



Commonwealth Edison
Braidwood Nuclear Power Station
Route #1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

September 18, 1992
BW/92-0482

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

Dear Sir:

The enclosed voluntary Licensee Event Report from Braidwood
Generating Station is being transmitted to you as a 30-day written report.

This report is number 92-010-00, Docket No. 50-456.

K. L. Kofron
Station Manager
Braidwood Nuclear Station

KLK/AJS/dla
630
ZD85G

Encl: Licensee Event Report No. 92-010-00

cc: NRC Region III Administrator
NRC Resident Director
INPO Record Center
CECo Distribution List

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)

Braidwood 1

Docket Number (2)

0 | 5 | 0 | 0 | 0 | 4 | 5 | 6

Page (3)

1 | of | 0 | 5

Title (4)

Dual Accounting for Samarium Due to Procedural Deficiency

| 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 4 | 9 2 | 9 2 | 0 1 0 | 0 0 | 0 2 | 1 3 | 9 2 | Braidwood 2 | 0 5 0 0 0 4 5 7 |
| 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 0 8 5 | | | 20.405(a)(1)(ii) | | 50.36(c)(2) | | 50.73(a)(2)(vii) | | <input checked="" type="checkbox"/> Other (Specify | |
| | | | 20.405(a)(1)(iii) | | 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: D. Wise, Technical Staff Engineer Ext. 2490

TELEPHONE NUMBER: AREA CODE 8 | 1 | 5 | 4 | 5 | 8 | - | 2 | 8 | 0 | 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 |
|-------|--------|-----------|---------------|---------------------|-------|--------|-----------|---------------|---------------------|
| | | | | | | | | | |

SUPPLEMENTAL REPORT EXPECTED (14)

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

Expected Submission Date (15) Month | Day | Year

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

Procedure 1/2 BwOS 1.1.1.1.e-1 'Shutdown Margin Surveillance Verification During Shutdown' makes a correction for the presence of Samarium to the boron value obtained from Curvebook Table 1-1 'Minimum Required Boron Concentration for Shutdown Margin as a Function of Temperature and Burnup.' However, Table 1-1 already accounts for the presence of Samarium.

| LICENSEE EVENT REPORT (LER) TEXT CONTINUATION | | | | | | | | | | | Form Rev 2.0 | |
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| | | | | | | Year | Sequential Number | Revision Number | | | | |
| Braidwood 1 | | 0 5 0 0 0 4 5 6 | | | | 9 2 | - 0 1 0 | - 0 0 | 0 2 - f 0 5 | | | |
| TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX] | | | | | | | | | | | | |

A. PLANT CONDITIONS PRIOR TO EVENT:

UNIT: BRAIDWOOD 1;
 EVENT DATE: August 14, 1992; EVENT TIME: 1500;
 MODE 1 - Power Operation Rx Power 085%
 RCS [AB] Temperature/Pressure HOT / HOP

UNIT: BRAIDWOOD 2;
 EVENT DATE: August 14, 1992; EVENT TIME: 1500;
 MODE 1 - Power Operation Rx Power 094%
 RCS [AB] Temperature/Pressure HOT / HOP

B. DESCRIPTION OF EVENT:

On 7/22/92 at approximately 1315 hours, Braidwood Nuclear Group Personnel contacted their counterparts at Byron Station and the Commonwealth Edison Nuclear Fuel Services (NFS) department via conference call. The call was made to determine what samarium conditions Curvebook Table 1-1 'Minimum Boron Concentration for Shutdown Margin as a Function of Temperature and Burnup' was generated with. NFS responded that peak samarium was included at 0 MWD/MTU and Hot Full Power (HFP) equilibrium samarium was included after 1000 MWD/MTU. The current Braidwood Shutdown Margin (SDM) procedure 1/2 BwOS 1.1.1.1.e-1 assumes that there is no samarium in Table 1-1. This created the situation where the procedure may double account for the samarium already in Table 1-1. NFS was requested to provide verification of the samarium conditions in Table 1-1 and provide the maximum reactivity effect the samarium has on the required boron concentration.

Past performances of BwOS 1.1.1.1.e-1 were to be reviewed using the maximum reactivity effect specified by NFS. This value was supplied on 7/31/92, and was determined to be 80 ppm. If the difference between measured and calculated boron concentrations was greater than 80 ppm, the effect of the samarium would not cause a SDM violation.

At 1430 hour on 7/23/92, the Braidwood Lead Nuclear Engineer (LNE) reviewed the samarium issue with the Braidwood Station Reactor Engineer (SRE). The SRE suggested to put together a temporary procedure change (TPC) in case a unit trip occurred before the samarium error in the SDM procedure was corrected. Operations was contacted by the SRE and were notified to have a TPC ready if there was a unit trip.

The Braidwood Nuclear Group took responsibility for retrieving all occurrences/performances of BwOS 1.1.1.1.e-1 and reviewing which ones corrected for samarium. These surveillances were then reviewed to determine the difference between the calculated required boron concentration and the actual value. This review was completed on 8/21/92. No violations of the SDM Technical Specification caused by the samarium error were found.

This event is being reported as a Voluntary Licensee Event Report, pursuant to 10CFR50.73.

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C. CAUSE OF EVENT

The direct cause for the potential 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. Braidwood Curve Book (BwCB) 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 Braidwood 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.

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 October 1989 when the Unit 1 Cycle 2 Curvebook 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 May of 1990 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. No instances were found where the procedure caused a failure to meet shutdown margin requirements.

Shutdown margin is calculated assuming that the most reactive control rod in the core is fully withdrawn, and accident analyses proceed from the basis. Normally during plant shutdown, all control rods are fully inserted in the core. This provides an additional -810 pcm of margin which is not accounted for in the surveillance. This margin is more than adequate to offset the effects of double counting samarium. This ensures that the plant is actually in a safe and bounded condition.

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

E. CORRECTIVE ACTIONS:

1. 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 NFS 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 three years ago, prior to the implementation of these measures.
2. NFS will provide a document including a comprehensive listing of the assumptions inherent in the curvebook data tables and figures. This documentation should 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. Furthermore, NFS shall have a procedure controlling this process. This will be tracked to completion by action item 456-180-92-01001.
3. The training course for Qualified Nuclear Engineers will include a section on the curvebook assumptions. This will be tracked to completion by action item 456-180-92-01002.
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. This will be tracked to completion by action item 456-180-92-01003.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (LER)

Byron LER 1-92-007

Braidwood LER 1-92-006 Both Trains of BDPS Inoperable

b) INDUSTRY SEARCH (CPEX's, NPRDS)

INPO SOER 88-2; Premature Criticality Events During Reactor Startup

INPO SER 33-85; Premature Criticality Events During Reactor Startup

Due To Inaccurate Estimates And Inadequate Monitoring

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

c) ANALYSIS

A detailed review of the above events and information determined that there is no adverse or potentially adverse trend at this time.

G. COMPONENT FAILURE DATA:

| MANUFACTURER | NOMENCLATURE | MODEL NUMBER | MFG PART NUMBER |
|--------------|--------------|-----------------|--------------------|
|--------------|--------------|-----------------|--------------------|

None.