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Additional Information Relative to the Performance of AREVA NP Supplied BWR Fuel Channels

Ref. 1: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "10 CFR Part 21 Notification of an Error in BWR Safety Limit" NRC:05:069, December 5, 2005.

Ref. 2: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Viewgraphs for December 8, 2005 Meeting on Channel Bow" NRC:05:068, December 5, 2005.

Ref. 3: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Control Rod Friction Surveillance Recommendations for Framatome ANP Fuel Channels" NRC:06:005, February 7, 2006.

The purpose of this letter is to provide the NRC with an update regarding the performance of AREVA NP BWR Fuel Channels.

Background

AREVA NP reported in Reference 1 that BWR Fuel Channels supplied by AREVA NP were experiencing unexpected bow. This resulted in the declaration of a defect for one plant as discussed in Reference 1. Distortion of fuel channels can result in increased fuel rod peaking while interference between the fuel channels and control blades can result in reduced scram times. Both can reduce margin to plant operating limits. This is consistent with the industry experience described in NRC Information Notice 89-69 Supplement 1.

A meeting was held with the NRC to discuss this issue on December 8, 2005. The viewgraphs presented during that meeting are documented in Reference 2.

AREVA NP has recommended to its customers that they implement a surveillance program for control blade cell friction. Cell friction surveillance recommendations were developed and communicated to utility customers to help them manage this issue. The purpose of the recommendations is to allow plant operators to identify slow to settle cells, avoid damage to fuel and core internals due to potential interference between the

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control blades and the fuel assemblies, and to maintain conservative margins to licensed operating limits. Criteria were empirically developed to identify channels that are susceptible to shadow corrosion based upon control blade exposure and assembly burnup. Based upon susceptibility, control cells can be classified into categories with different intervals for surveillance testing. The objective is to assure identification of all susceptible cells while minimizing the surveillance of non-affected cells. AREVA NP is continuing to monitor reactor experience with the surveillance recommendations and revisions will be issued as necessary to incorporate operating experience. The recommendations were provided to the NRC for information in Reference 3.

There is sufficient conservatism in the safety analysis that application of an MCPR penalty is not necessary until there is evidence that increased control cell friction is present as indicated by slow to settle control blades. Once slow control blade settling has been detected and it is apparent that a plant may be affected by unusual channel bow, an MCPR penalty of 0.02 should be applied as a precautionary measure unless an analysis has been performed to quantify the MCPR impact and the results incorporated in the licensing limits. Plant licenses contain requirements for scram testing to assure control blade operability and limits on the number of inoperable control blades assure shutdown capability.

Reactor experience has shown that channel bow due to shadow corrosion develops slowly and can be effectively managed with proper surveillance and increased operating limits. Surveillance to identify control cells with increased friction in combination with scram testing to assure shutdown capability assures that plant licensing bases are not impacted. Operational experience will be used to refine the surveillance recommendations. Two recent cases of operational experience in early 2006 are described below.

Susquehanna Unit 2

PPL used Areva NP's surveillance recommendations to test control blade settling in February 2006. During a sequence exchange conducted at the same time, two cells were identified with slow settling times. The cells contained channels that had control blade exposure over the threshold for susceptibility to slow settling times but with burnup that was slightly under the threshold for 80 mil channels. In order to identify all channels that are susceptible to slow settling, the burnup threshold for 80 mil channels has been reduced and the recommendations modified to reflect this lower threshold.

LaSalle Unit 1

In September 2005, LaSalle Unit 1 reported one slow to settle control blade in a cell with two assemblies supplied by AREVA NP and two assemblies supplied by another fuel vendor. The control blade in this cell subsequently failed to insert completely during a low power scram at the end of the cycle. The root cause for this was identified as increased friction between the fuel channel and the control blade due to excessive channel bow. A second contributing factor to this event was improper performance of the surveillance for cell friction (GNF surveillance recommendations in this case). It is expected that had proper surveillance been performed that this control blade would have been declared inoperable prior to the scram when it failed to fully insert.

On the basis of a comparison of the cell conditions over the operating cycle with the AREVA NP surveillance recommendations, the burnup threshold for 100 mil channels has been reduced and the recommendations to customers modified to reflect this lower threshold. This event highlights the importance of performing the recommended surveillance properly in order to avoid the potential for control blades to fail to fully insert.

The above information is being provided to keep the NRC abreast of the development of the AREVA NP surveillance recommendations provided in Reference 3. AREVA NP will continue to monitor the performance of AREVA NP supplied BWR Fuel Channels and to communicate with the NRC as new information is developed.

Sincerely,

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Project 728