



Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

September 14, 1992

Ltr: BYRON 92-0585


U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(i).

This report is number 92-007; Docket No. 50-454.

Sincerely,



R. Pleniewicz
Station Manager
Byron Nuclear Power Station

RP/CW/mw

Enclosure: Licensee Event Report No. 92-007

cc: A. Bert Davis, NRC Region III Administrator
W. Kropp, NRC Senior Resident Inspector
INPO Record Center
CEC Distribution List

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LICENSEE EVENT REPORT (LER)

Form

Facility Name (1)

Docket Number (2)

Page (3)

Byron, Unit 1

0 5 0 0 0 4 5 4 1 of 2 5

Title (4)

Non-Conservative Samarium in Previous Revisions to SUM

Event Date (5)			LER Number (6)			Report Date (7)			Other Facilities Involved (8)											
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names	Docket Number(s)										
0	8	1	8	9	2	9	2	0	0	7	0	0	0	9	1	1	9	2	Byron Unit 2	0 5 0 0 0 4 5 5
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)																	
1			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)											
POWER LEVEL (10)			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)											
0 9 5			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		Other (Specify											
			20.405(a)(1)(iii)		X 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		in Abstract											
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		below and in											
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		Text)											

LICENSEE CONTACT FOR THIS LER (12)

Name J. Nevling, Technical Staff Engineer Ext. 2154

TELEPHONE NUMBER

J. VanLaere, Asst. Tech Staff Supervisor Ext. 2106

AREA CODE

8 1 5 2 3 4 - 5 4 4 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
				N					

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15)

Yes (If yes, complete EXPECTED SUBMISSION DATE) X NO

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

A review of past executions of Byron Operating Surveillance BOS 1.1.1.1.e-1, Shutdown Margin Surveillance, has determined that on February 11, 1990, Byron Unit 2 did not meet its Technical Specification requirement for shutdown margin. This review was initiated when non-conservative errors were discovered in past revisions of the surveillance. Only one instance was found where requirements were not met. Similar errors were discovered in the current revision of this procedure, but did not result in a violation of the shutdown margin requirement.

This event is reportable per 10CFR50.73(a)(2)(i), any operation or condition prohibited by the plant's Technical Specification.

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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 08/18/92 / 1200

Unit 1 MODE 1 - Pwr Ops Rx Power 95% RCS [AB] Temperature/Pressure Normal Operating

Unit 2 MODE 1 - Pwr Ops Rx Power 96% RCS [AB] Temperature/Pressure Normal Operating

B. DESCRIPTION OF EVENT:

On July 27, 1992, engineers at Braidwood Station identified a non-conservative error in the method used to calculate shutdown margin. Although this method is not currently in use at Byron, it had been used prior to September, 1991. A review of previous executions of Byron Operating Surveillance BOS 1.1.1.1.e-1 was performed for both units to determine if adequate shutdown margin had been maintained. On August 18, 1992, it was determined that the requirements of Technical Specification 3.1.1.1 had not been met for the surveillance performed on February 11, 1990. Specifically, 2BOS 1.1.1.1.e-1, Shutdown Margin Surveillance, was performed using the erroneous method and showed that adequate margin existed. Re-evaluation of this execution with the error corrected showed that actual shutdown margin was -793 pcm rather than the required value of -1300 pcm.

During the review of this event, a second error was discovered in the procedure. This error consisted of double accounting for the change in shutdown margin requirements below 200°F. The second error in the procedure did not affect this execution of the surveillance, nor did it cause any other execution to fail.

During the review and analysis of this event, an additional error was discovered in the existing shutdown margin procedure. This consisted of a potential non-conservatism in the calculation of boron worths at very low temperatures. A review of executions of the current procedure was performed. No instance was found where adequate shutdown margin was not maintained.

C. CAUSE OF EVENT:

The direct cause for the failure to maintain adequate shutdown margin was a procedural flaw which accounted for the reactivity worth of samarium twice. The base methodology for calculating shutdown margin was derived from the Westinghouse Plant Operations Package (POP). This methodology used a baseline required boron concentration value which was adjusted for off-nominal conditions. Byron Curve Book (BCB) Table 1-1 listed these boron concentration values. Nominal conditions were assumed to be a no-xenon, no-samarium case. The presence of samarium and xenon was credited in procedural steps within the shutdown margin surveillance. Beginning with Cycle 2 for each unit, Nuclear Fuel Services (NFS) assumed design duties for the Byron cores, including the calculation of cycle-specific Table 1-1 boron concentration data. In an effort to improve the accuracy of the tables, the presence of samarium was included in the calculation.

A second problem involved the transition from the Mode 4 to Mode 5 shutdown margin requirements. In Modes 2 through 4 1300 pcm of shutdown margin is required. This decreases to 1000 pcm in Mode 5. This 300 pcm change was accounted for explicitly in the shutdown margin surveillance and also implicitly within the BCB Table 1-1 values. Neither of these changes in the method of calculating Table 1-1 was adequately communicated to the generating stations. Therefore, both of these phenomena were accounted for twice.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION											Form Rev 2.0	
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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

C. CAUSE OF EVENT: (continued)

Problems with the existing procedure arose because of similar lack of understanding of the assumptions inherent in the curvebook figures and tables. Station personnel had included calculations for known reactivity phenomena which were in fact already accounted for within the curvebook figures and tables. No indication of these assumptions was included with the figures, however, making it impossible to determine that a discrepancy existed without extensive research (such as was prompted by the known problems in this case).

The root cause for these events was a breakdown in communications between the station nuclear groups and corporate Nuclear Fuel Services Department (NFS). The original failure occurred in April of 1987 when the Unit 1 Cycle 2 Nuclear Design Report (NDR) was transmitted to the station without a description of the changes incorporated in the tables. Following this initial failure to address the changes, the Unit 2 Cycle 2 curvebook was issued in March of 1989 with the same assumptions built into the tables. During the length of time that the methods at both the station and NFS had been in place (essentially two years) there was no review performed. Subsequent cycles continued this pattern until the recent discovery of the error and examination of the entire issue.

D. SAFETY ANALYSIS:

These events had no adverse impact on plant or public safety. Only one instance was found where the procedure caused a failure to meet shutdown margin requirements. Even in this instance, plant safety analysis remained bounding.

Shutdown margin is calculated assuming that the most reactive control rod in the core is fully withdrawn and accident analyses proceed from that basis. At the time when the Technical Specification limit was exceeded, all control rods were fully inserted in the core. This provided an additional -810 pcm of margin which was not accounted for in the surveillance. The cumulative total margin was then -1603 pcm. This margin is more than adequate to ensure that the plant was actually in a safe and bounded condition.

E. CORRECTIVE ACTIONS:

1. Current and past revisions of the shutdown margin surveillance were reviewed for inconsistencies with the curvebook tables and figures. As previously discussed, this review identified one additional problem in prior revisions of the procedure and one problem in the current procedure. This review included, but was not limited to; an assessment of the assumptions inherent in the curvebook figures, a comparison of the methods assumed in the Nuclear Design Report versus those in use in the procedures and a re-assessment of the appropriateness of the method currently used to calculate shutdown margin. These reviews included discussions with NFS and the other station nuclear groups.
2. NFS will provide a document including a comprehensive listing of the assumptions inherent in the curvebook data tables and figures. This documentation shall be detailed enough that errors such as exist in the present procedure can be easily identified. Whenever the curvebook data table generation methodology is changed, the requested document shall have a revision submitted to the station as well. Any changes in the methods used to generate the curvebook tables and figures will be reviewed for possible impact on station procedures as part of the On-Site Review of the cycle specific Nuclear Design Report. NTS #454-180-92-04300-04 will track a revision to BVS XPT-3 requiring this review. Furthermore, NFS shall have a procedure controlling this process. NTS #4541809204300-01 will track completion of this listing.

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TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]

E. CORRECTIVE ACTIONS: (continued)

3. The training course for Qualified Nuclear Engineers will include a section on the curvebook assumptions. (NTS #4541809204300-02)
4. Procedure revisions have been submitted to correct the errors known to exist in the current revisions of the shutdown margin surveillances for both units. (NTS #4541809204300-03)
5. A number of initiatives were undertaken in 1990 to improve communications between the station nuclear groups and NFS. At the present time, these include: a weekly technical issues conference call; quarterly face-to-face meetings with all three PWR stations and NFS; temporary assignment of station personnel to NF to increase familiarity with NFS procedures and responsibilities; and the assignment of one individual to be the liaison between each station and NFS. These measures have substantially improved communications already. It should be noted that the primary communications failure took place more than five years ago, prior to the implementation of these measures.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (DIR, LER)

DVR 6-1-86-066 Shutdown Margin Procedure Incorrect
 DVR 6-2-90-006 ECC Tolerance Due to Inaccurate Rod Worth Curves
 Trend 90-02
 DVR 6-1-88-012 INCORE Computational Errors
 DVR 6-1-88-234 Incorrect Boron Follow Constants Caused by Computer Problems
 DVR 6-1-89-038 Error in Prediction of Burnup Required for Negative MTC
 DVR 6-2-90-002 Improper FOLLOW Constants

b) INDUSTRY SEARCH (OPEX's NPRDS)

No items were found which were directly related to this event.

c) NWR

Not applicable.

d) ANALYSIS

DVR 6-10-86-066 was caused by a calculational error by Westinghouse that failed to account for the reactivity competition effects of Xenon, Samarium, and Boron. This error applied to only Unit 1 Cycle 1.

Trend 90-02 identified four occurrences of inadequate review of NFS generated data that was to be used in Technical Specification surveillances. The corrective actions listed in item E.1 were designed to improve reviews.

The root cause of DVR 6-2-90-006 is similar to the problems identified in this LER. It must be noted that the errors that caused this event occurred prior to the event recorded in DVR 6-2-90-006. The corrective actions identified in E.2 and E.3 are designed to make further improvements in communication between the station and NFS.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

G. COMPONENT FAILURE DATA:

MANUFACTURER	NOMENCLATURE	MODEL NUMBER	MFG PART NUMBER
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None.

H. OTHER RELATED DOCUMENTS:

Letter W. Naughton to R. Pleniewicz, "Resolution of Action Items from Byron Reactivity Management Task Force", March 15, 1990 PND/013/90

Technical Specification 3/4.1.1 and 3/4.1.2, Boration Control Shutdown Margin