ATTACHMENT 2

TO

NSD920243

COOPER NUCLEAR STATION

NRC DOCKET NO. 50-298, DPR-46

6-36
NPP1- 5BØ-009

GRENIER

DEST=GRENIER USER=VERF QUEUE=LPT DEVICE=@LP9

PAGES=36

PATH=:UDD:TDU:BEVERLY:TORPLOT

END

NSSFC /SYSB/ Kansas City MO

AOS/VS II RELEASE 1.00.00.00
AOS/VS II XLPT-32 REVISION 1.00.00.00

91-0887

Nebraska Public Power District

DESIGN CALCULATIONS COVER SHEET

STATION BLACKOUT WITH ... AND RR SEAL LEAK	Calculation No. 91-261
...tructure N/A	Supersedes Calc. No. N/A
...nt N/A	Task Identification No. 28784
...ication: ☐ Essential	Design Change No. N/A
☒ Non-Essential	Discipline NUCLEAR
	*ASME Stress reports shall be approved by Registered P.E.
NPPD Generated Calculation	Non NPPD Generated Calculation
Prepared By Kent Sutton Date 25 Nov. 91	Companies Name ______ Date ______
Checked By David ... Date 12/31/91	NPPD Reviewed By ______ Date ______
Approved By John C. ... Date 1/3/92	NPPD Approval ______ Date ______
Third Party Review Req'd. Yes/No	

Calc. Description:

Modular Accident Analysis Program was used to evaluate the timing of thermal-hydraulic phenomenon during a Station Blackout Scenario with RCIC available as the sole injection source. The results will be used to support the CNS response to 10CFR50.63 Station Blackout Rule.

References

1. SBO 10CFR50.63 submittals for CNS.
2. Letter EEH-91-073, ENERCON Services to NPPD dated 10/17/91.
3. BWR Owners Group Emergency Procedure Guidelines, Rev. 4.
4. CNS EP5.8 (EOPs), Rev. 5.
5. Accident Sequence Delineation Document, PRA-ET001, Rev. 0, Section 3.2.1 (DRAFT).
6. PRA Procedure PRA-P011 ~~(DRAFT)~~ KS 1-3-92
7. Terry Turbine Letter to IDCORE (GE), dated 10/24/72 and GE Letter PFB-10-83, filed C25.1.5.3.
8. PRA System Notebook, PRA-SN010, Nuclear System Pressure Relief System, Rev. 0.

Attachments

A. Archived Data Sets
B. Input File Listing
C. Summary File Listing
D. SBO Output Figures

Design Basis or References:

1. USAR N/A
2. TECH. SPECS. N/A

Attachments:

A. ______
B. ______

9. PRA System Notebook, PRA-SN018, Reactor Core Isolation Cooling (RCIC) System, Rev. 0
10. MAAP 3.0B, Rev.6 Users Manual.
11. NEDC 91-149, Rev. 0.
12. MIPS Version 1.40 Users Manual.

Rev. No.	Revision Description	Prepared By	Checked By	Approved By	Date

N132-0389

Nebraska Public Power District
DESIGN CALCULATIONS SHEET

Sheet 1 of 7

Calc. No. 91-261

STATION BLACKOUT WITH RCIC AND RR SEAL LEAK

NPPD Generated Calculation
Prepared By: Kent Sutton
Date: 31 Dec 1991
Checked By: David C Stuart
Date: 12/31/1991

Review of Non-NPPD Generated Calculations
Company's Name:
NPPD Reviewer:
Date: 19

1.0 Introduction

The effects of a station blackout (SBO) coupled with primary system leakage into the drywell were analyzed using a detailed deterministic simulation of a normal plant SCRAM initiated from a main steam isolation valve (MSIV) closure.

2.0 Purpose

A thermal-hydraulic analysis is needed to support the CNS Station Blackout Safety Evaluation Report (SER) [Ref. 1]. The CNS SBO for 10 CFR 50.63 will assume a small LOCA in combination with loss of offsite and failure of diesel AC power. This is to simulate the NRC assumed primary system leakage of 61 gpm for CNS [Ref. 2]. Information is needed on the drywell heatup rate and in particular the drywell temperature at the end of the CNS Station Blackout coping duration. The continued operation of RCIC under these containment conditions is also of importance.

3.0 Description

The following sequence of events describes the SBO scenario being analyzed. The operator actions modeled in this scenario are based on Rev. 4 of the BWR Owner's Group Emergency Procedure Guidelines [Ref. 3] which are incorporated into Rev. 5 of the CNS EP5.8 (EOPs) [Ref. 4].

A normal SCRAM is initiated by MSIV closure with all forms of coolant injection including Control Rod Drive Pump SCRAM flow locked out. At level 2, RCIC and HPCI are allowed to autostart on low water level. After initial injection, HPCI is secured by the operator and RCIC continues to control level between level 2 and level 8. The operator maintains RCIC suction from Emergency Condensate Storage Tank for the duration of the event. The pressure in the vessel is controlled by the safety relief valves (D/F) operating on low-low set, which adds decay energy to the suppression pool. The two SRVs (D/F) are also used to reduce reactor pressure (emergency depressurization) according to the Heat Capacity Temperature Limit (HCTL) of Graph 7, CNS EP5.8, Rev. 5 [Ref. 4]. Since no low pressure injection systems are available, the operator is directed not to depressurize the vessel to lower than 120 psig, per EOP-2 Step SP/T-5. Throughout the event, primary containment heat removal systems (RHR, Cont. Vent) are considered not available.

To prevent automatic initiation of ADS in MAAP, ADS is locked out. This is not a required operator action for this sequence since neither LPCI or Core Spray systems are available. Therefore ADS inhibit is not required. However, this input is required due to the ADS system model in MAAP which initiates on high drywell pressure or low reactor water level.

4.0 Assumptions

The T1 transient modeled in this analysis is representative of those delineated in the loss of offsite power event tree, see Section 3.2.1 of the event tree document [Ref. 5]. The following system failures and requirements are needed to follow the event tree logic path.

- Offsite AC power and Diesel Generators are lost simultaneously at t=0.

- MSIVs are locked closed at time t=0.

- Control rods insert upon scram signal.

- Recirculation pumps trip at t=0 and coastdown.

- Core Spray, CRD, RHR and Drywell Vent systems are unavailable.

Several other assumptions were also needed to simulate the plant response and operator actions.

1. Reset SRVs to low-low setpoint at t=0.

2. The operator maintains RCIC suction from ECST.

3. RCIC fails at 200°F suction temperature.

4. Continuously monitor HCTL and emergency depressurize following EOPs using two SRVs.

5. HPCI initially starts and then is manually secured after cycling off automatically.

6. Drywell coolers are inoperable at the onset of the transient and remain off.

7. A leak rate of 61 gpm exists from the RR pump seals at rated pressure.

8. The convection heat losses from the RPV to the drywell are 4.8 MBtu/Hr at rated conditions.

9. The number of reflective insulation plates is 11, each with a width of 0.292 ft.

10. The initial bulk air temperature in the drywell and pedestal is 140°F at rated conditions.

11. The initial bulk water temperature in the suppression pool and the emergency condensate storage tank is 90°F.

5.0 Methodology

Deterministic calculations were performed using Modular Accident Analysis Program (MAAP) version 3.0B computer code [Ref. 10,11]. The executable code accessed is BMAAP.EXP and BMAAP.XMP with 3-12-1991, 11:25a as the date and time tags for both these files.

5.1 Archive of MAAP Analysis

The results of the analysis performed in this calculation were archived according to the

PRA Procedure PRA-P011 [Ref. 6]. All input and output files are stored in *MP007C00* on WORM drive cartridge MAAP_#1, refer to Attachment A for specific file information.

5.2 Computer Code Input

The MAAP input deck was prepared to utilize the flexibility of the MIPS preprocessor for organization and structure [Ref. 12]. The bases for the MAAP input is discussed below. The MAAP(MIPS) input deck construction reflects the requirements and assumptions of Section 4.0. A brief discussion is provided for each item. Refer to Attachment C for particular items discussed.

5.2.1 Bases For Assumptions

1. Once the first group of SRVs lift, the SRVs reset automatically to the low-low setpoint [Ref. 8]. For this analysis, it is conservatively assumed that the SRVs go to low-low set immediately, at t=0. This will give the bounding suppression pool heatup rate for SRV low-low set operation.

2. CNS EP5.8, Rev. 5 requires that RCIC maintain suction on the emergency condensate storage tank. Therefore no operator action is required since the normal lineup is from the ECST.

3. The RCIC Terry Turbine lube oil is cooled with water taken from the suction line of the pump. The turbine design limits [Ref. 7] on the lube oil temperature indicate 200°F is the maximum oil temperature for continuous reliable operation of the turbine. Temperatures above this value would therefore cause RCIC failure (although not instantaneously). Note: this only becomes a factor when taking suction from the torus.

4. In CNS EP5.8, Rev. 5, EOP-2 Step SP/T-5 requires RPV pressure be reduced to stay within the constraints of Graph 7, Heat Capacity Temperature Limit. To depressurize the RPV, two SRVs are opened to simulate emergency depressurization, in accordance with EOP-1, Step RC/P-17. This is monitored continuously using MIPS to adjust SRV lift pressures.

5. For the purposes of this study it is assumed that HPCI is available initially, injecting coolant to the vessel for a single on-off cycle. After tripping off on level 8, the operator secures HPCI and vessel level control is maintained using RCIC.

6. The drywell coolers are dependent upon REBCCW for operation which in turn requires AC power to run, and AC is needed for fan power also. Therefore it is assumed that the drywell coolers are unavailable for the duration of the scenario.

7. The CNS Station Blackout as defined by the NRC assumes that the effects of primary system leakage of 61 gpm be included in the thermal-hydraulic analysis. Each Reactor Recirculation Pump seal leaks at 18 gpm, for a total of 36 gpm from the primary system to the drywell. Then, including the Technical Specifications maximum allowable identified leakage adds another 25 gpm [Ref. 1]. To model the LOCA, the MAAP input parameter ZLOCA was given the RR suction nozzle elevation (930 ft, saturated liquid leak) and ALOCA (leak area=0.00098 ft^2) was adjusted to obtain a single leak of 61 gpm from the reactor recirculation pump seals at rated RPV pressure (>1000 psia).

8. The heat transfer rate between the reactor pressure vessel and drywell was calculated in NEDC 89-1439, Rev. 2 as 4,770,837 Btu/Hr (or roughly 4.8 MBtu/Hr). This value is based on 1989-90 operational data.

9. The reflective insulation thickness and number of plates is listed in the review comments of NEDC 90-326, Rev. 0 as 11 plates at a thickness of 0.292 ft. This supersedes the old value of 253 plates listed in the parameter file. The parameter file will be updated to reflect the change when Rev. 0 is approved.

10. The initial bulk air temperature in the drywell and pedestal is based on NEDC 89-1439, Rev. 2 operating data from 1989-90. The maximum average air temperature is not expected to exceed 150°F during normal operation (includes zone 2A). For the purposes of the station blackout study, an average drywell temperature of 140°F is selected to prevent being overly conservative. A separate perturbation addresses the impact of 150°F initial temperature. See Section 5.4.1.

11. The initial suppression pool water temperature is 90°F which is the same initial value used in the design basis loss of coolant accident analysis reported in the USAR. The enthalpy of the condensate storage tank water is also based on 90°F. This is considered the upper bound for the expected ambient temperatures.

5.3 Computer Code Output

The *.LOG file was reviewed for errors, warnings and diagnostic messages. No errors, warnings or diagnostics were found. Therefore program convergence is assured within all subroutines accessed.

No information was directed to the restart files. A summary of the sequence of events is given in the SUM file, refer to Attachment C. This file provides a chronological record of when trips and setpoints were reached. Important details of the analysis are summarized below, also refer to Section 5.4.

Time	Description
3.5 sec	Reactor Scram due to high pressure.
189 sec	HPCI starts to inject.
194 sec	RCIC starts to inject.
307 sec	HPCI locked out.
15 min	Level re-established, RCIC begins to cycle as needed to maintain level.
4.0 hrs	End of run, core remains covered and containment is intact.

5.4 Graphical Results

Attachment D shows the trended results of the analyses. Variables of importance are plotted. If further information is needed additional figures can be generated using the archive files. Definitions of figure contents are provided below.

Figure 1:	TGDW -	Temperature of gas in the drywell (F).
Figure 2:	PDW -	Pressure in the drywell (psia).
Figure 3:	XWSH -	Height of water in the shroud (ref. to bottom of vessel, collapsed) (ft).
Figure 4:	TWSP -	Temperature of water in the suppression pool (F).
Figure 5:	PPS -	Pressure in primary system (psia).
Figure 6:	WWLOCA -	Flow rate of liquid through the Recirculation Pump Seals into drywell (Mlbm/Hr).
Figure 7:	QRVDW -	Heat transfer rate between reactor pressure vessel and drywell (MBtu/Hr).
Figure 8:	PWW -	Pressure in the wetwell (psia).

5.4.1 General Observations

The RPV reference elevations in MAAP are listed below:

Level 8 High Level Trip	47.65 ft
Normal Water Level	46.0 ft
Top of Active Fuel (TAF)	29.4 ft
Vessel Bottom (I.D.)	0.0 ft (917 ft above Sea Level)

Calc. No. 91-261
STATION BLACKOUT WITH RCIC AND RR SEAL LEAK

NPPD Generated Calculation
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Review of Non-NPPD Generated Calculations
Company's Name:
NPPD Reviewer:
Date: 19

The results after progressing 4 hours into the scenario, are summarized by the following conditions:

1. Suppression pool temperature is roughly 160°F and HCTL limit is not reached, since depressurization is not required below 174°F.

2. Drywell temperature increased to 263°F and wetwell pressure increased to 26 psia, 11 psi below the RCIC turbine high exhaust pressure trip [Ref. 9].

3. An additional case was executed which used identical input as Attachment B, but with an initial drywell (and pedestal) air temperature of 150°F (added 10°F). This perturbation demonstrated that the final drywell temperature after 4 hours also increased 10°F.

6.0 Conclusion

The progression of the 10 CFR 50.63 station blackout scenario, using primarily RCIC for core injection, indicates that containment gas temperatures do not exceed 281°F within 4 hours.

N132-0389

Nebraska Public Power District

DESIGN CALCULATIONS SHEET

Calc. No. 91 - 261

STATION BLACKOUT WITH RCIC AND RR SEAL LEAK

NPPD Generated Calculation

Prepared By: Kent Sutton

Date: 31 Dec 1991

Checked By: David Oltman

Date: 12/31/1991

Review of Non-NPPD Generated Calculations

Company's Name:

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NEDC 91-261
Attachment A

This Attachment lists all of the MAAP (Rev. 6) input and output files which were part of this calculation. The date and time tags are used to determine the file revisions used for a given analysis.

FILE NAME	SIZE	DATE	TIME
SBO-S3.AUW	1	12-31-91	2:29p
SBO-S3.HUR	0	12-31-91	2:27p
SBO-S3.HUW	870	12-31-91	2:51p
SBO-S3.INP	4442	12-31-91	2:34p
SBO-S3.LOG	33139	12-31-91	2:51p
SBO-S3.PL1	84853	12-31-91	2:51p
SBO-S3.PL2	56805	12-31-91	2:51p
SBO-S3.PL3	51445	12-31-91	2:51p
SBO-S3.PL4	64231	12-31-91	2:51p
SBO-S3.PL5	72067	12-31-91	2:51p
SBO-S3.PL6	64231	12-31-91	2:51p
SBO-S3.PL7	125689	12-31-91	2:51p
SBO-S3.RSR	1	12-31-91	2:29p
SBO-S3.RSW	50551	12-31-91	2:51p
SBO-S3.SUM	8162	12-31-91	2:51p
SBO-S3.TAB	59268	12-31-91	2:51p
COOPR6DV.PAR	120959	12-31-91	2:33p
COOPER.ISF	2221	09-28-91	11:39a
COOPER.OSF	3912	09-28-91	11:45a

```
VERBOSE

SENSITIVITY

TITLE
\SBO-S3\ CNS STATION BLACKOUT WITH RR SEAL LOCA
COOPER REV 6 PARAMETER FILE 12-31-91, DV
DRYWELL HEATUP CALCULATION - KES, NPPD 12-31-91
END

SYMBOL TABLES
      INPUT SYMBOLS ARE IN C:\MAAPEXEC\MAAP\MIPS\COOPER.ISF
      OUTPUT SYMBOLS ARE IN C:\MAAPEXEC\MAAP\MIPS\COOPER.OSF
END

PARAMETER FILE COOPR6DV.PAR DO NOT LIST

C
C   INPUT FOR REACTOR DEPRESSURIZATION ALONG HCTL CURVE
C
C       PLEASE NOTE CONTROL BLOCK IS OVERRIDDEN BY ANY
C       WHEN STATEMENTS THAT FOLLOW IN THE INPUT DECK, THUS
C       MUST USE THIS HCTL WITHOUT WHEN BLOCK AS HERE. CANT USE
C       AS ATTACH FILE HOWEVER.
C
C       SRVS CONTROL PRESSURE BASED ON        NOTE:MODIFIED HCTL
C       HEAT CAPACITY TEMPERATURE LIMIT       BASED ON LOW LOW SET,
C       FIGURE 2 -1, REV. 5 CNS EOP,          ASSUME AN SRV WILL OPEN
C       CHANGE SETPOINT AS TEMP INCREASES     INITIALLY, T.S. PG 59
C       REF. NEDC 89-1905, REV. 1             SRV/D 1029.7, SRV/F 1039.7
CONTROL SRV/D LOW SETPOINT
        USING POOL TEMP
           177.0 F  1029.7 PSIA
           183.5 F   889.7 PSIA
           190.7 F   739.7 PSIA
           198.6 F   589.7 PSIA
           207.5 F   439.7 PSIA
           218.6 F   289.7 PSIA
           227.3 F   199.7 PSIA
           22[illegible].7 [illegible]   179.7 PSIA
       END
CONTROL SRV/D HIGH SETPOINT
        USING POOL TEMP
           177.0 F  1029.7 PSIA
           183.5 F   889.7 PSIA
           190.7 F   739.7 PSIA
           198.6 F   589.7 PSIA
           207.5 F   439.7 PSIA
           218.6 F   289.7 PSIA
           227.3 F   199.7 PSIA
           229.7 F   179.7 PSIA
       END
CONTROL SRV/F LOW SETPOINT
        USING POOL TEMP
           177.0 F  1039.7 PSIA
```

```
          183.5 F    899.7 PSIA
          190.7 F    749.7 PSIA
          198.6 F    599.7 PSIA
          207.5 F    449.7 PSIA
          218.6 F    299.7 PSIA
          227.3 F    209.7 PSIA
          229.7 F    189.7 PSIA
      END
CONTROL SRV/F HIGH SETPOINT
       USING POOL TEMP
          177.0 F   1039.7 PSIA
          183.5 F    899.7 PSIA
          190.7 F    749.7 PSIA
          198.6 F    599.7 PSIA
          207.5 F    449.7 PSIA
          218.6 F    299.7 PSIA
          227.3 F    209.7 P IA
          229.7 F    189.7 PSIA
      END

C
C   MAKE PARAMETER FILE CHANGES PRIOR
C   TO BEGINNING CALCULATION
C
PARAMETER CHANGES
C
C   SET INITIAL HEAT FLUX TO NED CALC INFO,
C   ROUGHLY 4.8 MBTU/HR.  (NEDC 89-1439,REV 2)
C   ALSO NOTE CHANGE TO #168 FROM PARAMETER
C   FILE REVIEW OF NEDC 90-326.
           01,167,4.8D6
           01,168,11
C
C  INITIAL BULK AIR TEMPERATURE IN THE
C  DRYWELL AND PEDESTAL, SEE NEDC 89-1439,
C  REV. 02.  SET INITIAL BULK TEMPERATURE
C  OF SUPP. POOL AND CONDENSATE STORAGE
C  TANK TO DBA LOCA VALUES (90 F).
           03,07,0.[illegible]99
           03,107,58.[illegible]18
           09,08,140.
           09,09,140.
           09,10,90.
           09,11,90.
C
C   SMOOTH CONVERGENCE OF SOLUTION
C
           11,3,0.004
           11,4,0.005
C
C   HIGH SUPP POOL LEVEL TO SWAP RCIC
C   SUCTION - MAINTAIN SUCTION ON ECST
C
           03,206,885.0
C
```

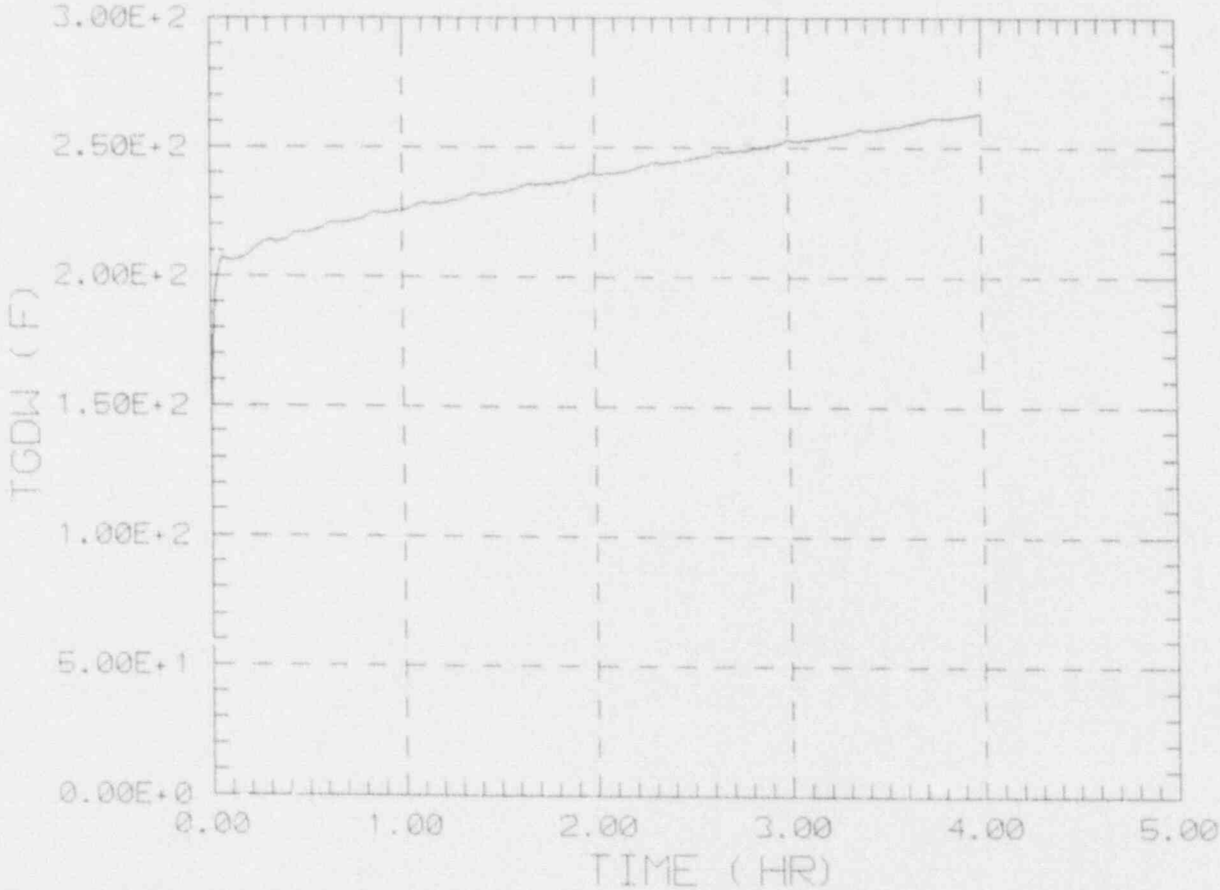
```
C SMALL-SMALL LOCA ON RECIRC PUMP SEALS IN DW
C CHECK PLOT TO DETERMINE FLOW RATE (AT LLSET
C REACTOR PRESSURE.
C
            01,47,930.0
            01,48,0.00098
C
C       ASSIGN BANDWIDTH FOR LOW LOW SET,
C       ON F AND D.
C
               SRV/D DEADBAND IS 140.0 PSI
               SRV/F DEADBAND IS 150.0 PSI
END PARAMETER CHANGES NOLIST

NOT A RESTART

PRINT TIME 4 HRS

FINAL TIME 4 HRS

PARALLEL

WHEN BEGIN
     LOCA ON
     AC POWER OFF
     DIESEL GEN OFF
     MSIVS CLOSE
     DW COOLERS OFF
     RHR HX1 OFF
     RHR HX2 OFF
     LPCI1 OFF
     LPCI2 OFF
     LPCI3 OFF
     LPCS OFF
     RCIC AUTO
     S S RCIC BLOCK
     HPCI AUTO
     S S HPCI BLOCK
     LPCS OFF
     ADS OFF
     CRD OFF
END

C
C       CHANGE SRV GRP 1 (SRV/D) AND GRP 2 (SRV/F) TO
C       NARROW MARGIN AS POOL TEMP. INCREASES.  THIS WILL
C       PREVENT DROPPING VESSEL PRESSURE BELOW 120 PSIA
C
WHEN POOL TEMP > 225 F
     PARAMETER CHANGES
       SRV/D DEADBAND 45.0 PSI
       SRV/F DEADBAND 55.0 PSI
     END PARAMETER CHANGE
END
```

```
C
C MANUALLY SECURE HPCI INJECTION
C AFTER INITIALLY AUTO STARTING
C
WHEN EVENT CODE (78) IS FALSE
     AND EVENT CODE (39) IS TRUE
       HPCI TRIP
END
```

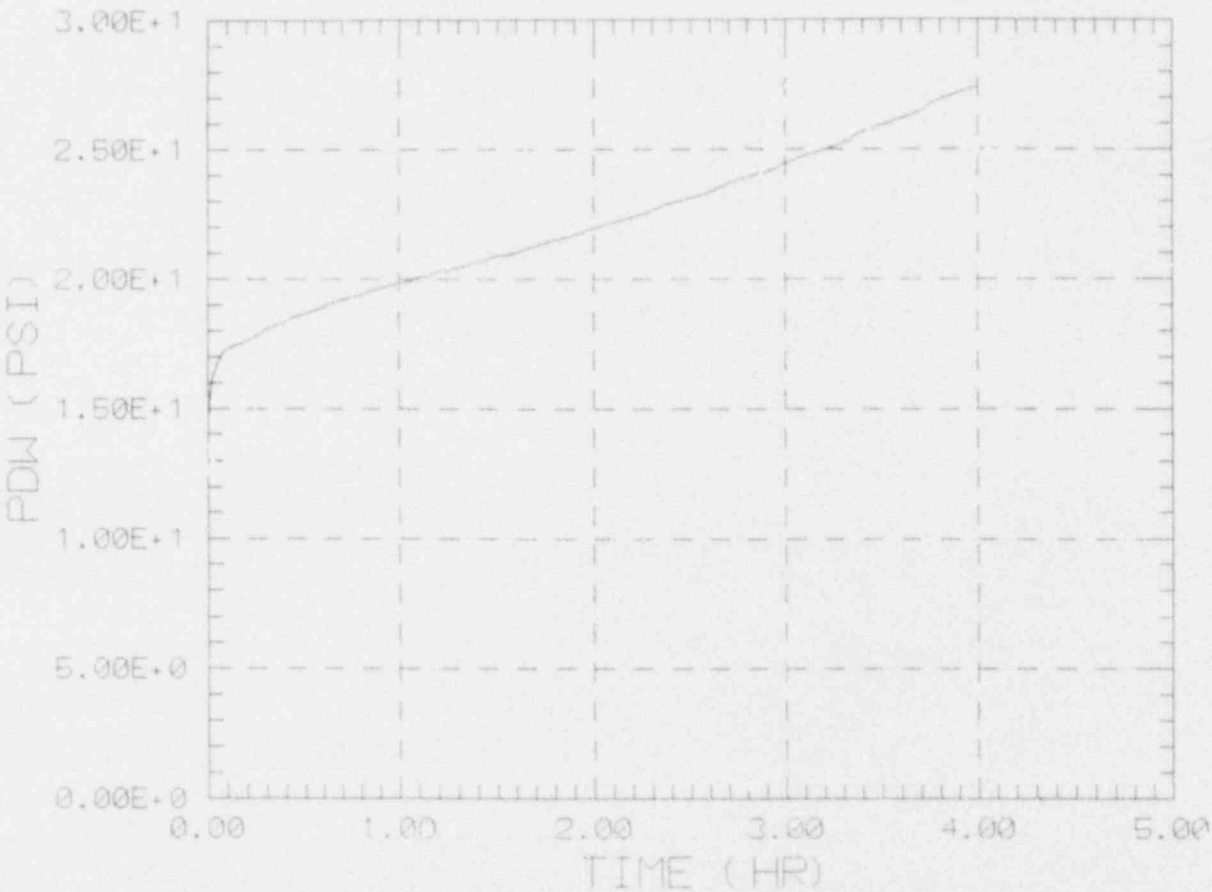
0.0	10	SCRAM SIGNAL RECIEVED
0.0	19	FEEDWATER PUMP TRIPPED
0.0	62	MSIV CLOSED
0.0	63	LOSS OF AC POWER (LOCKED)
0.0	65	RECIRC PUMP TRIPPED
0.0	66	TURBINE STOP VALVES CLOSED
0.0	70	PERMISSIBLE FOR RPT
0.0	71	CRD PUMP OFF
0.0	94	RESET HIGH DRYWELL PRESSURE TRIP FOR ADS
0.0	203	LPCI LOOP 1 LOCKED OFF
0.0	207	LPCS LOCKED OFF
0.0	215	MSIVS LOCKED CLOSED
0.0	226	ADS LOCKED CLOSED
0.0	228	RHR HTX #1 LOCKED OFF
0.0	230	RHR HTX #2 LOCKED OFF
0.0	232	LPCI LOOP 2 LOCKED OFF
0.0	250	LOSS OF AC POWER
0.0	251	LOSS OF DIESEL POWER
0.0	256	BREAK IN PRIMARY SYSTEM (LOCA)
0.0	260	LPCI LOOP 3 LOCKED OFF
0.0	278	CRD PUMP LOCKED OFF
1.4	9	HIGH VESSEL PRESSURE SCRAM
3.5	64	REACTOR SCRAMMED
11.8	160	LOW LEVEL FOR SCRAM
38.0	78	LOW LEVEL TRIP FOR HPCI
38.0	82	LOW LEVEL TRIP FOR RCIC
63.0	7	HPCI ON
67.9	29	RCIC ON
135.5	78	RESET LOW LEVEL TRIP FOR HPCI
135.5	82	RESET LOW LEVEL TRIP FOR RCIC
135.6	78	LOW LEVEL TRIP FOR HPCI
135.6	82	LOW LEVEL TRIP FOR RCIC
136.8	78	RESET LOW LEVEL TRIP FOR HPCI
136.8	82	RESET LOW LEVEL TRIP FOR RCIC
141.1	79	HIGH DRYWELL PRESSURE FOR HPCI
141.1	161	HIGH DRYWELL PRESSURE FOR SCRAM
226.2	7	HPCI OFF
226.2	29	RCIC OFF
226.2	39	LEVEL 8 HIGH WATER LEVEL
227.1	79	RESET HIGH DW PRESS. FOR HPCI
227.1	201	HPCI LOCKED OFF
1025.3	29	RCIC ON
1025.3	39	RESET LEVEL 8 TRIP
2159.2	29	RCIC OFF
2159.2	39	LEVEL 8 HIGH WATER LEVEL
2168.2	29	RCIC ON
2168.2	39	RESET LEVEL 8 TRIP
2169.4	29	RCIC OFF
2169.4	39	LEVEL 8 HIGH WATER LEVEL
2169.8	29	RCIC ON
2169.8	39	RESET LEVEL 8 TRIP
2924.4	29	RCIC OFF
2924.4	39	LEVEL 8 HIGH WATER LEVEL
2979.7	29	RCIC ON
2979.7	39	RESET LEVEL 8 TRIP

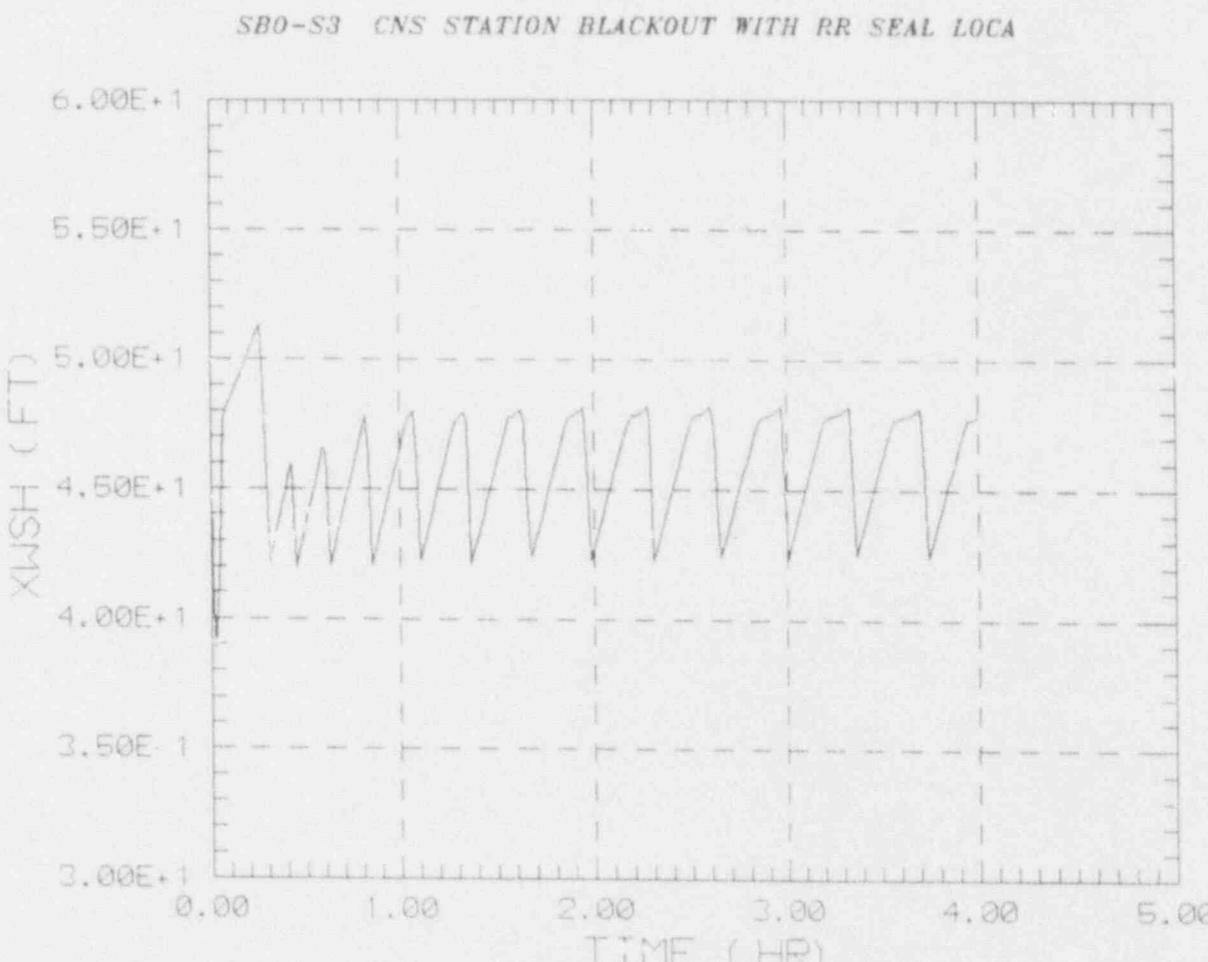
3752.6	29	RCIC OFF
3752.6	39	LEVEL 8 HIGH WATER LEVEL
3884.7	29	RCIC ON
3884.7	39	RESET LEVEL 8 TRIP
4663.9	29	RCIC OFF
4663.9	39	LEVEL 8 HIGH WATER LEVEL
4861.6	29	RCIC ON
4861.6	39	RESET LEVEL 8 TRIP
4865.4	29	RCIC OFF
4865.4	39	LEVEL 8 HIGH WATER LEVEL
4865.4	29	RCIC ON
4865.4	39	RESET LEVEL 8 TRIP
5637.9	29	RCIC OFF
5637.9	39	LEVEL 8 HIGH WATER LEVEL
5896.4	29	RCIC ON
5896.4	39	RESET LEVEL 8 TRIP
5902.1	29	RCIC OFF
5902.1	39	LEVEL 8 HIGH WATER LEVEL
5904.2	29	RCIC ON
5904.2	39	RESET LEVEL 8 TRIP
6707.3	29	RCIC OFF
6707.3	39	LEVEL 8 HIGH WATER LEVEL
7024.7	29	RCIC ON
7024.7	39	RESET LEVEL 8 TRIP
7834.0	29	RCIC OFF
7834.0	39	LEVEL 8 HIGH WATER LEVEL
8197.2	29	RCIC ON
8197.2	39	RESET LEVEL 8 TRIP
8204.2	29	RCIC OFF
8204.2	39	LEVEL 8 HIGH WATER LEVEL
8204.5	29	RCIC ON
8204.5	39	RESET LEVEL 8 TRIP
9000.9	29	RCIC OFF
9000.9	39	LEVEL 8 HIGH WATER LEVEL
9416.0	29	RCIC ON
9416.0	39	RESET LEVEL 8 TRIP
10244.1	29	RCIC OFF
10244.1	39	LEVEL 8 HIGH WATER LEVEL
10707.1	29	RCIC ON
10707.1	39	RESET LEVEL 8 TRIP
11529.2	29	RCIC OFF
11529.2	39	LEVEL 8 HIGH WATER LEVEL
12023.5	29	RCIC ON
12023.5	39	RESET LEVEL 8 TRIP
12837.8	29	RCIC OFF
12837.8	39	LEVEL 8 HIGH WATER LEVEL
13379.6	29	RCIC ON
13379.6	39	RESET LEVEL 8 TRIP
14188.1	29	RCIC OFF
14188.1	39	LEVEL 8 HIGH WATER LEVEL
14400.0	159	BATTERY POWER UNAVAILABLE

SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA

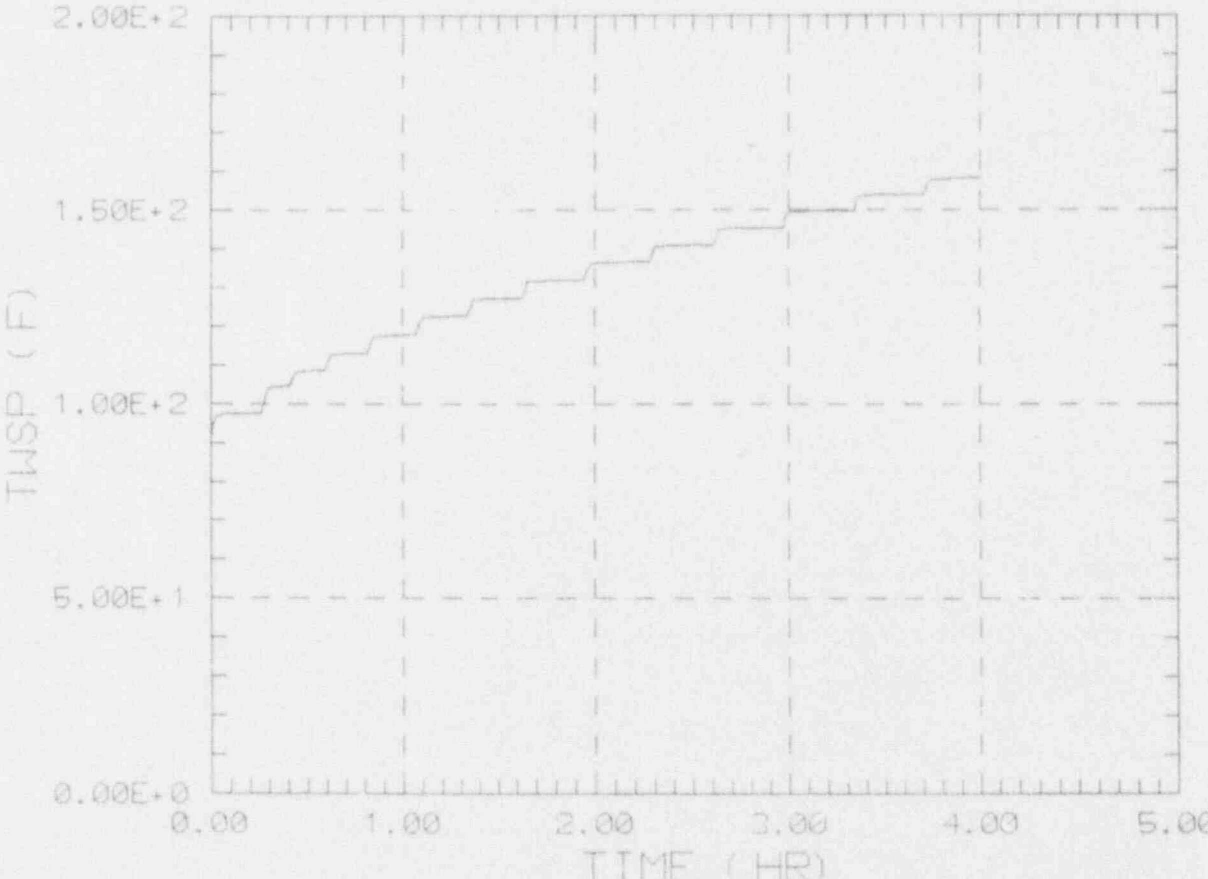


SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA

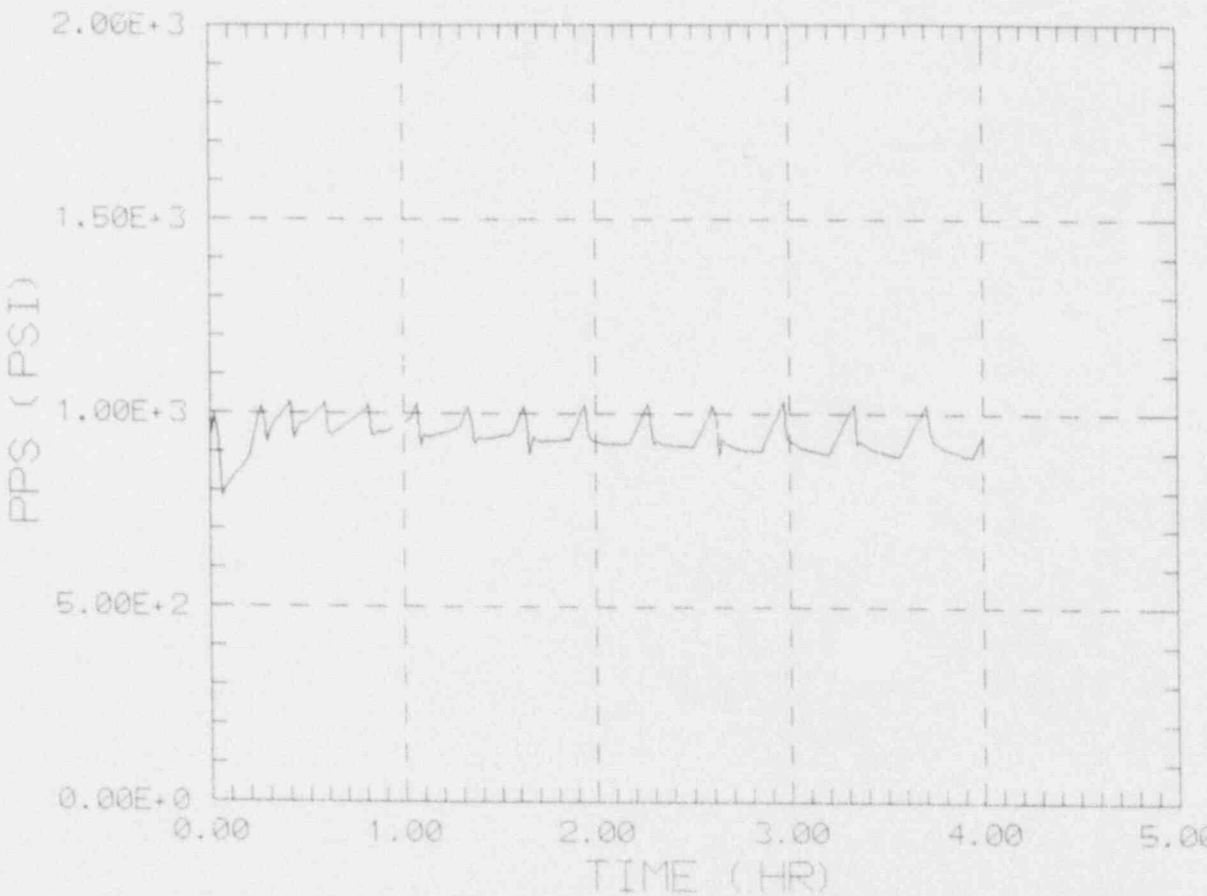



SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA
6.00E+1
5.50E+1
5.00E+1
4.50E+1
4.00E+1
3.50E+1
3.00E+1
XWSH (FT)
0.00
1.00
2.00
3.00
4.00
5.00
TIME (HR)

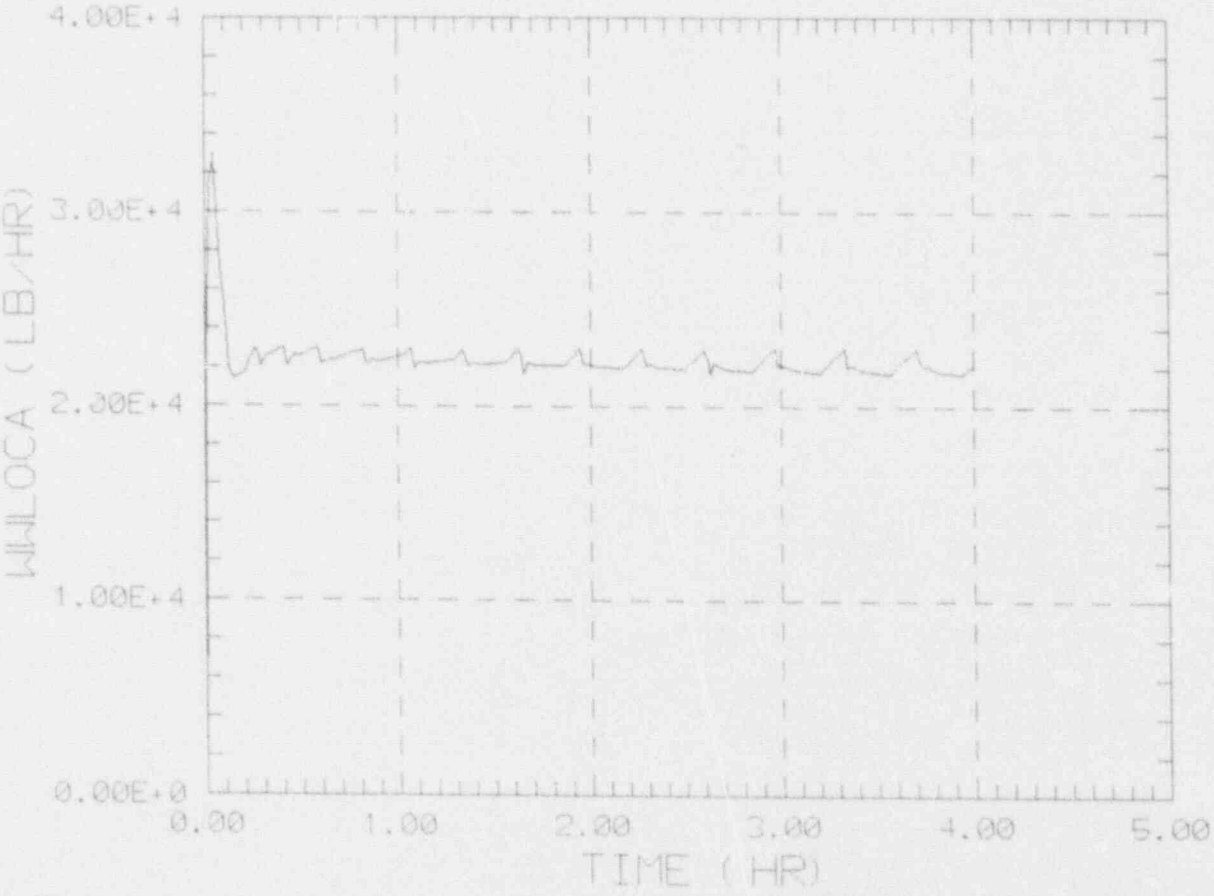
SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA



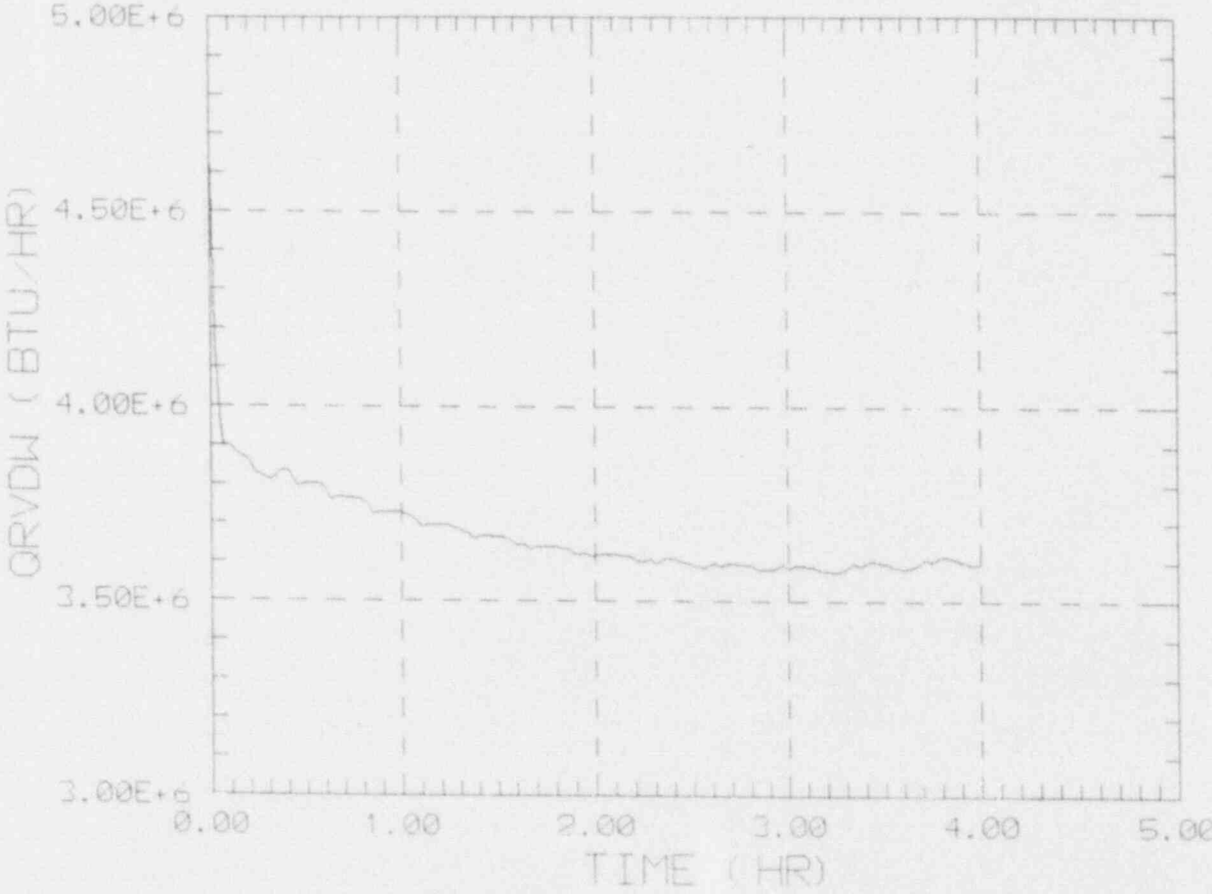
SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA



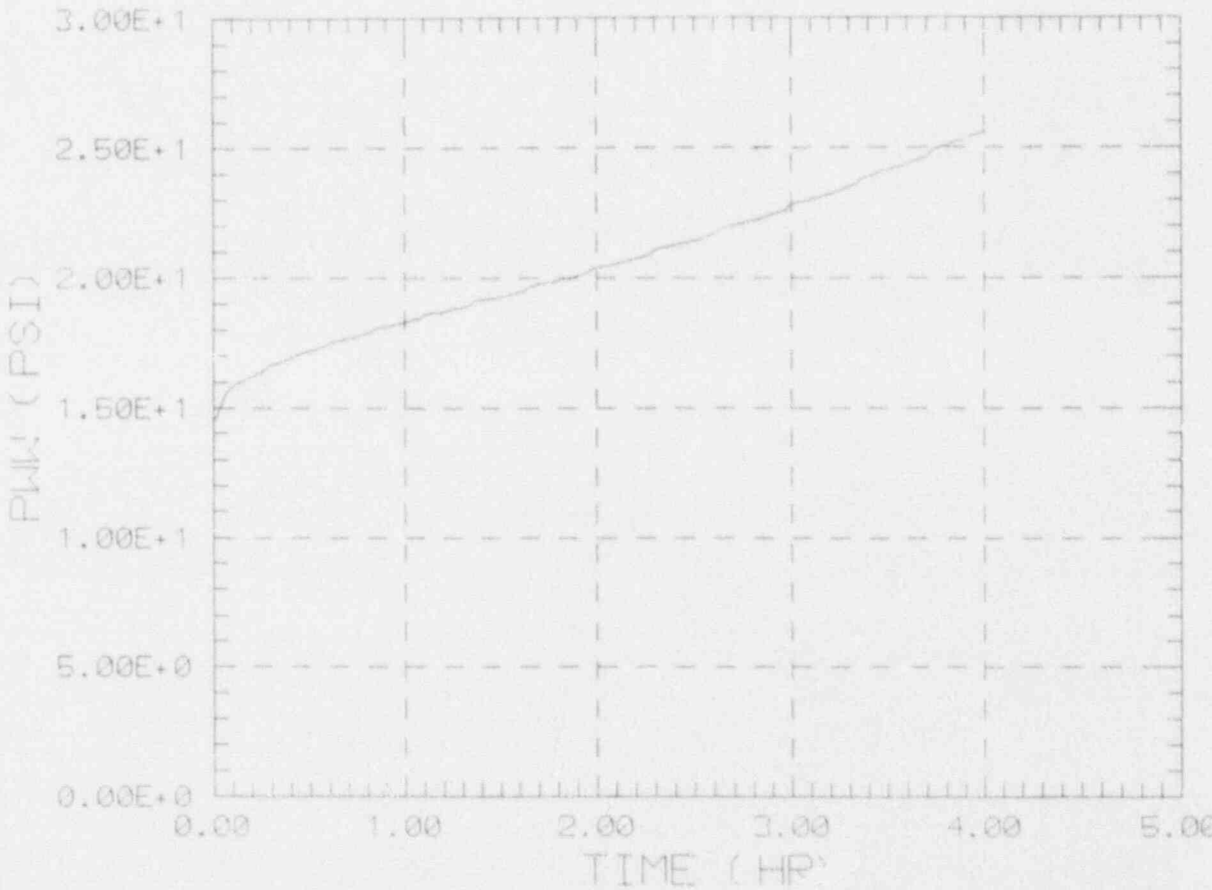
SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA



SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA



SBO-S3 CNS STATION BLACKOUT WITH RR SEAL LOCA



CALCULATION DESIGN VERIFICATION

1.0 The following basic questions shall be addressed, as applicable during the performance of any design verification. These questions are taken from ANSI N45.2.11-1974.

1.1 Were the design inputs, per Procedure 3.4.2, correctly selected and incorporated into the design?

1.2 Are the latest applicable revisions of design documents utilized?

1.3 Are assumptions necessary to perform the design activity adequately described and reasonable? When necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are complete?

1.4 Are the applicable codes, standards and regulatory requirements, including issue and addenda, properly identified and are their requirements and design met?

1.5 Have applicable construction and operating experience been considered?

1.6 Have the design interface requirements been satisfied?

1.7 Was an appropriate design method used?

1.8 Is the output reasonable compared to inputs?

1.9 Are the specified parts, equipment, and processes suitable for the required application?

1.10 Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?

1.11 Has the design properly considered radiation exposure to the public and plant personnel?

1.12 Has this design adequately considered hazards such as missiles, jet impingement, etc.?

1.13 Has the design adequately considered seismic requirements, barge impact, and Mark I loadings as appropriate?

Calculation Number: NED 91-261, Revision: 0, has been reviewed for the above design verification elements and the appropriate design verification elements have been adequately addressed.

Design Verifier: David A. Stuart Date: 12/31/91