Commonwealth Edison Company
Byron Generating Station
4450 North German Church Road
Byron, IL 61010-9794
Tel 815-234-5441

ComEd

June 25, 1996

LTR: BYRON 96-0180
FILE: 3.03.0800 (1.10.0101)

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 96-008; Docket No. 50-454.

Sincerely,

K. L. Kofron
Station Manager
Byron Nuclear Power Station

KLK/WD/js

Enclosure: Licensee Event Report No. 96-008

cc: H. J. Miller, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
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(1752AA/WPF/010496)
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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
BYRON NUCLEAR POWER STATION	05000454	1 OF 9

TITLE (4)

Fuel Assemblies Located in Incorrect Region of Spent Fuel Pool

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 NAME	DOCKET NUMBER
										05000
05	28	96	96	-- 008 --	00	06	25	96	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	5
POWER LEVEL (10)	0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David D. Goff, System Engineer X2154	815-234-5441

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 28 May, 1996, Byron Station nuclear engineers confirmed that fuel assemblies F37E, F44E, and G67F were residing in Region 2 of the Spent Fuel Pool (SFP) without meeting the requirements of Technical Specification (TS) 5.6.1.1.b.2, "Fuel Storage - Region 2." The assemblies did not meet the minimum burnup requirements, nor were they checkerboarded. The required minimum burnups were 32651 MWd/MTU, 32651 MWd/MTU, and 32771 MWd/MTU respectively. The actual burnups were 32648 MWd/MTU, 32638 MWd/MTU, and 32728 MWd/MTU respectively.

The cause of this event was cognitive personnel error. The computer spreadsheet used to verify minimum required burnup contained erroneous information for assemblies F37E, F44E, and G67F, and the data in the spreadsheet had not been independently verified. Personnel approving placement of G67F into SFP Region 2 did not have the current revision of Burnup criteria for determination of fuel assembly eligibility for placement into Region 2. Ultimately, the fuel assemblies' burnups were not verified to meet the requirements of TS 5.6.1.1 Amendment 68, "Fuel Storage - Criticality," prior to its implementation.

On 29 May, 1996, the three fuel assemblies were moved into Region 1, as allowed by TS 5.6.1.1.a.2, "Fuel Storage - Region 1." All fuel assemblies remaining in Region 2 were verified either to meet the minimum required burnup or to be stored in a checkerboard pattern.

This event resulted in no safety concerns. The event was bounded by both the older and the newer criticality analyses for Region 2 fuel storage. Adequate reactivity controls were in place to ensure that the k_{eff} limit of 0.95 required by TS 5.6.1.1, "Fuel Storage - Criticality" was not challenged during this event.

This event is reportable under 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's TS.

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 05-28-96 / 1700

Unit 1 Mode 5 - Cold Shutdown Rx Power Shutdown RCS [AB] Temperature/Pressure 84°F / 0 psig

Unit 1 Mode 4 - Hot Shutdown Rx Power Shutdown RCS [AB] Temperature/Pressure 335°F / 321 psig

B. DESCRIPTION OF EVENT:

Byron Administrative Procedure (BAP) 2000-3T1, "Spent Fuel Burnup Verification Checklist," is a checklist used to verify that fuel assemblies either have or have not accrued the minimum required burnup for uncheckerboarded SFP Region 2 storage. The minimum required burnup is calculated by linear interpolation between values given in BAP 2000-3A1, "Minimum Required Burnup as a Function of Enrichment for Region II High Density Spent Fuel Storage Racks." The values in BAP 2000-3A1 are intended to bound TS Figure 5.6-1, "Minimum Burnup Versus Initial Enrichment For Region 2 Storage."

On 10 February, 1993, Byron Station nuclear engineers (engineers 1 and 2) completed BAP 2000-3T1 for fuel assemblies including F37E and F44E. The checklist showed both assemblies with an initial enrichment of 3.8 wt% U-235 and a minimum required burnup for placement into Region 2 of 32540 MWd/MTU, given by BAP 2000-3A1 Rev 1. F37E and F44E had accrued actual burnups of 32648 MWd/MTU and 32638 MWd/MTU respectively. The minimum value of 32540 MWd/MTU was appropriate for an initial enrichment of 3.8 wt% U-235, and both assemblies met the Technical Specification requirement for uncheckerboarded Region 2 storage.

On 11 February, 1993, Nuclear Fuels Services (NFS) issued letter NFS:PSS:93-060 which, in part, stated that fuel assemblies F37E and F44E met the minimum burnup requirements of TS 5.6.1.1. This letter showed F37E and F44E having accumulated 32648.0 MWd/MTU and 32638.4 MWd/MTU respectively.

On 18 August, 1993, Byron Station fuel handlers moved fuel assemblies F37E and F44E into SFP locations K-C2 and K-D8, respectively, in Region 2. The assemblies were not stored in a checkerboard pattern since they met the minimum required burnup restrictions presently in place. The moves were performed in accordance with page 93-104 of an approved BAP 2000-3T3 Rev 1, "PWR Station Nuclear Component Transfer List." Engineers 1 and 3 verified that BAP 2000-3T1 was completed prior to transfer list approval.

Starting in the summer months of 1994, engineer 3 was assisting in the preparation of a license amendment request. This request would allow storage of fuel in Region 2 up to 5.0 wt% U-235 and was supported by a new criticality analysis.

On 11 August, 1994, Byron Station engineers (engineers 3 and 4) initiated Problem Identification Form (PIF) 454-201-94-69200. This PIF documented that Byron Station and NFS employed different methods in determining whether a fuel assembly meets the minimum burnup requirement for Region 2 storage. NFS used a polynomial fit through the points given in the criticality analysis after applying a 1.03 multiplicative penalty to account for fit error and uncertainty in the assembly burnup calculation. Byron Station used linear interpolation between points which bound TS Figure 5.6-1 Amendment 25. This PIF also identified that TS Figure 5.6-1 Amendment 25 did not, for all initial enrichments, bound the criticality analysis used as the basis for the curve.

B. DESCRIPTION OF EVENT (cont.)

Byron Station and NFS continued to use different criteria for minimum required burnup determination. The license amendment request being developed, when approved, would render the second problem moot. For the interim, engineer 3 prepared a revision request for BAP 2000-3A1 to change the points used for minimum burnup determination such that both TS Figure 5.6-1 Amendment 25 and the criticality analysis would be bounded.

On 16 September, 1994, Byron Station nuclear engineers (engineers 5 and 6) completed BAP 2000-3T1 for fuel assemblies including G67F. This checklist showed the G67F assembly with an initial enrichment of 3.809 wt% U-235 and meeting the minimum required burnup for placement into Region 2 of 32661 MWd/MTU. G67F had accrued an actual burnup of 32728 MWd/MTU. The minimum value of 32661 MWd/MTU was conservative for an initial enrichment of 3.809 wt% U-235. Engineer 6 stated that the enrichment value was conservatively rounded up to 3.81 wt% U-235 when the minimum required burnup was calculated. G67F met the Technical Specification requirement for uncheckerboarded Region 2 storage.

Also on 16 September, 1994, NFS issued letter NFS:PSS:94-225 which, in part, stated that fuel assembly G67F did not meet the minimum burnup requirements of TS 5.6.1.1. The discrepancy between the Byron Station and NFS conclusions resulted from the different methods in determining eligibility of a Region 2 storage candidate. Since G67F had accrued the minimum required burnup in accordance with BAP 2000-3A1 Rev 1, it was deemed to be suitable for uncheckerboarded Region 2 storage.

On 20 October, 1994, Byron Station Onsite Review (OSR) 94-078 approved a license amendment request for Byron Station Units 1 and 2 Technical Specifications. This amendment request later became TS Amendment 68. This request would, in part, revise Figure 5.6-1 Amendment 25 to be conservatively 3% greater than the new criticality analysis. Discrete values would be provided in Figure 5.6-1 along with instructions that would allow linear interpolation between the values. In particular, the required burnup for an initial enrichment of 3.8 wt% U-235 would be increased from 32540 MWd/MTU to 32651 MWd/MTU.

The OSR 94-078 package did not document the review of incumbent fuel assemblies and their eligibility for Region 2 storage with the new minimum burnup curve. Engineer 3 and a representative from NFS participated in the OSR.

However, Byron Station nuclear engineers (engineers 3 and 7) had conducted a review of the incumbent fuel assemblies over the course of several months from approximately August to November, 1994. This review was performed by engineer 7 building a computer spreadsheet to calculate assembly eligibility, and then the ouput was spot checked by engineer 3 for verification. The spreadsheet required input data for initial enrichment, storage location, and actual accrued burnup, and then checked each fuel assembly against several minimum burnup criteria, including those that would become BAP 2000-3A1 Rev 2 and TS Amendment 68. The spreadsheet calculation produced a Boolean output for each assembly, i.e., "OK" or "not OK" for uncheckerboarded Region 2 storage.

Initial enrichment, storage location, and actual accrued burnup data loaded into the spreadsheet for F37E, F44E, and G67F were incorrect. This resulted in the spreadsheet producing erroneous "OK" outputs for those assemblies. Had correct data been loaded into the spreadsheet, the assemblies would have been properly identified as "not OK" when compared against the minimum required burnups of BAP 2000-3A1 and TS Amendment 68.

B. DESCRIPTION OF EVENT (cont.)

On 26 October, 1994, PIF 454-201-94-69200 was closed with the understanding that Byron Station and NFS would continue to use different methods for determining minimum required burnup for Region 2 storage. This would serve as a diverse means to identify assemblies suitable for Region 2 storage.

On 13 December, 1994, Byron Station OSR approved revision 2 of BAP 2000-3A1. This revision was processed as a corrective action to PIF 454-201-94-69200, which identified that TS Figure 5.6-1 Amendment 25 did not, for all initial enrichments, bound the criticality analysis used as the basis for the curve. The new revision bounded both the criticality analysis and TS Figure 5.6-1 Amendment 25. Under the new revision, the minimum required burnup for an initial enrichment of 3.8 wt% U-235 was increased from 32540 MWd/MTU to 32800 MWd/MTU. Byron Station took credit for the review performed in association with OSR 94-078 to verify compliance of the incumbent fuel assemblies. As stated before, the spreadsheet contained erroneous data for F37E, F44E, and G67F. Hence, all three assemblies passed the review. Under BAP 2000-3A1 Rev 2, fuel assemblies F37E, F44E, and G67F no longer met the minimum required burnup, though they all met the requirements of revision 1.

On 20 January, 1995, the Nuclear Regulatory Commission (NRC) issued Amendment 68 to Byron Station Units 1 and 2 TS, revising Figure 5.6-1 as requested under the licensing amendment request previously submitted.

On 23 January, 1995, Byron Station fuel handlers moved fuel assembly G67F into SFP location G-L12 in Region 2. The assembly was not stored in a checkerboard pattern since it had been verified to meet the requirements of BAP 2000-3A1 Rev 1. This was done in accordance with page 95-5 of an approved PWR Station Nuclear Component Transfer List. Engineers 5 and 8 verified that BAP 2000-3T1 Rev. 1 was completed prior to transfer list approval. However, BAP 2000-3T1 Rev. 1 had been completed in September, 1994, using BAP 2000-3A1 Rev 1. BAP 2000-3A1 Rev. 2 was now the current revision, and assembly burnups should have been compared to revision 2 requirements rather than the revision 1 requirements. The assembly did not meet the minimum burnup requirement of BAP 2000-3A1 Rev 2 or TS Amendment 68, though it did comply with TS Figure 5.6-1 Amendment 25.

On 25 January, 1995, Byron Station OSR 95-007 approved for use Amendment 68 and its implementation plan. The OSR 95-007 package acknowledged that TS Figure 5.6-1 was changing. The implementation plan stated that the Byron Station nuclear engineering group "will revise BAP 2000-3A1 to reflect the new burnup curve to identify assemblies that are acceptable to load in Region 2." At that time, it was thought that BAP 2000-3A1 Rev 2 was more conservative than TS Figure 5.6-1 Amendment 68. Therefore, the implementation plan required no deadline for revision of BAP 2000-3A1. The OSR package did not discuss the review that had been performed of the incumbent assemblies. Engineer 5 and the Station Reactor Engineer (SRE) participated in the OSR.

On 30 January, 1995, Byron Station OSR approved revision 3 of BAP 2000-3T2, "NCTL Verification Checklist." This revision provided more explicitly detailed guidance on how to perform the verification of minimum required burnups on BAP 2000-3T1.

On 8 February, 1995, Byron Station OSR approved revision 2 of BAP 2000-3T1. This revision added more documentation of information so that minimum required burnups could be more readily and accurately determined.

B. DESCRIPTION OF EVENT (cont.)

On 1 March, 1995, all TS manual holders were instructed, in a letter from the Byron Station Regulatory Assurance Department Supervisor, to implement TS Amendments 67, 68, and 69. At this time, assemblies F37E, F44E, and G67F, were in Region 2 and were in violation of TS 5.6.1.1. Each had been previously approved for residence in Region 2 using a revision of BAP 2000-3A1 which reflected an earlier TS amendment.

On 17 August, 1995, Byron Station OSR approved revision 3 of BAP 2000-3A1. This revision was processed due to TS Amendment 68 changing the minimum required burnup curve. The procedure now exactly matched TS Figure 5.6-1, requiring 32651 MWd/MTU for an initial enrichment of 3.8 wt% U-235. Again, Byron Station took credit for the review performed in association with OSR 94-078 to verify compliance of the incumbent fuel assemblies. Two fuel assemblies were moved into SFP Region 2 since implementation of TS Amendment 68 on 1 March, 1995. They were moved from failed fuel canisters on 1 June and 29 June. Both assemblies met the minimum burnup requirement.

On 24 May, 1996, while performing BAP 2000-3T1 for fuel assemblies anticipated to be moved in association with upcoming spent fuel storage rack neutron attenuation testing, Byron Station nuclear engineers (engineers 7 and 9) found indications that fuel assemblies F37E and F44E did not meet the minimum burnup as required by TS 5.6.1.1.b.2.a, "Fuel Storage - Region 2." Nor were these two assemblies stored in a checkerboard pattern as allowed by TS 5.6.1.1.b.2.b, "Fuel Storage - Region 2." Byron Station contacted NFS for verification of actual burnup and minimum required burnup and to assist the investigation into whether these fuel assemblies were incorrectly residing in Region 2.

On 26 May, 1996, while performing BAP 2000-3T1 for fuel assemblies anticipated to be moved in association with upcoming spent fuel storage rack neutron attenuation testing, Byron Station nuclear engineers (engineers 7 and 9) found indications that fuel assembly G67F did not meet the minimum burnup as required by TS 5.6.1.1.b.2.a. Nor was this assembly stored in a checkerboard pattern as allowed by TS 5.6.1.1.b.2.b. Byron Station again contacted NFS for verification of actual burnup and minimum required burnup and to include this fuel assembly in the investigation.

On 28 May, Byron Station nuclear engineers (engineers 7, 9 and the acting SRE) and NFS held a conference call discussing the results of the NFS investigation into fuel assemblies F37E, F44E, and G67F. It was determined at 17:00 that all three assemblies were in violation of TS 5.6.1.1.b.2.

C. CAUSE OF EVENT:

The cause of F37E and F44E being incorrectly stored in Region 2 was cognitive personnel error. The data used by the computer spreadsheet for verifying minimum required burnup was not entered correctly nor was it independently verified to be accurate. The spreadsheet data failed to show that F37E and F44E were in SFP Region 2. Furthermore, the spreadsheet data failed to use the correct burnup values for F37E and F44E. This resulted in assemblies F37E and F44E producing erroneous "OK" spreadsheet outputs. This faulty technical review was part of the basis for the Byron Station OSR 95-008 approval and acceptance of TS Amendment 68. The amendment was then implemented with plant conditions not conforming to the new requirements.

C. CAUSE OF EVENT (cont.)

The cause of G67F being incorrectly stored in Region 2 was also cognitive personnel error. Personnel approving the NCTL to place G67F in SFP Region 2 failed to use the current procedure revision of BAP 2000-3A1 to verify that G67F had accrued the minimum required burnup for uncheckerboarded Region 2 storage. The previous revision that was used did not reflect current plant conditions. This resulted in an ineligible fuel assembly being placed into Region 2.

D. SAFETY ANALYSIS:

The SFP condition throughout this event was bounded by the two criticality analyses used as the bases for TS Figure 5.6-1 prior to and after Amendment 68. All uncheckerboarded fuel assemblies, including F37E, F44E, and G67F, met the minimum burnup requirements of those analyses. However, the SFP condition failed to meet the current TS requirement, which was 3% greater than the current criticality analysis.

UFSAR section 9.1.3.2 addresses the safety evaluation for storing spent fuel in the SFP. The criticality portion is based on the "Byron and Braidwood Spent Fuel Rack Criticality Analysis Considering Boraflex Gaps and Shrinkage" document from Westinghouse dated June, 1994, as amended by 94CB*-G-0105 and 94CB*-G-0142. Section 5.0, Discussion of Postulated Accidents, addresses an abnormal condition where reactivity would increase beyond the analyzed condition: a fuel assembly is misloaded into Region 2 which does not satisfy the requirements.

While, in the scenario considered, only one assembly is misloaded, the analysis makes several conservative assumptions:

1. All fuel assemblies contain U-235 at the nominal enrichment or its equivalent at the minimum required burnup.

2. All fuel assemblies are uniformly enriched. No credit is taken for reduced-enrichment or natural uranium axial blankets.

3. No credit is taken for U-234, U-236, or any fission product poisons. No credit is taken for any burnable absorber material which may remain in the fuel.

4. All storage locations are loaded with fuel assemblies not containing any absorption material.

5. The storage locations are infinite in lateral extent.

6. The array is moderated by pure water of 1.0 g/cc.

7. A conservative Boraflex degradation model is assumed.

8. The scenario where a fresh assembly with an enrichment of 4.2 wt% is inserted into a 5x5 array of the nominal assemblies is considered.

D. Safety Analysis (cont.)

The maximum k_{eff} at a 95% probability with 95% confidence and including the statistical summation of independent uncertainties is 0.9449 for Region 2 under the nominal conditions. The increase in reactivity due to the misloaded assembly is no more than 0.0438 delta k. However, only a single failure must be accounted for, so soluble boron may be credited. The reactivity from 300 ppm boron is approximately -0.06 delta k, more than offsetting the increase from the misloading. Thus, the k_{eff} limit of 0.95 required by TS 5.6.1.1 is not challenged during this abnormal condition.

The situation described in this report, with three fuel assemblies misloaded rather than just one, is more conservative than the accident analysis due to the following considerations:

1. Nearly all fuel assemblies residing in Region 2 exceed the minimum burnup requirement, making them less reactive than the reference assemblies.

2. Many fuel assemblies have reduced-enrichment or natural uranium axial blankets of six inches at both ends, reducing their reactivities.

3. All fuel assemblies contain U-234 and U-236, and spent assemblies contain fission product poisons as well. These materials further reduce reactivity.

4. Not every storage location contains fuel. Locally, there are several empty locations. Some of the fuel assemblies contain absorber material such as rod cluster control assemblies (RCCAs).

5. The SFP is finite, exhibiting nonzero neutron leakage at the boundaries.

6. The water in the SFP is normally approximately 80 degF, having a density less than 1.0 g/cc. Soluble boron concentration in the SFP remained greater than 1280 ppm since January, 1995, providing at least -0.22 delta k reactivity.

7. Previous neutron attenuation testing results imply that the Boraflex in Region 2 has not deteriorated to the extent assumed in the analysis.

8. The improperly located fuel assemblies are significantly less reactive than the fresh 4.2 wt% enriched assembly assumed in the accident analysis. Fuel assemblies F37E, F44E, and G67F fell short of the required burnup by 3 MWd/MTU, 13 MWd/MTU, and 43 MWd/MTU respectively. These values are within approximately 0.1% of the required burnup values.

The combination of the above factors ensured that the k_{eff} limit of 0.95 required by TS 5.6.1.1 was not challenged during this event.

E. CORRECTIVE ACTIONS:

On 28 May, 1996, at 17:15, Byron Station nuclear engineers initiated PIF 454-180-96-0008, identifying three fuel assemblies inappropriately residing in Region 2 of the SFP. Byron Station Regulatory Assurance, Operations, and System Engineering management were notified. The NRC Resident Inspector was also notified.

Concurrently, NFS initiated PIF 901-201-96-07800 identifying possible inadequacies and inconsistencies in their methods of determining eligibility of Region 2 candidate fuel assemblies. The investigation results show that these inadequacies and inconsistencies did not contribute to the root causes of this event.

On 29 May, 1996, at 05:15, Byron Station fuel handlers moved fuel assemblies F37E, F44E, and G67F into SFP storage locations in Region 1. This was done in accordance with page 96-103 of an approved PWR Station Nuclear Component Transfer List.

NFS subsequently performed a review of all fuel assemblies residing in Region 2 using TS Amendment 68 criteria. This review was transmitted as NFS:PSS:96-142 and PSSCN:96-023. It consisted of a list of every fuel assembly in the Byron Station SFP as of 31 March, 1996, and identified which assemblies had achieved the minimum required burnup for Region 2 storage. Byron Station engineers 7 and 9 then verified that those assemblies not meeting minimum burnup were either stored in Region 1 or in a checkerboard pattern. There were no assemblies stored inappropriately in Region 2. All fuel moves into Region 2 performed since 31 March, 1996, have had eligibility requirements verified in accordance with BAP 2000-3A1 Rev 3.

BAP 2000-3T2 Rev 3 is currently in place and provides explicit guidance on the preparation and independent review of BAP 2000-3T1 Rev. 2. This revision was not in place at the times F37E, F44E, and G67F were approved for uncheckerboarded Region 2 storage. The guidance provided presents an additional barrier to mislocating a fuel assembly that could have prevented this event.

BAP 2000-3T1 Rev. 2 is currently in place and provides improved documentation of minimum required burnup for fuel assemblies being moved to or within Region 2. This revision was not in place at the times F37E, F44E, and G67F were approved for uncheckerboarded Region 2 storage. The improved documentation shows initial enrichment, minimum required burnup, and actual accrued burnup for each assembly and presents an additional barrier to mislocating a fuel assembly that could have prevented this event.

BAP 2000-3A1 Rev. 3 is currently in place and is identical to the requirements of TS Figure 5.6-1 Amendment 68 as well as the current NFS method of determining Region 2 storage eligibility. All future fuel assemblies approved for Region 2 storage will have minimum required burnups determined in accordance with this procedure or its equivalent. Any future TS Amendment changing TS Figure 5.6-1 will have a concurrent revision to BAP 2000-3A1 associated with it reflecting the new requirements. This presents an additional barrier to mislocating a fuel assembly that could have prevented this event.

Performance expectations have been discussed with persons involved in the errors that contributed to this event.

This LER will be discussed with all members of the Byron Station nuclear engineering group, emphasizing personnel performance expectations. A copy will be placed in the nuclear engineering group required reading book. NTS item 454-201-96-0008-01 tracks completion of this action.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

LER 454:94-006, "Fuel Assembly Located in Wrong Region of Spent Fuel Pool due to Personnel Error," documents a similar event. On 15 July, 1994, SED found a fuel assembly in Region 2 that neither met the minimum burnup requirements of TS Figure 5.6-1 nor was checkerboarded. The cause of this event was determined to be cognitive personnel errors. The Nuclear Materials Custodian and an independent reviewer failed to use the approved method to verify assemblies met the minimum burnup requirements for storage in Region 2.

Although the 454:94-006 event resulted in a fuel assembly incorrectly residing in SFP Region 2, the circumstances leading to this event were different from those leading to the 454-180-96-0008 event.

G. COMPONENT FAILURE DATA:

No components failed in association with this event.