BW fuel assembly uses Zircaloy grid straps in the active fuel region to reduce parasitic neutron absorption whereas the existing fuel assembly uses Inconel grid straps. The lowest intermediate spacer grid in the Mark-BW fuel assembly does not utilize mixing vanes as the existing fuel assemblies do. The Mark-BW grid spacer attachment reduces grid-to-fuel pin binding potential which minimizes the amount of fuel rod bowing. The flow resistance of the Mark-BW Fuel is slightly higher, however the analyzed RCS flow limit is lower so that the available flow margin is increased.

2. The Mark-BW fuel assembly top nozzle is reconstitutable. The Mark-BW fuel assembly bottom nozzle incorporates a debris-resistant design which helps to trap potential loose objects or debris from the coolant and thus minimizes the potential fuel cladding damage. The amount of available debris is small, thus flow blockage of the bottom nozzle is not likely to occur.

3. The Mark-BW fuel assembly fastens the 24 guide thimble tubes and central instrument sheath on the top and bottom end nozzles and end grid straps to form the structural skeleton of the fuel assembly. The Mark-BW fuel assembly structure joins the bottom nozzle, top nozzle, guide and instrument thimbles, and grid spacers differently than the existing fuel assembly.

4. The Mark-BW fuel assembly places the fuel rods on the bottom nozzle rather than maintaining a clearance between the fuel rod ends and the bottom nozzle as in the existing fuel assembly design.

5. The Mark-BW fuel assembly uses fuel rod end plugs which are slightly different than the existing fuel assembly fuel rod end plugs but have negligible influence on fuel rod functions.

6. The Mark-BW fuel rod clad is the same outside diameter as the existing fuel rods, but the clad thickness of the Mark-BW fuel is 0.024 inches as opposed to 0.0225 inches for the existing fuel. This results in the Mark-BW fuel pellet being 0.3195 inches in diameter, a decrease from the 0.3225-inch diameter of the existing fuel pellets.

7. The Mark-BW fuel assembly locates plenums and springs on the top and bottom of the fuel rather than on the top only as with the existing fuel assemblies. The additional springs provide protection against axial gap formation during shipping, handling, and irradiation.

The changes to the analytical methods and models are based on different approaches or techniques employed by the different fuel suppliers. The analyses for Mark-BW fuel confirm the results and conclusions of previous analyses for the existing fuel assemblies. Changes in the fuel assembly design, Plant operation, and parameter input values have been small and do not significantly alter results or conclusions from analyses for existing fuel assemblies. For example, the analysis assumed that thimble plugs were not installed in fuel assemblies; this causes a slight increase in bypass flow.

The shutdown margin is changed to 1.3 percent for Modes 1 through 3. This change was originally analyzed by Westinghouse and was intended to be submitted prior to this LCA. However, since this change was not submitted, the shutdown margin changes are included in this LCA. A shutdown margin of 1.3 percent was used in the steamline break analysis provided in BAW-10176. The evaluation of the change entails reanalysis of the Main Steam Line Break (MSLB) accident to verify that the acceptance criteria are met. This evaluation is complete and the results support the reduced shutdown margin.

The changed analytical methods and models examined the Trojan Final Safety Analysis Report (FSAR) referenced transients and accidents to assess continued applicability of the sequence of events and bounding results for reload cores with Mark-BW fuel. FSAR-evaluated transients or accidents affected by operation with Mark-BW fuel were reanalyzed. Other transients or accidents were evaluated to identify relevant core-related parameters and bounding values to be confirmed for consistency with the referenced safety analyses. These analyses and evaluations confirmed that Trojan Plant operation with Mark-BW reload cores and mixed cores will continue to be within the previously reviewed and licensed safety limits.

The changed analyses methods and models for use of Mark-BW fuel at Trojan include various tests and computer codes as described in the following topical reports which have been/will be submitted for NRC approval:

BAW-10176, January 1990, "Mark-BW Reload Safety Analysis for Trojan".

BAW-10177, October 1990, "Mark-BW Reload LOCA Analysis for the Trojan Plant".

BAW-10178P, March 1990, "Mark-BW Thermal-Hydraulic Applications for the Trojan Nuclear Plant".

These analyses methods and models for use of Mark-BW fuel utilize acceptance criteria fully consistent and compatible with that of the

Trojan FSAR for existing fuel. This license change application is based on the premise that these referenced topical reports will receive NRC approval.

The changes to the TTS are provided in Attachment B. These changes incorporate the Core Operating Limits Report (COLR) and reduce the potential for changes related to reactor physics parameters that generally change with each reload core. Consistent with the guidance of NRC Generic Letter 88-16, these changes include:

1. The addition of the definition of a named formal report that includes the values of cycle-specific parameter limits that have been established using an NRC-approved methodology (BAW-10163-P-A) and consistent with all applicable limits of the safety analysis.

2. The addition of an administrative reporting requirement to submit the formal report on cycle-specific parameter limits to the NRC for information.

3. The modification of individual Technical Specifications to note that cycle-specific parameters shall be maintained within the limits provided in the defined formal report.

Significant Hazards Determination

A determination of no significant hazards considerations may be made if operation in accordance with the proposed change would not:

1. involve a significant increase in the probability or consequences of an accident previously evaluated;

2. create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. involve a significant reduction in margin of safety.

The specific concerns of the above items are addressed as follows:

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The analyses provided in Topical Reports BAW-10176, BAW-10177, and BAW-10178 show that the change does not significantly change the results of previously evaluated events. These analyses provide the template for accident analyses assumptions that must be met by the cycle-specific reload analysis.

   The Trojan Cycle 14 reload core with Mark-BW fuel will be evaluated to operate within the approved limits for accident analysis. The limits provided in the TTS and described in the FSAR provide the framework for accident analyses. By maintaining these limits, the probability or consequences of accidents related to the core changes do not significantly change. Thus, it is concluded that there is no significant increase in the probability or consequences of previously evaluated accidents.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The change to Mark-BW fuel cores and mixed (transition) cores has been evaluated in the Topical Reports, and it was concluded that the change did not create new or different kinds of accidents. The change in fuel suppliers has been evaluated for consideration of the effects of power distribution and peaking factors such that there are no restrictions on the use of Mark-BW fuel assemblies beyond those already established in the FSAR and TTS. Adherence to the safety analysis limits restricts the possibility of new or different accidents. Historically, new accidents have not been associated with changes in fuel suppliers as long as safety analysis limits continue to be met. It is concluded that transition to Mark-BW fuel does not create the possibility of a new or different kind of accident from those previously evaluated.

3. Does the change involve a significant reduction in a margin of safety?

The margin of safety is established by the acceptance criteria used by the NRC. Meeting the acceptance criteria assures that the consequences of accidents are within known and acceptable limits. The Loss-of-Coolant Accident (LOCA) acceptance criteria are unchanged: peak cladding temperature of ≤2200°F, peak cladding oxidation of ≤17 percent, average clad oxidation of ≤1 percent, and long-term coolability. These requirements continue to be met. The methods used to demonstrate conformance with these limits have changed, and are reviewed to assure that the methods, as well as the results, are acceptable. The acceptance criteria for DNB events has not changed and is still the 95x95 probability and confidence interval that DNB is not occurring during the transient. The DNB correlation, and methods used to demonstrate that DNB limits are met, have changed, and these changes are reviewed to assure conformance with acceptable practices. The shutdown margin change appears to affect a margin of safety, but the analysis results in BAW-10176 show that acceptable consequences are maintained. Thus, the new shutdown margin does not intrude on the margin of safety provided by the acceptance criteria. Other changes, as well as the changes discussed above, have been evaluated in the referenced safety analyses and are shown to meet applicable acceptance criteria. Other margins such as avoiding fuel centerline melting are not significantly changed. Based on these results, it is concluded that the margin of safety is not significantly reduced.

In addition to the above elements of a significant hazards determination, it is relevant to compare a change with previously reviewed significant hazards determinations. The following items are of concern:

4. Are the fuel assemblies significantly different from those found previously acceptable at Trojan?

   Fuel currently at Trojan has evolved over many years and has been adapted to handle various circumstances. The Mark-BW fuel assemblies were made to fit the existing design envelope and have the same external dimensions as the Westinghouse fuel. The Zircaloy grids do not significantly alter fuel assembly performance. Evaluation of the Mark-BW fuel assemblies shows they are compatible with the existing assemblies. This has been shown previously at the McGuire plant. It is concluded that the fuel design has not been changed significantly from fuel previously approved at Trojan. The purpose of this license change application is to review and document the analysis and Technical Specification changes needed to support use of the new fuel.

5. Have the Technical Specification acceptance criteria and analysis methods used to meet them not been significantly changed and previously found to be acceptable by the NRC?

   The transition to Mark-BW fuel and incorporation of COLR does not significantly change the Technical Specification acceptance criteria. The analytical methods used to demonstrate conformance with the applicable safety limits and applicable regulations will receive NRC review and approval, and are incorporated into the TTS for future reload cores consistent with the guidance of NRC Generic Letter 88-16.

In conclusion, the changes associated with the transition to Mark-BW fuel and incorporation of COLR into the TTS for operation at Trojan have been found to involve no significant hazards. Implicit in this conclusion is the position that the referenced topical reports have received prior NRC approval. The application of Mark-BW fuel is not judged to be significantly different from other fuel and is so warranted by the vendor. Thus, there are no significant hazards associated with the transition to Mark-BW fuel.

Environmental Evaluation

An environmental evaluation was performed as required by 10 CFR 50.59 and the TTS. The review determined that the proposed change does not create an unreviewed environmental question.

GRA/bsh
5743W.1290