



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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SEND TO: Pete Snyder

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MESSAGE

Pete, Attached are 2 pages from the license Feb 5, 2003 letter to us on the Thermal power issue.

I believe the following will be a "quick" answer from the nukes "What is the current United bias for LFPC?" -> Please ask ... Thanks!

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B-26

Attachment 1

Byron Station Unit 1
Licensed Thermal Power Limit Verification

adjustments and indicated Byron Station, Unit 1 was producing 12.9 MWe more than Braidwood Station, Unit 1 before uprate. Post-uprate tests supported this difference indicating Byron Unit 1 was producing 16.0 MWe more than Braidwood Unit 1. The variation between the pre-uprate and post-uprate unit differences is within the accuracy of the ASME test ability.

Considering the MWe difference between Byron Unit 1 and Braidwood Unit 1 after implementation of the ultrasonic feedwater corrections, EGC expected to see a similar scale difference between secondary cycle plant parameter data, with Byron Unit 1 indicating higher key flows and pressures than Braidwood Unit 1. Analysis and continued data gathering indicate key parameter data for Byron Unit 1 trending approximately 1% higher than Braidwood Unit 1, which supports this conclusion.

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3. Assessment of Byron Station Unit 1 Fuel Burnup Rate

The NRC indicated that there appears to be evidence of higher fuel burnup rate at Byron Unit 1 as compared to Braidwood Unit 1. The EGC Nuclear Fuels Group has reviewed the fuel burnup rates at both Byron Unit 1 and Braidwood Unit 1 after Crossflow was implemented. Specifically, the review was performed by examining the respective unit's fuel cycle boron letdown curve focusing on the point where the cycle loses full power capability. Based on examination of boron concentration measurements alone, no conclusion can be drawn regarding the actual value of reactor power level.

Prior to each refueling outage, the core design process is initiated to determine the next cycle's energy requirements, optimum uranium order, core loading pattern, cycle operating characteristics, and acceptability of the core design from a neutronic, thermal-hydraulic, and safety analysis perspective. Fuel management for the Byron and Braidwood units utilize the NRC-approved Westinghouse ANC / Phoenix computer codes and methods. Energy planning and operation uncertainties are incorporated into the core design process to accommodate fuel management flexibility and potential extended cycle operations (i.e., coastdown). Factors that influence the energy requirements for a specific fuel cycle and ultimately the amount of uranium procured for each core design include the expected number of operating days, the predicted operating capacity factor, load follow requirements, extended cycle operations, the ANC code bias associated with loss of full power capability (LFPC), and the fuel assembly multi-cycle energy requirements plan. After consideration of these aspects of the future cycle's operating characteristics, the Nuclear Fuels Group establishes the core-loading pattern.

Part of the design requirements mentioned above was the ANC code bias. An ANC code bias is used to adjust the cycle energy based on differences seen, from cycle to cycle, between the predicted and actual end of cycle energies. This bias is the energy equivalent of the difference in boron concentration between where the fuel cycle actually reaches LFPC (i.e., where the critical boron concentration at "all rods out, hot full power," is zero) and where the cycle should be on the predicted boron letdown curve. The boron letdown curve is generated as part of the ANC hot full power depletion cases and is expressed in ppm boron versus core burnup in megawatt-days per metric tonne uranium (MWD/MTU). Westinghouse methods, with respect to LFPC predictions, have shown a generic industry bias of 10 ppm

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boron. This 10 ppm bias is based on Westinghouse's historical design practices. A 10 ppm bias is equivalent to approximately three days of full power operation for Byron and Braidwood Stations. The 10 ppm bias is a statistical value based on the results of all Westinghouse designs; however, each individual unit normally has a bias that varies somewhat from the Westinghouse statistical average.

The bias for Byron Unit 1 has historically been in the range of 15 to 20 ppm, but has increased to approximately 50 ppm. This bias is within the range of recent fuel cycle bias variations (i.e., approximately 10 ppm to 60 ppm) observed on the other Byron/Braidwood units. The LFPC bias for a given cycle can be influenced by a number of issues, such as changes in plant parameters, plant uncertainties, methodologies, etc. Other known factors such as Axial Offset Anomaly (AOA) and Boron-10 depletion are not expected to significantly impact the LFPC bias. These are local factors and their impact would be manifested as "measured to predicted" differences in the monthly Technical Specification reactivity surveillance results. There is currently no definitive indication that a burnup rate higher than the corresponding licensed thermal power limit is actually being experienced on Byron Station, Unit 1.

Specific bias data for the Byron and Braidwood units "pre" and "post" Crossflow implementation are presented below. Note that the Crossflow technology was implemented in May 2000 for Byron Station, Units 1 and 2, and June 1999 for Braidwood Station, Units 1 and 2.

Byron 1

Cycle 9 - 15 ppm (Fall 1997 to Spring 1999).
 Cycle 10 - 30 ppm (Spring 1999 to Fall 2000). Crossflow implemented May 2000.
 Cycle 11 - 50 ppm (Fall 2000 to Spring 2002). Power uprate implemented May 2001.
 Cycle 12 - currently in middle of cycle - LFPC bias indeterminate. Used bias of 35 ppm.

Byron 2

Cycle 8 - 20 ppm (Spring 1998 to Fall 1999).
 Cycle 9 - 20 ppm (Fall 1999 to Spring 2001). Crossflow was implemented May 2000.
 Cycle 10 - 60 ppm (Spring 2001 to Fall 2002). Power uprate implemented May 2001.
 Cycle 11 - early in cycle - LFPC bias indeterminate. Used bias of 35 ppm for cycle planning.

Braidwood 1

Cycle 7 - 10 ppm (Spring 1997 to Fall 1998).
 Cycle 8 - 15 ppm (Fall 1998 to Spring 2000). Crossflow implemented June 1999.
 Cycle 9 - 25 ppm (Spring 2000 to Fall 2001).
 Cycle 10 - 35 ppm (Fall 2001 to Spring 2003). Projected bias as we approach Spring 2003 outage). Power uprate implemented at beginning of cycle in October 2001.

Braidwood 2

Cycle 7 - 10 ppm (Fall 1997 to Spring 1999).
 Cycle 8 - 15 ppm (Spring 1999 to Fall 2000). Crossflow implemented June 1999.
 Cycle 9 - 10 ppm (Fall 2000 to Spring 2002).
 Cycle 10 - currently in middle of cycle - LFPC bias indeterminate. Used 20 ppm bias for cycle planning. Power uprate implemented at beginning of cycle in April 2002.