

50-261

## NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

FILE NUMBER

INCIDENT REPORT

TO:

MR. NORMAN C. MOSELEY

FROM:

CAROLINA POWER & LIGHT COMPANY  
H. R. BANKS

DATE OF DOCUMENT

5/14/76

DATE RECEIVED

5/19/76

☒ LETTER☐ NOTORIZED

PROP

INPUT FORM

NUMBER OF COPIES RECEIVED

NONE SIGNED

☐ ORIGINAL☒ UNCLASSIFIED☒ COPY

## DESCRIPTION

LTR. TRANS THE FOLLOWING:

## ENCLOSURE

LICENSEE EVENT RPT. (RO 50-261/76-12) ON  
5/1/76 CONCERNING REACTOR BROUGHT TO  
CRITICALITY WITH CONTROL RODS INSERTED INTO  
CORE BELOW INSERTION LIMITS AS DEFINED BY  
TECH SPEC DURING REACTOR STARTUP FOR TRAINING.

ACKNOWLEDGED

DO NOT REMOVE

PLANT NAME:

H. B. ROBINSON #2

NOTE: IF PERSONNEL EXPOSURE IS INVOLVED  
SEND DIRECTLY TO KREGER/J. COLLINS

## SAFETY

## FOR ACTION/INFORMATION

ENVIRO

5/20/76

RJL

☒ BRANCH CHIEF: REID  
W/3 CYS FOR ACTION  
☒ LIC. ASST: INGRAM  
W/ 1 CYS  
ACRS 16 CYS HOLDING/SENT TO LA

## INTERNAL DISTRIBUTION

☒ REG FILE  
☒ NRC PDR  
☒ I & E (2)  
☒ MIPC (3)  
☒ SCHROEDER/IPPOLITO  
☒ HOUSTON  
☒ NOVAK/CHECK  
☒ GRIMES/SCHWENCER (1) EA  
☒ CASE  
☒ ~~F. WILLIAMS~~  
☒ HANAUER  
☒ TEDESCO/MACCARY  
☒ EISENHUT  
☒ BAER  
☒ SHAO  
☒ VOLLNER/BUNCH  
☒ KREGER/J. COLLINS

## EXTERNAL DISTRIBUTION

☒ LPDR: HARTVILLE, S. C.  
☒ TIC  
☒ NSIC

## CONTROL NUMBER

5055

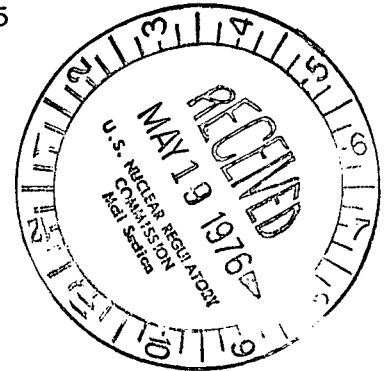
3921  
Carolina Power & Light Company

May 14, 1976

File: NG-3513 (R)

Serial: NG-76-705

Mr. Norman C. Moseley, Director  
U. S. Nuclear Regulatory Commission  
Region II, Suite 818  
230 Peachtree Street, N.W.  
Atlanta, Georgia 30303



Dear Mr. Moseley:

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261  
LICENSE NO. DPR-23  
LICENSEE EVENT REPORT 76-12

In accordance with Section 6.9.2.a of the Technical Specifications for H. B. Robinson Steam Electric Plant, Unit 2, the attached Licensee Event Report is submitted. This report fulfills the requirement for a written report within fourteen (14) days of a reportable occurrence and is in accordance with the format set forth in Regulatory Guide 1.16, Revision 4.

Yours very truly,

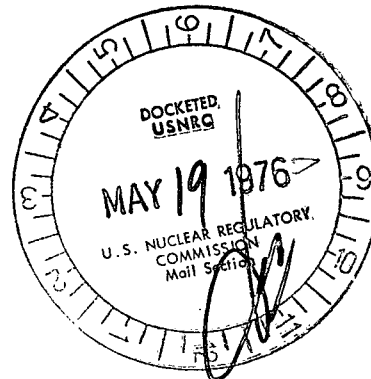
H. R. Banks  
Manager  
Nuclear Generation

Regulatory Docket File

DBW:jwk

Attachments

cc: Messrs. W. G. McDonald  
E. Volgenan



5055

# ● CENSEE EVENT REPORT

CONTROL BLOCK:

**(PLEASE PRINT ALL REQUIRED INFORMATION)**

LICENSEE NAME														LICENSE NUMBER											LICENSE TYPE					EVENT TYPE	
01	S	C	H	B	R	2	0	0	-	0	0	0	0	0	-	0	0	4	1	1	1	0	0	1							
7	8	9				14	15									25	26					30	31	32							

CON'T		CATEGORY		REPORT TYPE	REPORT SOURCE	DOCKET NUMBER							EVENT DATE					REPORT DATE							
01				T	L	0	5	0	-	0	2	6	1	0	5	0	1	7	6	0	5	1	4	7	6
7	8	57	58	59	60	61							68	69					74	75					80

EVENT	DESCRIPTION
1	10/10/2010
2	10/10/2010
3	10/10/2010
4	10/10/2010
5	10/10/2010
6	10/10/2010
7	10/10/2010
8	10/10/2010
9	10/10/2010
10	10/10/2010
11	10/10/2010
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93	10/10/2010
94	10/10/2010
95	10/10/2010
96	10/10/2010
97	10/10/2010
98	10/10/2010
99	10/10/2010
100	10/10/2010

EVENT DESCRIPTION																																																		
02	During performance of a reactor startup for training, the reactor was brought to																																																	
03	criticality with control rods inserted into the core below the insertion limits as																																																	
04	defined by Plant Technical Specifications. The reactor was shut down and emergency																																																	
05	boration was initiated in accordance with Plant Procedures. (HBR2 RO 76-12)																																																	
06																																																		
07																																																		
<table border="0"> <thead> <tr> <th>SYSTEM CODE</th> <th>CAUSE CODE</th> <th colspan="5">COMPONENT CODE</th> <th>PRIME COMPONENT SUPPLIER</th> <th colspan="4">COMPONENT MANUFACTURER</th> <th>VIOLATION</th> </tr> </thead> <tbody> <tr> <td>Z Z</td> <td>A</td> <td>Z</td> <td>Z</td> <td>Z</td> <td>Z</td> <td>Z</td> <td>Z</td> <td>Z</td> <td>9</td> <td>9</td> <td>9</td> <td>Y</td> </tr> <tr> <td>7 8 9</td> <td>10</td> <td>11</td> <td>12</td> <td>13</td> <td>14</td> <td>15</td> <td>16</td> <td>17</td> <td>43</td> <td>44</td> <td>45</td> <td>46</td> <td>47</td> <td>48</td> </tr> </tbody> </table>										SYSTEM CODE	CAUSE CODE	COMPONENT CODE					PRIME COMPONENT SUPPLIER	COMPONENT MANUFACTURER				VIOLATION	Z Z	A	Z	Z	Z	Z	Z	Z	Z	9	9	9	Y	7 8 9	10	11	12	13	14	15	16	17	43	44	45	46	47	48
SYSTEM CODE	CAUSE CODE	COMPONENT CODE					PRIME COMPONENT SUPPLIER	COMPONENT MANUFACTURER				VIOLATION																																						
Z Z	A	Z	Z	Z	Z	Z	Z	Z	9	9	9	Y																																						
7 8 9	10	11	12	13	14	15	16	17	43	44	45	46	47	48																																				

## CAUSE DESCRIPTION

CAUSE DESCRIPTION

08	The licensed Control Operator failed to recognize the fact that criticality was	80
7 8 9		
09	being approached with rods below the insertion limits. An ECP well within these	80
7 8 9		
10	limits had been erroneously calculated prior to the startup.	80
7 8 9		

METHOD OF

7 8 9		FACILITY STATUS		% POWER			OTHER STATUS		METHOD OF DISCOVERY		DISCOVERY DESCRIPTION	
1	1	C	0	0	0	NA	A	NA				
7	8	9	10	11	12	13	44	45	46		80	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

FORM OF ACTIVITY RELEASED  
[ Z ]

CONTENT OF RELEASE  
[ Z ]

AMOUNT OF ACTIVITY  
NA

LOCATION OF RELEASE  
NA

## PERSONNEL EXPOSURES

PERSONNEL EMPLOYMENT										
NUMBER			TYPE		DESCRIPTION					
1	3		0	0	0	2	NA			
7	8	9	10	11	12	13	80			

## PERSONNEL INJURIES

NUMBER				DESCRIPTION	
1	4	0	0	0	NA

## OFFSITE CONSEQUENCES

OFFICE CORRESPONDENCE

15 NA 8

LOSS OR DAMAGE TO FACILITY

16		Z		DESCRIPTION		NA	
7	8	9	10	8			

## PUBLICITY

17 NA 8

### ADDITIONAL FACTORS

18 (Supplementary information attached)

19

NAME: J. B. McGirt PHONE: 803-332-1351

GPO 881-667

Supplemental Information to Reportable Occurrence 76-12

1. Report No.: 50-261/76-12
- 2a. Report Date: May 10, 1976
- 2b. Occurrence Date: May 1, 1976
3. Facility: H. B. Robinson SEG Plant  
Hartsville, South Carolina 29550

4. Identification of Occurrence

Reactor criticality with control rods inserted into the core below the minimum insertion limits as defined by Technical Specification 3.10.1.3. This event constitutes a reportable occurrence in accordance with Technical Specification 6.9.2.a.2.

5. Conditions Prior to Occurrence

The reactor was at hot shutdown with the secondary plant isolated for maintenance. A reactor startup was in progress for the purpose of training. An estimated critical position (ECP) calculation had been performed and a plot of the inverse count rate ratio (1/M) was being maintained during the startup as required by plant operating procedures.

6. Description of Occurrence

At 2300 hours on May 1, 1976, criticality was achieved with Control Rod Bank "C" at 43 steps withdrawn. Plant Technical Specifications define the minimum critical position for Bank "C" at zero power to be 101 steps. In accordance with Plant Abnormal Procedure CPL-AP-2, the reactor was emergency borated and shut down.

7. Designation of Apparent Cause of Occurrence

The licensed Control Operator responsible for the startup failed to recognize the fact that criticality was being approached below the insertion limits. A contributing factor to the recognition of the problem rested with the routine ECP calculated for the startup. The critical rod position determined for that startup was 154 steps on Control Bank "D". This was well within the insertion limits and 239 steps above the position of actual criticality. As part of the ECP procedure, the operator is required to make a determination as to whether or not the result satisfies the insertion limits. The apparently correct ECP satisfied these requirements which may have been a factor at the time of the unexpected criticality. Two training startups had been performed earlier in the day within the administrative tolerance of their respective ECP's.

An additional factor, relating to the occurrence, pertains to the inverse count rate ratio ( $1/M$ ) plot which was maintained during the startup. Because of the unexpected criticality, only two points were entered on the plot, the base data point and a point from data taken at 125 steps on Control Bank "B". Criticality, based on these points, was predicted to be greater than 210 steps on Bank "C". However, the base data is normally obtained well below the point where subcritical multiplication becomes significant, thereby yielding an erroneous predicted critical rod position with just those points. A third set of data (which was never obtained) could have predicted the error in the ECP.

The error in the ECP resulted from the method of determining xenon conditions following reactor shutdown. The Plant Operating Manual (POM) contains curves which describe xenon worth (ppm) versus time following shutdown from equilibrium conditions at power. For calculation purposes a power-level-weighting scheme is used in the ECP to determine an equilibrium power from the 36-hour power history prior to the last shutdown. From this scheme an average power for xenon calculations is used to interpolate between the four existing curves in the POM. This method correctly accounts for the xenon worth shift in the curve but does not account for the time variable shift. In the case at point, the reactor was at full power equilibrium conditions approximately five hours prior to shutdown. In that five hours, power was reduced in various steps, for secondary plant maintenance considerations prior to shutdown. This resulted in an increasing xenon worth immediately following power decrease from full power. The actual xenon transient, therefore, changed in shape as well as in magnitude. Since ECP calculations were based on a xenon transient beginning at shutdown rather than five hours earlier when the power reduction was initiated, the ECP result was in error. ECP calculations which resulted in successful startups were made a times in the xenon transient when the magnitudes of error were not significant.

#### 8. Analysis of Occurrence

Upon recognition that criticality had occurred below the minimum rod insertion limits, the reactor was emergency borated in accordance with Plant Abnormal Procedure CPL-AP-2, and brought to hot shutdown condition. Adequate shutdown margin as defined in Plant Technical Specifications was available prior to emergency boration. No personnel injuries, undue exposures, releases of radioactive materials or threat to the public health and safety resulted from this event.

#### 9. Corrective Action

Immediate corrective action involved emergency boration and reactor shutdown as described above. Action to effectively mitigate the recurrence of the event involved a reassessment of the reactor startup procedures including the calculation procedures for the ECP. It was reemphasized to operating personnel, the importance of anticipating criticality during any positive reactivity addition and not relying on the results of ECP's or the indications of  $1/M$  plots.

An effort is in progress to provide better xenon data to the operator for calculation of the ECP. The effort is aimed at removing the power/time dependent errors which were apparent in the calculation associated with this occurrence. Additionally, guidelines for maintaining the  $1/M$  plot during a startup are being reviewed to provide the most effective use of this means of predicting criticality.

10. Failure Data

No failures of this type have previously occurred.



Carolina Power & Light Company

May 14, 1976

File: NG-3513 (R)

Serial: NG-76-705

Mr. Norman C. Moseley, Director  
U. S. Nuclear Regulatory Commission  
Region II, Suite 818  
230 Peachtree Street, N.W.  
Atlanta, Georgia 30303

Dear Mr. Moseley:

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261  
LICENSE NO. DPR-23  
LICENSEE EVENT REPORT 76-12

In accordance with Section 6.9.2.a of the Technical Specifications for H. B. Robinson Steam Electric Plant, Unit 2, the attached Licensee Event Report is submitted. This report fulfills the requirement for a written report within fourteen (14) days of a reportable occurrence and is in accordance with the format set forth in Regulatory Guide 1.16, Revision 4.

Yours very truly,

H. R. Banks  
Manager  
Nuclear Generation

DBW:jwk

Attachments

cc: Messrs. W. G. McDonald  
E. Volgenan

# LICENSEE EVENT REPORT

CONTROL BLOCK:         
16

[PLEASE PRINT ALL REQUIRED INFORMATION]

LICENSEE NAME <span style="border: 1px solid black; padding: 0 5px;">01</span> <span style="border: 1px solid black; padding: 0 5px;">S</span> <span style="border: 1px solid black; padding: 0 5px;">C</span> <span style="border: 1px solid black; padding: 0 5px;">H</span> <span style="border: 1px solid black; padding: 0 5px;">B</span> <span style="border: 1px solid black; padding: 0 5px;">R</span> <span style="border: 1px solid black; padding: 0 5px;">2</span>										LICENSE NUMBER <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">-</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">-</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span>										LICENSE TYPE <span style="border: 1px solid black; padding: 0 5px;">4</span> <span style="border: 1px solid black; padding: 0 5px;">1</span> <span style="border: 1px solid black; padding: 0 5px;">1</span> <span style="border: 1px solid black; padding: 0 5px;">1</span> <span style="border: 1px solid black; padding: 0 5px;">0</span>					EVENT TYPE <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">1</span>	
7	8	9	14	15	25	26	30	31	32																	

CATEGORY <span style="border: 1px solid black; padding: 0 5px;">01</span> CONT			REPORT TYPE <span style="border: 1px solid black; padding: 0 5px;">T</span>			REPORT SOURCE <span style="border: 1px solid black; padding: 0 5px;">L</span>			DOCKET NUMBER <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">5</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">-</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">2</span> <span style="border: 1px solid black; padding: 0 5px;">6</span> <span style="border: 1px solid black; padding: 0 5px;">1</span>										EVENT DATE <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">5</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">1</span> <span style="border: 1px solid black; padding: 0 5px;">7</span> <span style="border: 1px solid black; padding: 0 5px;">6</span>					REPORT DATE <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">5</span> <span style="border: 1px solid black; padding: 0 5px;">1</span> <span style="border: 1px solid black; padding: 0 5px;">4</span> <span style="border: 1px solid black; padding: 0 5px;">7</span> <span style="border: 1px solid black; padding: 0 5px;">6</span>				
7	8	9	57	58	59	60	61	68	69	74	75	80																

EVENT DESCRIPTION

<span style="border: 1px solid black; padding: 0 5px;">02</span>	During performance of a reactor startup for training, the reactor was brought to	80
<span style="border: 1px solid black; padding: 0 5px;">03</span>	criticality with control rods inserted into the core below the insertion limits as	80
<span style="border: 1px solid black; padding: 0 5px;">04</span>	defined by Plant Technical Specifications. The reactor was shut down and emergency	80
<span style="border: 1px solid black; padding: 0 5px;">05</span>	boration was initiated in accordance with Plant Procedures. (HBR2 RO 76-12)	80
<span style="border: 1px solid black; padding: 0 5px;">06</span>		80

SYSTEM CODE <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span>		CAUSE CODE <span style="border: 1px solid black; padding: 0 5px;">A</span>		COMPONENT CODE <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">Z</span>					PRIME COMPONENT SUPPLIER <span style="border: 1px solid black; padding: 0 5px;">Z</span>		COMPONENT MANUFACTURER <span style="border: 1px solid black; padding: 0 5px;">Z</span> <span style="border: 1px solid black; padding: 0 5px;">9</span> <span style="border: 1px solid black; padding: 0 5px;">9</span> <span style="border: 1px solid black; padding: 0 5px;">9</span>			VIOLATION <span style="border: 1px solid black; padding: 0 5px;">Y</span>	
7	8	9	10	11	12	17	43	44	47	48					

CAUSE DESCRIPTION

<span style="border: 1px solid black; padding: 0 5px;">08</span>	The licensed Control Operator failed to recognize the fact that criticality was	80
<span style="border: 1px solid black; padding: 0 5px;">09</span>	being approached with rods below the insertion limits. An ECP well within these	80
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FACILITY STATUS <span style="border: 1px solid black; padding: 0 5px;">C</span>		% POWER <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span>			OTHER STATUS NA			METHOD OF DISCOVERY <span style="border: 1px solid black; padding: 0 5px;">A</span>		DISCOVERY DESCRIPTION NA			
7	8	9	10	12	13	44	45	46					

FORM OF ACTIVITY RELEASED <span style="border: 1px solid black; padding: 0 5px;">Z</span>		CONTENT OF RELEASE <span style="border: 1px solid black; padding: 0 5px;">Z</span>		AMOUNT OF ACTIVITY NA			LOCATION OF RELEASE NA			
7	8	9	10	11	44	45				

PERSONNEL EXPOSURES

<span style="border: 1px solid black; padding: 0 5px;">13</span>	NUMBER <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span>			TYPE <span style="border: 1px solid black; padding: 0 5px;">Z</span>	DESCRIPTION NA				
7	8	9	11	12	13				

PERSONNEL INJURIES

<span style="border: 1px solid black; padding: 0 5px;">14</span>	NUMBER <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span> <span style="border: 1px solid black; padding: 0 5px;">0</span>			DESCRIPTION NA				
7	8	9	11	12				

OFFSITE CONSEQUENCES

<span style="border: 1px solid black; padding: 0 5px;">15</span>	NA								
7	8	9							

LOSS OR DAMAGE TO FACILITY

<span style="border: 1px solid black; padding: 0 5px;">16</span>	TYPE <span style="border: 1px solid black; padding: 0 5px;">Z</span>	DESCRIPTION NA							
7	8	9	10						

PUBLICITY

<span style="border: 1px solid black; padding: 0 5px;">17</span>	NA								
7	8	9							

ADDITIONAL FACTORS

<span style="border: 1px solid black; padding: 0 5px;">18</span>	(Supplementary information attached)								
7	8	9							

<span style="border: 1px solid black; padding: 0 5px;">19</span>									
7	8	9							

NAME: J. B. McGirt PHONE: 803-332-1351



Supplemental Information to Reportable Occurrence 76-12

1. Report No.: 50-261/76-12
- 2a. Report Date: May 10, 1976
- 2b. Occurrence Date: May 1, 1976
3. Facility: H. B. Robinson SEG Plant  
Hartsville, South Carolina 29550
4. Identification of Occurrence

Reactor criticality with control rods inserted into the core below the minimum insertion limits as defined by Technical Specification 3.10.1.3. This event constitutes a reportable occurrence in accordance with Technical Specification 6.9.2.a.2.

5. Conditions Prior to Occurrence

The reactor was at hot shutdown with the secondary plant isolated for maintenance. A reactor startup was in progress for the purpose of training. An estimated critical position (ECP) calculation had been performed and a plot of the inverse count rate ratio (1/M) was being maintained during the startup as required by plant operating procedures.

6. Description of Occurrence

At 2300 hours on May 1, 1976, criticality was achieved with Control Rod Bank "C" at 43 steps withdrawn. Plant Technical Specifications define the minimum critical position for Bank "C" at zero power to be 101 steps. In accordance with Plant Abnormal Procedure CPL-AP-2, the reactor was emergency borated and shut down.

7. Designation of Apparent Cause of Occurrence

The licensed Control Operator responsible for the startup failed to recognize the fact that criticality was being approached below the insertion limits. A contributing factor to the recognition of the problem rested with the routine ECP calculated for the startup. The critical rod position determined for that startup was 154 steps on Control Bank "D". This was well within the insertion limits and 239 steps above the position of actual criticality. As part of the ECP procedure, the operator is required to make a determination as to whether or not the result satisfies the insertion limits. The apparently correct ECP satisfied these requirements which may have been a factor at the time of the unexpected criticality. Two training startups had been performed earlier in the day within the administrative tolerance of their respective ECP's.

An additional factor, relating to the occurrence, pertains to the inverse count rate ratio (1/M) plot which was maintained during the startup. Because of the unexpected criticality, only two points were entered on the plot, the base data point and a point from data taken at 125 steps on Control Bank "B". Criticality, based on these points, was predicted to be greater than 210 steps on Bank "C". However, the base data is normally obtained well below the point where subcritical multiplication becomes significant, thereby yielding an erroneous predicted critical rod position with just those points. A third set of data (which was never obtained) could have predicted the error in the ECP.

The error in the ECP resulted from the method of determining xenon conditions following reactor shutdown. The Plant Operating Manual (POM) contains curves which describe xenon worth (ppm) versus time following shutdown from equilibrium conditions at power. For calculation purposes a power-level-weighting scheme is used in the ECP to determine an equilibrium power from the 36-hour power history prior to the last shutdown. From this scheme an average power for xenon calculations is used to interpolate between the four existing curves in the POM. This method correctly accounts for the xenon worth shift in the curve but does not account for the time variable shift. In the case at point, the reactor was at full power equilibrium conditions approximately five hours prior to shutdown. In that five hours, power was reduced in various steps, for secondary plant maintenance considerations prior to shutdown. This resulted in an increasing xenon worth immediately following power decrease from full power. The actual xenon transient, therefore, changed in shape as well as in magnitude. Since ECP calculations were based on a xenon transient beginning at shutdown rather than five hours earlier when the power reduction was initiated, the ECP result was in error. ECP calculations which resulted in successful startups were made a times in the xenon transient when the magnitudes of error were not significant.

#### 8. Analysis of Occurrence

Upon recognition that criticality had occurred below the minimum rod insertion limits, the reactor was emergency borated in accordance with Plant Abnormal Procedure CPL-AP-2, and brought to hot shutdown condition. Adequate shutdown margin as defined in Plant Technical Specifications was available prior to emergency boration. No personnel injuries, undue exposures, releases of radioactive materials or threat to the public health and safety resulted from this event.

#### 9. Corrective Action

Immediate corrective action involved emergency boration and reactor shutdown as described above. Action to effectively mitigate the recurrence of the event involved a reassessment of the reactor startup procedures including the calculation procedures for the ECP. It was reemphasized to operating personnel, the importance of anticipating criticality during any positive reactivity addition and not relying on the results of ECP's or the indications of 1/M plots.

An effort is in progress to provide better xenon data to the operator for calculation of the ECP. The effort is aimed at removing the power/time dependent errors which were apparent in the calculation associated with this occurrence. Additionally, guidelines for maintaining the 1/M plot during a startup are being reviewed to provide the most effective use of this means of predicting criticality.

10. Failure Data

No failures of this type have previously occurred.

**CP&L**

**Carolina Power & Light Company**

**H. B. ROBINSON STEAM ELECTRIC PLANT**  
Post Office Box 790  
Hartsville, South Carolina

May 3, 1976

Robinson File No. 2-0-4-a-1

Mr. Norman C. Moseley, Director  
Directorate of Regulatory Operations  
Nuclear Regulatory Commission  
Region II, Suite 818  
230 Peachtree Street, N.W.  
Atlanta, Georgia 30303

50-261/76-12

Mr. John G. Davis, Acting Director  
Director of Regulatory  
Nuclear Regulatory Commission  
Washington, D. C. 20545

Dear Sirs:

In accordance with Section 6.9.2.a.2 of the Technical Specifications the following Reportable Occurrence is reported:

On May 1, 1976 during an approach to critical for training purpose the reactor was brought critical below the control rod insertion limits. This is a violation of Technical Specification 3.10.1.3. The primary system was immediately Emergency Borated as per A.P.2 of the plant operating manual and the reactor was immediately shutdown.

This was reported to Mr. Marvin Sinkule of the NRC, Atlanta and Mr. Harold Banks of Carolina Power and Light Company on May 2, 1976.

Yours very truly,

  
Jack B. McGirt, Manager  
H. B. Robinson SEG Plant

REM:gg



Carolina Power & Light Company

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Carolina Power and Light Company  
Docket No. 50-261 Robinson Unit 2  
License No. DPR-23

REPORTABLE OCCURRENCE REPORT

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