

QA CATEGORY 1

REVISION	0
RESPONSIBLE SECTION	PRA
SERIAL NUMBER	C2-517-1051-RE
PLANT (UNIT) / SYSTEM	CY
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BACKUP COMPLETE	4/12/93
DATE SENT TO NPRF	3/30/93
QUALITY SOFTWARE USED	RMQS 2.4d

TITLE: Connecticut Yankee Core Melt Frequency Impact
of Changing Pump Allowed Outage Increase

METHOD OF REVIEW:

Duplicated computer output
Reviewed in accordance with MEO 5.06 Rev. 5

Prepared By: E.A. Oswald / E.A. Oswald
(Print/Signature)
Date: 3/19/93

Reviewed By: John D. Cairano / John D. Cairano
(Print/Signature)
Date: March 25, 1993

Approved By: Donald A. Dubé / Donald A. Dubé
(Print/Signature)
Date: 3/29/93

SUBJECT _____

BY EAODATE 3/19/93CHKD. BY JCSDATE 3/25/93CALC. NO. 62-517-1051-ACREV. 0SHEET NO. 2OF 20Introduction

A proposed Technical Specification change has been requested (See Attachment 1.0) to extend the allowed outage time (AOT) from 72 hours to 7 days. In this analysis, PRA is to determine the impact of this change on the core melt frequency and whether this change is acceptable.

Quantification

The current out of service for maintenance unavailability for a charging pump is $1.03E-2$. To determine the impact of this change, it was assumed that this unavailability would increase by $7/3$ (7 days / 72 hours). The revised OOS unavailability is $2.40E-2$. The basic identifiers for the charging pumps being OOS are CP8QN18A and CP8QN18B.

The current RMS model for CYCMF, CYPRAIB was copied and called CHGOOS to perform the sensitivity analysis. When Table 4 - Component table was examined, it was found that cutsets including CP8QN18A had been truncated (i.e. below $1.0E-8$) whereas CP8QN18B was given in the table. Based on engineering judgment, it was assumed that sequence cutsets including CP8QN18A are already below 10^{-8} by increasing the maintenance unavailability by $7/3$ still would result in a negligible contribution to CMF increase.

The next step was to edit Table 4 changing the probability of CP8QN18B from $1.03E-2$ to $2.40E-2$. The CHGOOS model was then requantified using the CALCULATE option of RMS. The core melt frequency increased from $1.800E-4$ to $1.803E-4$ /yr. - an increase of $3.0E-7$ /yr a less than 1%.

To further investigate where the increase is coming from the following RMS tables were generated:

Table 1.0 CMF by PDS \Rightarrow SLSH changed

SUBJECT _____

BY

EGO

DATE

3/19/93

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3/25/93

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Table 2.0 - CMF by initiator \Rightarrow T61 and T67 changed

Table 3.0 - CY importance - AMQS 'CHG005'

CP8QN18B importance increased from $9.413E-4$ to $2.204E-3$

Table 4A and 4B - Comparison of T61 sequences with CP8QN18B

Table 5A and 5B - Comparison of T67 sequences with CP8QN18B

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Conclusion

Based on the above findings, the increase in the charging pump allowed outage time from 3 days to 7 days has a negligible impact on CMF and is found to be acceptable. The increase in CMF is $3.0E-7/yr$ or $\sim 17\%$. A permanent increase in CMF does require approval by the PRA Supervisor and possibly compensatory measures.

The impact on external events contribution to CMF was also examined qualitatively. Based on engineering judgment, the impact on the CMF due to external events (tornado, seismic, fire) is negligible. These dominant accident sequences are usually an external event taking out a support system or an electrical train (ex Distritzer Room AT) and operator action failure or failure of equipment which impact many systems (ex Service Water pump or Seal Water B). For example given a tornado,

$$\left(\begin{matrix} \text{Frequency of tornado} \\ \text{induced loss of SWGRA} \end{matrix} \right) \left(\begin{matrix} \text{Failure of RCP} \\ \text{cooling via} \\ \text{metering pump} \end{matrix} \right) \left(\begin{matrix} \Delta \\ \text{Failure of charging} \\ \text{Pump A (005)} \end{matrix} \right) = \text{CMF impact}$$

$$\left(\frac{10^{-4}}{yr} \right) \left(\overset{\text{assumption}}{10^2} \right) (2.4E-2 - 1.03E-2) = 1.4E-8/yr$$

To conclude, this increase in the chg pp ADT is acceptable in both terms of charging system unavailability and CMF contribution

SUBJECT _____

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Sheet A

In addition to compiling the core melt frequency impact on the increased allowed outage time, the charging system unavailability impact was also determined. The charging system is modeled for three different modes: 1) RCP seal cooling, 2) charging injection and 3) recirculation via charging. From the cutset reports generated in Reference 1: Calc File No. CA-517-604-RE Rev 3CWI "CY Charging System Unavailability Analysis", the unavailability impact is determined by increasing the cutsets with CP8QN18A, CP8QN18B by 7/3. From Table 6.0, it is shown that the charging injection unavailability would increase from $5.94E-3$ to $5.86E-3$. $\Delta = 2.0E-5$ or 0.3% increase. Overall, this is a negligible increase.

From Table 7.0, there are no RCP seal cooling cutsets containing CP8QN18A, B. Therefore the increase in the charging system unavailability is of no impact. From Table 8.0, it is shown that the charging portion of any recirculation unavailability increases from $6.88E-3$ to $7.17E-3$. $\Delta = 2.93E-4$ or 4.3%. Although this is a few percentage increase, it is still insignificant when the whole recirculation tree is quantified. The major contribution from recirculation is the human error failure probability associated with core alignment and failure of RHR. Charging is redundant with the NPST system and therefore an increase in the unavailability is insignificant.

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Table 1.0 - CMF by Plant Range State - RMQS'CMG005'

Damage Class	Core Melt	Any Rel.	Sig. Rel.	Econ Risk	Risk 5	Risk 6
AECH	3.660E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AECL	2.523E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AECM	1.728E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AEFL	1.344E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ALCL	1.222E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ALCM	4.287E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ALFL	2.102E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ALSL	2.313E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GFPH	8.360E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GLFH	6.863E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GLFL	3.589E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SECH	7.127E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SLCH	5.435E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SLCQ	1.285E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SLFH	1.318E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SLSH	4.313E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TECH	5.267E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TECO	7.321E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TEFH	7.331E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TESH	1.365E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TLCH	3.603E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TLFH	2.648E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TLSH	7.518E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VSEQ	3.587E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total Freq:	1.803E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CYPRAD:1.800E-4

$\Delta = 3.0E-7$ yr

CYPRAD

Table 2.0 - CMF by Initiator - Rmas'CHG005'

doc 3/25/93
ca-371-1051-RE-0
PJS fzo

Initiator	Core Melt	Any Rel.	Sig. Rel.	Eccn Risk	Risk 5	Risk 6
CYPRAB						
LG1	2.697E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LG2	1.659E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LG3	1.511E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LG4	1.273E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LG5	8.058E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG1	8.160E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG2	1.405E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG3	9.757E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG41	1.272E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG42	1.304E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG6	1.163E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SG10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG1A	5.887E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG2	7.053E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG3A	1.407E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG3B	1.810E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG4B	1.710E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG5A	5.583E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TG5C	1.596E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VIEF	3.587E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total Freq:	1.803E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CYPRAB : 1.800E-4

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Table 30 Contingency - A-MAS - CNGOOS

Original Signature
9.473E-4

Code	Description
1-1500-03	CONDENSATE M-474 FAILS TO OPEN
1-1500-04	CONDENSATE M-474 FAILS TO CLOSE
2-1500-01	CONDENSATE M-474 FAILS TO START
2-1500-02	CONDENSATE M-474 FAILS TO STOP
3-1500-01	CONDENSATE M-474 FAILS TO START
3-1500-02	CONDENSATE M-474 FAILS TO STOP
4-1500-01	CONDENSATE M-474 FAILS TO START
4-1500-02	CONDENSATE M-474 FAILS TO STOP
5-1500-01	CONDENSATE M-474 FAILS TO START
5-1500-02	CONDENSATE M-474 FAILS TO STOP
6-1500-01	CONDENSATE M-474 FAILS TO START
6-1500-02	CONDENSATE M-474 FAILS TO STOP
7-1500-01	CONDENSATE M-474 FAILS TO START
7-1500-02	CONDENSATE M-474 FAILS TO STOP
8-1500-01	CONDENSATE M-474 FAILS TO START
8-1500-02	CONDENSATE M-474 FAILS TO STOP
9-1500-01	CONDENSATE M-474 FAILS TO START
9-1500-02	CONDENSATE M-474 FAILS TO STOP
10-1500-01	CONDENSATE M-474 FAILS TO START
10-1500-02	CONDENSATE M-474 FAILS TO STOP
11-1500-01	CONDENSATE M-474 FAILS TO START
11-1500-02	CONDENSATE M-474 FAILS TO STOP
12-1500-01	CONDENSATE M-474 FAILS TO START
12-1500-02	CONDENSATE M-474 FAILS TO STOP
13-1500-01	CONDENSATE M-474 FAILS TO START
13-1500-02	CONDENSATE M-474 FAILS TO STOP
14-1500-01	CONDENSATE M-474 FAILS TO START
14-1500-02	CONDENSATE M-474 FAILS TO STOP
15-1500-01	CONDENSATE M-474 FAILS TO START
15-1500-02	CONDENSATE M-474 FAILS TO STOP
16-1500-01	CONDENSATE M-474 FAILS TO START
16-1500-02	CONDENSATE M-474 FAILS TO STOP
17-1500-01	CONDENSATE M-474 FAILS TO START
17-1500-02	CONDENSATE M-474 FAILS TO STOP
18-1500-01	CONDENSATE M-474 FAILS TO START
18-1500-02	CONDENSATE M-474 FAILS TO STOP
19-1500-01	CONDENSATE M-474 FAILS TO START
19-1500-02	CONDENSATE M-474 FAILS TO STOP
20-1500-01	CONDENSATE M-474 FAILS TO START
20-1500-02	CONDENSATE M-474 FAILS TO STOP

9.473E-4

Sequence Name	Plant Damage Class	Freq. Measure	Percent (%)	Accident Sequence Events
SLSH4	SLSH	5.30E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WSRQL37A SERVICE WATER PUMP P-37-1A STRAINER OOS DUE TO MAINT.
SLSH4	SLSH	5.30E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WSRQL37B SERVICE WATER PUMP P-37-1B STRAINER OOS DUE TO MAINT.
SLSH4	SLSH	4.77E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WCPBI43A CONTACT PAIR PS/1443X (1-7) FAILS TO CLOSE WSWPUMPA YEARLY FRACTION SW PUMP A IS IN STANDBY
SLSH4	SLSH	4.77E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WCPBI43B CONTACT PAIR PS/1443X (2-5) FAILS TO CLOSE WSWPUMPB YEARLY FRACTION SW PUMP B IS IN STANDBY
SLSH4	SLSH	4.70E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WP2QL37A SW PUMP P-37-1A OOS FOR MAINTENANCE
SLSH4	SLSH	4.70E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGA AVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WP2QL37B SW PUMP P-37-1B OOS FOR MAINTENANCE

TOTAL: 2.95E-07 .16% of CM Total Frequency 1.80E-04

any other...
CP8QN18B

Table 4B: RMO - CYPRAIB T61 Sequence with CP8QN18B

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Sequence Name	Plant Damage Class	Freq. Measure	Percent (%)	Accident Sequence Events
SLSH4	SLSH	2.27E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. NSRQL37A SERVICE WATER PUMP P-37-1A STRAINER OOS DUE TO MAINT.
SLSH4	SLSH	2.27E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. NSRQL37B SERVICE WATER PUMP P-37-1B STRAINER OOS DUE TO MAINT.
SLSH4	SLSR	2.05E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WCPBI43A CONTACT PAIR PS/1443X (1-7) FAILS TO CLOSE NSWPUMPA YEARLY FRACTION SW PUMP A IS IM STANDBY
SLSH4	SLSR	2.05E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WCPBI43B CONTACT PAIR PS/1443X (2-5) FAILS TO CLOSE NSWPUMPB YEARLY FRACTION SW PUMP B IS IM STANDBY
SLSH4	SLSH	2.02E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WP2QL37A SW PUMP P-37-1A OOS FOR MAINTENANCE
SLSH4	SLSH	2.02E-08	.0	TG1 IE GENERAL PLANT TRANSIENT INITIATING EVENT FREQUENCY AMODACBUS9K <module>BUS 9 FAILS CCHGAAVG AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING P CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. WP2QL37B SW PUMP P-37-1B OOS FOR MAINTENANCE

TOTAL: 1.27E-07 .07% of CM Total Frequency 1.80E-04

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Table SA
 RMDS-CNG 5 T67 Sequences with CP8QN18B

C:\CAFTA\SLSR.RPT

Sequence Name	Plant Damage Class	Freq. Measure	Percent (%)	Accident Sequence Events
SLSR12	SLSR	2.70E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WSRQL37B SERVICE WATER PUMP P-37-1B STRAINER OOS DUE TO MAINT.
SLSR12	SLSR	2.70E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WSRQL37A SERVICE WATER PUMP P-37-1A STRAINER OOS DUE TO MAINT.
SLSR12	SLSR	2.40E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WP2QL37B SW PUMP P-37-1B OOS FOR MAINTENANCE
SLSR12	SLSR	2.40E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WP2QL37A SW PUMP P-37-1A OOS FOR MAINTENANCE

TOTAL: 1.02E-07 .06% of CM Total Frequency 1.80E-04

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Table 50
 AMOS - CYB TG7 sequences with CP8QN18B

C:\CAPTA\SLSHO.RPT

Sequence Name	Plant Damage Class	Freq. Messages	Percent (%)	Accident Sequence Events
SLSH12	SLSR	1.16E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WSRQL37B SERVICE WATER PUMP P-37-1B STRAINER OOS DUE TO MAINT.
SLSH12	SLSH	1.16E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WSRQL37A SERVICE WATER PUMP P-37-1A STRAINER OOS DUE TO MAINT.
SLSH12	SLSH	1.03E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WP2QL37B SW PUMP P-37-1B OOS FOR MAINTENANCE
SLSH12	SLSH	1.03E-08	.0	TG7 IE LOSP INITIATING EVENT FREQUENCY AMODDGBSUPAIKX <module>DG B RELATED FAILURES CP8QN18B P-18-1B UNAVAILABLE DUE TO MAINTENANCE. ERPROBXX OFFSITE POWER RECOVERY IN 1.4 HOURS WP2QL37A SW PUMP P-37-1A OOS FOR MAINTENANCE

TOTAL: 4.38E-08 .02% of CM Total Frequency 1.80E-04

PC 3/25/93
 CAST-1051-REF-A
 PJ10440

.\CUTSET\CYCINJ.CUT
Filter: 'ACTIVE'

CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) GC2640					*5.84E-03
1) CMVAARWT	CCF 2/2 MOVs FAIL TO OPEN (MOVs 373 & 32).	4.00E-3	0.408	1.63E-03	1.63E-03
2) CMVBAVCT	CCF OF 2/2 VCT TO CHG. SUCTION MOVs TO ISOL. MOVs 257 & 257B	4.00E-3	0.408	1.63E-03	1.63E-03
3) CCVAU372	CHECK VALVE BA-CV-372 FAILS TO OPEN	2.00E-4	6	1.20E-03	1.20E-03
4) CMVAN032	MOV BA-MOV-32 FAILS TO OPEN (MECHANICAL FAILURE)	4.00E-3	6	2.40E-02	5.76E-04
CMVAN373	MOV BA-MOV-373 FAILS TO OPEN (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
5) CMVBN057	CH-MOV-257 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	5.76E-04
CMVBN57B	CH-MOV-257B FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
6) CBKBA105	480V BKR. FROM MCC5 (CKT. 11RJ) FAILS TO CLOSE. (MOV-257)	3.00E-4	6	1.80E-03	4.32E-05
CMVBN57B	CH-MOV-257B FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
7) CBKBA109	480V CKT. BKR. ON MCC5 (CKT. 7RF) FAILS TO CLOSE- MOV-32	3.00E-4	6	1.80E-03	4.32E-05
CMVAN373	MOV BA-MOV-373 FAILS TO OPEN (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
8) CBKBB108	480V CIRCUIT BREAKER ON MCC12 FAILS TO CLOSE. MOV-373	3.00E-4	6	1.80E-03	4.32E-05
CMVAN032	MOV BA-MOV-32 FAILS TO OPEN (MECHANICAL FAILURE)	4.00E-3	6	2.40E-02	
9) CBKBB115	480V BKR. FROM MCC12 (CKT. 1H) FAILS TO CLOSE. (MOV-257B)	3.00E-4	6	1.80E-03	4.32E-05
CMVBN057	CH-MOV-257 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
10) CCVAAVCT	CCF OF 2/2 SUCTION LINE VENT CHECK VALVES CV-408 & CV-409 TO CLOSE	2.00E-4	6.8E-2	1.36E-05	1.36E-05
11) CP8FAPPS	CCF OF 2/2 CENTRIFUGAL PUMPS TO RUN.	4.50E-5	.192	8.64E-06	8.64E-06
12) IMVSU240	SI-MOV-24 IS CLOSED DUE TO VALVE STEM SEPARATION	1.04E-4	.0556	5.78E-06	5.78E-06
13) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.56E-06
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CP8FN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
14) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.56E-06
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CP8FN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
15) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.68E-06
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
16) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.68E-06
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
17) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	3.46E-06
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
18) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	3.46E-06
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
19) CBKBA105	480V BKR. FROM MCC5 (CKT. 11RJ) FAILS TO CLOSE. (MOV-257)	3.00E-4	6	1.80E-03	3.24E-06
CBKBB115	480V BKR. FROM MCC12 (CKT. 1H) FAILS TO CLOSE. (MOV-257B)	3.00E-4	6	1.80E-03	
20) CBKBA109	480V CKT. BKR. ON MCC5 (CKT. 7RF) FAILS TO CLOSE- MOV-32	3.00E-4	6	1.80E-03	3.24E-06
CBKBB108	480V CIRCUIT BREAKER ON MCC12 FAILS TO CLOSE. MOV-373	3.00E-4	6	1.80E-03	
21) ITKUURWT	RWST FAILS	1.00E-7	24	2.40E-06	2.40E-06
22) IMVRU240	OPERATOR FAILS TO RESTORE SI-MOV-24 TO LOCKED OPEN POSITION		1.00E-6	1.00E-06	1.00E-06
23) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.83E-07
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
24) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.83E-07
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
25) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	2.59E-07

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1.30E-5
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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
26) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	2.59E-07
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
27) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	2.33E-07
CCPAI333	CP M2,T2 FROM 230/X3 FAILS TO OPEN.	1.35E-4	6	8.10E-04	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
28) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	2.33E-07
CCPAI333	CP M2,T2 FROM 230/X3 FAILS TO OPEN.	1.35E-4	6	8.10E-04	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
29) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.73E-07
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
CRMI230	COIL 230/X3 FAILS TO DEENERGIZE- LD-TV-230.	1.00E-4	6	6.00E-04	
30) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.73E-07
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
CRMI230	COIL 230/X3 FAILS TO DEENERGIZE- LD-TV-230.	1.00E-4	6	6.00E-04	
31) CBKBJ072	4160V CKT. BKR. ON EMER. BUS 8 (CKT. 3) FAILS TO CLOSE(P-18-1B).	3.00E-4	1	3.00E-04	1.62E-07
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
32) CBKKB073	4160V CKT. BKR. ON EMER. BUS 9 (CKT. 3) FAILS TO CLOSE (P-18	3.00E-4	1	3.00E-04	1.62E-07
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
33) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.08E-07
CCVAN272	CHG. PUMP P-18-1B DISCHARGE CHECK VALVE CV-272 FAILS TO OPEN	2.00E-4	1	2.00E-04	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
34) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.08E-07
CCVAN263	CHG. PUMP P-18-1A DISCHARGE CHECK VALVE CV-263 FAILS TO OPEN	2.00E-4	1	2.00E-04	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
35) CBKDJ043	4160V CIRCUIT BREAKER ON EMER. BUS 8 (CKT. 3) FAILS TO REMAIN CLOS	6.00E-7	24	1.44E-05	7.42E-08
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
36) CBKDK020	4160V CIRCUIT BREAKER ON EMER. BUS 9 (CKT. 3) FAILS TO REMAIN CLOS	6.00E-7	24	1.44E-05	7.42E-08
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMF		0.5	5.00E-01	
CP8FN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
37) CBKDJ043	4160V CIRCUIT BREAKER ON EMER. BUS 8 (CKT. 3) FAILS TO REMAIN CLOS	6.00E-7	24	1.44E-05	6.24E-08
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
38) CBKDK020	4160V CIRCUIT BREAKER ON EMER. BUS 9 (CKT. 3) FAILS TO REMAIN CLOS	6.00E-7	24	1.44E-05	6.24E-08
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
39) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.40E-08
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CP8PN8AM	CHG. PUMP 18-1B WAS NOT RESTORED FOLLOWING MAINTENANCE.		1.0E-4	1.00E-04	
40) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.40E-08
CP8FN18P	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CP8PN8AM	CHG. PUMP 18-1A WAS NOT RESTORED FOLLOWING MAINTENANCE.		1.0E-4	1.00E-04	
41) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMF.		0.5	5.00E-01	2.06E-08
CP8FN18P	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CPMEN10A	AUX. LUBE OIL PUMP P-10-1A FAILS TO START.	2.00E-3	1	2.00E-03	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
CPMEN49A	MAIN LUBE OIL PUMP (P149-1A) FAILS TO START.	2.00E-3	1	2.00E-03	
42) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	2.06E-08
CP8EN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CPMEN10B	AUX. LUBE OIL PUMP (P-10-1B) FAILS TO START.	2.00E-3	1	2.00E-03	
CPMEN49B	MAIN LUBE OIL PUMP (P-149-B) FAILS TO START.	2.00E-3	1	2.00E-03	
43) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.75E-08
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
CCPAI333	CP M2,T2 FROM 230/X3 FAILS TO OPEN.	1.35E-4	6	8.10E-04	
44) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.75E-08
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
CCPAI333	CP M2,T2 FROM 230/X3 FAILS TO OPEN.	1.35E-4	6	8.10E-04	
45) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.73E-08
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CPMEN10A	AUX. LUBE OIL PUMP P-10-1A FAILS TO START.	2.00E-3	1	2.00E-03	
CPMEN49A	MAIN LUBE OIL PUMP (P149-1A) FAILS TO START.	2.00E-3	1	2.00E-03	
46) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.73E-08
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CPMEN10B	AUX. LUBE OIL PUMP (P-10-1B) FAILS TO START.	2.00E-3	1	2.00E-03	
CPMEN49B	MAIN LUBE OIL PUMP (P-149-B) FAILS TO START.	2.00E-3	1	2.00E-03	
47) CCPBI090	CP L13,L14 FROM SIAS 'A' FAILS TO CLOSE. MOV-257 FAILS TO AUTO. CL	1.35E-4	6	8.10E-04	1.57E-08
CCPBI091	CP L13,L14 FROM SIAS 'B' FAILS TO CLOSE. MOV-257 FAILS TO AUTO. CL	1.35E-4	6	8.10E-04	
CMVBN57B	CH-MOV-257B FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
48) CCPBI114	CP 9,10 ON SIAS 4A FAILS TO CLOSE. (MOV-373)	1.35E-4	6	8.10E-04	1.57E-08
CCPBI315	CP 9,10 ON SIAS 4B FAILS TO CLOSE. (MOV-373)	1.35E-4	6	8.10E-04	
CMVAN032	MOV BA-MOV-32 FAILS TO OPEN (MECHANICAL FAILURE)	4.00E-3	6	2.40E-02	
49) CCPBI32A	CP C3,C4 FROM SIAS 4A FAILS TO CLOSE.	1.35E-4	6	8.10E-04	1.57E-08
CCPBI32B	CP C3,C4 FROM SIAS 4B FAILS TO CLOSE.	1.35E-4	6	8.10E-04	
CMVAN373	MOV BA-MOV-373 FAILS TO OPEN (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
50) CCPBI801	CP C1,C2 FROM SIAS 'A' FAILS TO CLOSE. MOV-257B FAILS TO AUTO. CLO	1.35E-4	6	8.10E-04	1.57E-08
CCPBI802	CP C1,C2 FROM SIAS 'B' FAILS TO CLOSE. MOV-257B FAILS TO AUTO. CLO	1.35E-4	6	8.10E-04	
CMVBN057	CH-MOV-257 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
51) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.42E-08
CCPBI628	CP 1,5 FROM 62E8-3 FAILS TO CLOSE. P-18-1B FAILS TO START.	1.35E-4	6	8.10E-04	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CPTGQ105	PC-105 FAILS TO OPERATE.	5.00E-6	18	3.24E-02	
52) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.42E-08
CCPBI629	CP 1,5 FROM 62E9-3 FAILS TO CLOSE.	1.35E-4	6	8.10E-04	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CPTGQ105	PC-105 FAILS TO OPERATE.	5.00E-6	18	3.24E-02	
53) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.30E-08
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
CRDMI230	COIL 230/X3 FAILS TO DEENERGIZE- LD-TV-230.	1.00E-4	6	6.00E-04	
54) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	1.30E-08
CBKBA171	480V CIRCUIT BREAKER ON MCC5 (CIRCUIT 9RM) FAILS TO CLOSE. (MOV-2	3.00E-4	6	1.80E-03	
CRDMI230	COIL 230/X3 FAILS TO DEENERGIZE- LD-TV-230.	1.00E-4	6	6.00E-04	
55) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.24E-08
CP8EN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CPMEN49A	MAIN LUBE OIL PUMP (P149-1A) FAILS TO START.	2.00E-3	1	2.00E-03	
CPSGN10A	LUBE OIL LOW PRESS. SWITCH FAILS TO OPERATE.	2.00E-4	6	1.20E-03	
56) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.24E-08

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
CP8GN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CPMEN49B	MAIN LUBE OIL PUMP (P-149-B) FAILS TO START.	2.00E-3	1	2.00E-03	
CPSGN10B	LUBE OIL LOW PRESS. SWITCH FAILS TO OPERATE.	2.00E-4	6	1.20E-03	
57) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.05E-08
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CPTGQ105	PC-105 FAILS TO OPERATE.	5.00E-6	18	3.24E-02	
CRCHI8BS	RELAY 62E8-3 FAILS TO ENERGIZE ON AUTO. SIAS START.	1.00E-4	6	6.00E-04	
58) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.05E-08
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CPTGQ105	PC-105 FAILS TO OPERATE.	5.00E-6	18	3.24E-02	
CRCHI8AS	RELAY 62E9-3 FAILS TO ENERGIZE ON AUTO. SIAS START.	1.00E-4	6	6.00E-04	
59) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.04E-08
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CPMEN49A	MAIN LUBE OIL PUMP (P149-1A) FAILS TO START.	2.00E-3	1	2.00E-03	
CPSGN10A	LUBE OIL LOW PRESS. SWITCH FAILS TO OPERATE.	2.00E-4	6	1.20E-03	
60) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.04E-08
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CPMEN49B	MAIN LUBE OIL PUMP (P-149-B) FAILS TO START.	2.00E-3	1	2.00E-03	
CPSGN10B	LUBE OIL LOW PRESS. SWITCH FAILS TO OPERATE.	2.00E-4	6	1.20E-03	

CAO 3/22/93
PC 2/15/93
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Ry 14/9/00

Table 7.0 RCP Seal Cooling via Charging Cutset Report

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CUTSET REPORT

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) GC1460					*4.68E-06
1) CRVAV408 DBSTAP1C	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1C FAILS TO PROVIDE OUTPUT	1.00E-3 3.83E-6	20 1	2.00E-02 9.19E-05	1.84E-06
2) CRVAV408 DBSTAP1D	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1D FAILS TO PROVIDE OUTPUT	1.00E-3 3.83E-6	20 1	2.00E-02 9.19E-05	1.84E-06
3) CRVAV408 DB1DA004	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1D BREAKER #4 FAILS TO REMAIN CLOSED	1.00E-3 5.00E-7	20 1	2.00E-02 1.20E-05	2.40E-07
4) CRVAV408 DB1DAP1C	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1C BREAKER FROM DC BUS A FAILS TO REMAIN CLOSED	1.00E-3 5.00E-7	20 1	2.00E-02 1.20E-05	2.40E-07
5) CRVAV408 DB1DAP1D	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1D BREAKER FROM DC BUS BX FAILS TO REMAIN CLOSED	1.00E-3 5.00E-7	20 1	2.00E-02 1.20E-05	2.40E-07
6) CRVAV408 DB1DA008	RANDOM FAILURE OF RV-408 TO OPEN. DC PANEL 1C BREAKER #8 FAILS TO REMAIN CLOSED	1.00E-3 5.00E-7	20 1	2.00E-02 1.20E-05	2.40E-07
7) CP8FAPPS CRVDN280	CCF OF 2/2 CENTRIFUGAL PUMPS TO RUN. P-11-1A HEADER RELIEF VALVE PREMATURELY OPENS.	4.50E-5 1.25E-5	.192 1	8.64E-06 4.50E-03	3.89E-08

- No cutsets containing CP8Q18A or B → therefore the increase in the charging pump unavailability is negligible

CAO 302493
JPC 3/25/93
CA-SIT-1057-REF-RNO
P4150920

Table 8.0 Changing Portion of Recirculation
Cutsheet Report

$\Delta = 2.93E-4 \text{ or } 4.3\%$

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) GC3822	<module>				*6.88E-03
1) CMVAARRR	CCF 2/2 RHRS MOVs FAIL TO OPEN. (MOVs-33A & 33B)	4.00E-3	0.408	1.63E-03	1.63E-03
2) CMVBAVCT	CCF OF 2/2 V.T TO CHG. SUCTION MOVs TO ISOL. MOVs 257 & 257B	4.00E-3	0.408	1.63E-03	1.63E-03
3) CAVBAA27	CCF 2 OF 2 LUBE OIL AIR COOLER BYPASS VALVES FAIL TO CLOSE.	2.00E-3	.408	8.16E-04	8.16E-04
4) CMVAR33A	MOV-33A FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	5.76E-04
CMVAR33B	MOV-33B FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
5) CMVBN057	CH-MOV-257 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	5.76E-04
CMVBN57B	CH-MOV-257B FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
6) CFNEAF89	CCF 2 OF 2 LUBE OIL AIR COOLING FANS TO START.	6.00E-4	.6	3.60E-04	3.60E-04
7) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	7.20E-05
CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
8) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	7.20E-05
CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
9) CCVB372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	6.40E-05
CMVBN32R	MOV-32 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	1	4.00E-03	
10) CCVB372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	6.40E-05
CMVBN37R	MOV-373 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	1	4.00E-03	
11) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.18E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8EN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
12) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.18E-05
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8EN18B	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
13) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	5.20E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
14) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	5.20E-05
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
15) CBKBA105	480V BKR. FROM MCC5 (CKT. 11RJ) FAILS TO CLOSE. (MOV-257)	3.00E-4	6	1.80E-03	4.32E-05
CMVBN57B	CH-MOV-257B FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
16) CBKBA33A	480V BKR. FROM MCC5 (CKT. 7FC) FAILS TO CLOSE. (MOV-33A)	3.00E-4	6	1.80E-03	4.32E-05
CMVAR33B	MOV-33B FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
17) CBKBA33B	480V BKR. FROM MCC5 (CKT. 12RF) FAILS TO CLOSE. (MOV-33B)	3.00E-4	6	1.80E-03	4.32E-05
CMVAR33A	MOV-33A FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
18) CBKBB115	480V BKR. FROM MCC12 (CKT. 1H) FAILS TO CLOSE. (MOV-257B)	3.00E-4	6	1.80E-03	4.32E-05
CMVBN057	CH-MOV-257 FAILS TO CLOSE DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
19) CFNFAP89	CCF 2 OF 2 LUBE OIL AIR COOLING FANS FAIL TO RUN GIVEN START.	1.00E-5	2.4	2.40E-05	2.40E-05
20) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	2.16E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
21) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	2.16E-05
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
22) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	2.16E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
23) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	2.16E-05

Change in
unavailability
due to OOS Prod
7.17E-3

1.44E-4
1.44E-4

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
24) CCPBI33A	CP 5,6 FAILS TO CLOSE FROM HS 1/33A AT MCB 'C'. MOV-33A FAILS TO O	1.35E-4	6	8.10E-04	1.94E-05
CMVAR33B	MOV-33B FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
25) CCPBI33B	CP 5,6 FAILS TO CLOSE FROM HS 1/33B AT MCB 'C'. MOV-33B FAILS TO O	1.35E-4	6	8.10E-04	1.94E-05
CMVAR33A	MOV-33A FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	
26) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.85E-05
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CP8EN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
27) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.85E-05
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CP8EN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
28) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.56E-05
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
29) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.56E-05
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
30) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.52E-05
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
31) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.52E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
32) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.52E-05
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
33) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.52E-05
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
34) CCVAAVCT	CCF OF 2/2 SUCTION LINE VENT CHECK VALVES CV-408 & CV-409 TO CLOSE	2.00E-4	6.8E-2	1.36E-05	1.36E-05
35) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.30E-05
CP8EN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
36) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.30E-05
CP8EN18B	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
37) CCPBI032	CP 7,8 FROM HS 1/32 FAILS TO CLOSE.	1.35E-4	6	8.10E-04	1.30E-05
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
38) CCPBI373	CP 5,6 FROM HS 1/373 FAILS TO CLOSE.	1.35E-4	6	8.10E-04	1.30E-05
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
39) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.10E-05
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
40) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.10E-05
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
41) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.08E-05
CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	

4.32E-5

4.32E-5

3.03E-5

3.03E-5

Joe 5/25/95
ca-517-1051-RE-RNO
PJ 7/7/90

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Filter: 'ACTIVE'

CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
42) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.08E-05
CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
43) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.08E-05
CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
44) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.08E-05
CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
45) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	9.27E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
46) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	9.27E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
47) CP8FAPPS	CCF OF 2/2 CENTRIFUGAL PUMPS TO RUN.	4.50E-5	.192	8.64E-06	8.64E-06
48) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	7.80E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
49) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	7.80E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
50) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	6.48E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
51) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	6.48E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
52) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.48E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
53) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.48E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
54) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.48E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
55) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	6.48E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
56) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.56E-06
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CP8FN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
57) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	5.56E-06
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CP8FN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
58) CBKBA32R	480V BREAKER FROM MCC5 (CKT. 7RF) FAILS TO CLOSE. (MOV-32)	3.00E-4	1	3.00E-04	4.80E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
59) CBKBB37R	480V BREAKER FROM MCC12 FAILS TO RECLOSE.	3.00E-4	1	3.00E-04	4.80E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	

2.16E-5

2.16E-5

1.30E-5

1.30E-5

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CUTSET REPORT

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
60) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.68E-06
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
61) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.68E-06
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
62) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.55E-06
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
63) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.55E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
64) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.55E-06
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
65) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	4.55E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
66) CMVAR33A	MOV-33A FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	3.83E-06
CSWGI33B	HS 1/33B FAILS TO OPERATE.	2.66E-5	6	1.60E-04	
67) CMVAR33B	MOV-33B FAILS TO OPEN DUE TO MECH. FAILURE.	4.00E-3	6	2.40E-02	3.83E-06
CSWGI33A	HS 1/33A FAILS TO OPERATE.	2.66E-5	6	1.60E-04	
68) CAVBR202	LETDOWN FLOW CONTROL VALVE LD-FCV-202 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	3.46E-06
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
69) CAVBR203	LETDOWN FLOW CONTROL VALVE LD-FCV-203 FAILS TO CLOSE DUE TO MECH.	2.00E-3	6	1.20E-02	3.46E-06
CAVBV230	LD-TV-230 FAILS TO CLOSE DUE TO MECH. FAILURE.	2.00E-3	6	1.20E-02	
CMVBV200	MOV LD-MOV-200 FAILS TO CLOSE (MECHANICAL FAILURE).	4.00E-3	6	2.40E-02	
70) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	3.24E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
71) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	3.24E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
72) CBKBA105	480V BKR. FROM MCC5 (CKT. 11RJ) FAILS TO CLOSE. (MOV-257)	3.00E-4	6	1.80E-03	3.24E-06
CBKBB115	480V BKR. FROM MCC12 (CKT. 1H) FAILS TO CLOSE. (MOV-257B)	3.00E-4	6	1.80E-03	
73) CBKBA33A	480V BKR. FROM MCC5 (CKT. 7FC) FAILS TO CLOSE. (MOV-33A)	3.00E-4	6	1.80E-03	3.24E-06
CBKBA33B	480V BKR. FROM MCC5 (CKT. 12RF) FAILS TO CLOSE. (MOV-33B)	3.00E-4	6	1.80E-03	
74) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	3.24E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
75) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	3.24E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
76) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	3.19E-06
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
77) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	3.19E-06
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	

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CUTSET REPORT

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
78) CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	2.55E-06
CSWGI113	MANUAL SWITCH ON MB 'C' FOR MOV BA-MOV-32 FAILS TO OPERATE.	2.66E-5	6	1.60E-04	
79) CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	2.55E-06
CSWGI373	MANUAL SWITCH ON CONTROL BOARD C FOR MOV BA-MOV-373 FAILS TOOPERAT	2.66E-5	6	1.60E-04	
80) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	2.27E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
81) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	2.27E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
82) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	2.27E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
83) CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	2.27E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
84) CCPAI04A	CP C3,C4 FROM SIAS '4A' FAILS TO OPEN.	1.35E-4	1	1.35E-04	2.16E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
85) CCPAI04B	CP C3,C4 FROM SIAS '4B' FAILS TO OPEN.	1.35E-4	1	1.35E-04	2.16E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
86) CCPAI04A	CP 9,10 FROM SIAS '4A' FAILS TO OPEN.	1.35E-4	1	1.35E-04	2.16E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
87) CCPAI04B	CP 9,10 FROM SIAS '4B' FAILS TO OPEN.	1.35E-4	1	1.35E-04	2.16E-06
CCVBU372	CHECK VALVE BA-CV-372 FROM RWST TO CHG. SUCTION FAILS TO CLOSE.	2.00E-4	80	1.60E-02	
88) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.94E-06
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
89) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.94E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
90) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.94E-06
CFNEN89A	FAN F-89-1A FAILS TO START.	6.00E-4	6	3.60E-03	
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
91) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.94E-06
CFNEN89B	FAN F-89-1B FAILS TO START.	6.00E-4	6	3.60E-03	
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
92) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.80E-06
CBKBJ072	4160V CKT. BKR. ON EMER. BUS 8 (CKT. 3) FAILS TO CLOSE(P-18-1B).	3.00E-4	1	3.00E-04	
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
93) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.80E-06
CBKBK073	4160V CKT. BKR. ON EMER. BUS 9 (CKT. 3) FAILS TO CLOSE (P-18	3.00E-4	1	3.00E-04	
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
94) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	1.62E-06
CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
95) CBKBA03F	480V BKR. 3F FROM MCC 13-4 FAILS TO CLOSE. (F-89-1B)	3.00E-4	6	1.80E-03	1.62E-06
CBKBB06E	480V BKR. 6E FROM MCC 12-11 FAILS TO CLOSE. (F-89-1A)	3.00E-4	6	1.80E-03	
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
96) CBKBA33A	480V BKR. FROM MCC5 (CKT. 7FC) FAILS TO CLOSE. (MOV-33A)	3.00E-4	6	1.80E-03	1.46E-06
CCPBI33B	CP 5,6 FAILS TO CLOSE FROM HS 1/33B AT MCB 'C'. MOV-33B FAILS TO O	1.35E-4	6	8.10E-04	

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CUTSET REPORT

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
97) CBKBA33B	480V BKR. FROM MCC5 (CKT. 12RF) FAILS TO CLOSE. (MOV-33B)	3.00E-4	6	1.80E-03	1.46E-06
CCPBI33A	CP 5,6 FAILS TO CLOSE FROM HS 1/33A AT MCB 'C'. MOV-33A FAILS TO C	1.35E-4	6	8.10E-04	
98) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.44E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNFN89B	FAN F-89-1B FAILS TO RUN.	1.00E-5	24	2.40E-04	
99) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.44E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNFN89B	FAN F-89-1B FAILS TO RUN.	1.00E-5	24	2.40E-04	
100) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.44E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNFN89A	FAN F-89-1A FAILS TO RUN.	1.00E-5	24	2.40E-04	
101) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.44E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CFNFN89A	FAN F-89-1A FAILS TO RUN.	1.00E-5	24	2.40E-04	
102) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.36E-06
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
103) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.36E-06
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
104) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.36E-06
CP8FN18B	PUMP P-18-1B FAILS TO RUN GIVEN START (MECHANICAL FAILURE)	4.50E-5	24	1.08E-03	
CTSGN27A	TEMPERATURE SWITCH TC-27-1A FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
105) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.36E-06
CP8FN18A	PUMP P-18-1A FAILS TO RUN GIVEN START (MECHANICAL FAILURE).	4.50E-5	24	1.08E-03	
CTSGN27B	TEMPERATURE SWITCH TC-27-1B FAILS TO OPERATE.	3.90E-7	18	2.53E-03	
106) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.24E-06
CFNFN89A	FAN F-89-1A FAILS TO RUN.	1.00E-5	24	2.40E-04	
CP8FN18B	P-18-1B UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
107) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.24E-06
CFNFN89B	FAN F-89-1B FAILS TO RUN.	1.00E-5	24	2.40E-04	
CP8FN18A	P-18-1A UNAVAILABLE DUE TO MAINTENANCE.	1.03E-2	1	1.03E-02	
108) CAVBN27A	TC-27-1A FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.20E-06
CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CCVAN272	CHG. PUMP P-18-1B DISCHARGE CHECK VALVE CV-272 FAILS TO OPEN	2.00E-4	1	2.00E-04	
109) CAVBN27B	TC-27-1B FAILS TO CLOSE.	2.00E-3	6	1.20E-02	1.20E-06
CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	
CCVAN263	CHG. PUMP P-18-1A DISCHARGE CHECK VALVE CV-263 FAILS TO OPEN	2.00E-4	1	2.00E-04	
110) CCHGAAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1A IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.04E-06
CFNFN89A	FAN F-89-1A FAILS TO RUN.	1.00E-5	24	2.40E-04	
CP8EN18B	PUMP P-18-1B FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	
111) CCHGBAVG	AVG. FACTOR FOR SYSTEM GIVEN P-18-1B IS NORMALLY OPERATING PUMP.		0.5	5.00E-01	1.04E-06
CFNFN89B	FAN F-89-1B FAILS TO RUN.	1.00E-5	24	2.40E-04	
CP8EN18A	PUMP P-18-1A FAILS TO START DUE TO MECHANICAL FAILURE.	8.67E-3	1	8.67E-03	

2.89E-6

2.89E-6

280 3/22/93
PC 3/25/93
Ca-517-1051-RF-Rnd
By 209/20

SUBJECT QA Comments BY JDC DATE 7/25/97
CHKD. BY _____ DATE _____
CALC. NO. 2-517-1051-RE REV. 0
SHEET NO. _____ OF _____

QA Comments

1. I could not accept the fact that charging pump 'A' was truncated while charging pump 'B' was not. So a re-ran ETQUANT with a truncation of $1.0E-10$ instead of $1.0E-08$ and found charging pump 'A' in the accident sequence cutsets.
2. I duplicated all of the RMQS results in this calc. file and found none to be in error.
3. Need reference to RMQS model CYPAA1B in a reference section.

ATTACHMENT 1.0

FIGURE 7.2 PROPOSED TECHNICAL SPECIFICATIONS CHANGE FORM

Serial # C-2-93 (step 2.0)

Unit CY

TSCR EMERGENCY TSCR
TEMPORARY TS WAIVER

1.0 ORIGINATOR AND UNIT ENGINEERING MANAGER

Description of proposed change (attach detailed information).

Technical Specification
Section Numbers

Title(s) of Section(s)

Page and
Revision Numbers

3.5.1a

ECCS Subsystems

3/4 5-1

Amend No 125

Attach marked-up copy of Technical Specification Pages(s).

DO NOT RETYPE PAGE(S)

Originator John M. MAJEWSKI Date 11/2/92

Approval/Disapprove Pierre J. [Signature] Date 11-2-92
Immediate Supervisor

Approval/Disapprove [Signature] Date 12-18-92
Unit Engineering Manager

2.0 MANAGER, GFL

Log in. Assign Serial Number. Designate reviewers in Step 3.0 below.

Manager, GFL S.P. Putina (for [Signature]) Date 2/6/93

3.0 DESIGNATED REVIEWERS

NOTE: ALL SAFETY REVIEWS AND SHC DETERMINATIONS SHALL BE WRITTEN, SIGNED AND ATTACHED TO THIS FORM.

DESIGNATED REVIEWER P.A. Anderson REQUEST THAT PAA Perform Review FOR INCREASING WORKABLE PERIOD UP TO SEVEN DAYS.

Safety Review Attached Yes No SHC Determination attached Yes No

Reviewer: [Signature] Date: 2/9/93

DESIGNATED REVIEWER O.A. Dubie

Safety Review Attached Yes No SHC Determination attached Yes No

Reviewer: _____ Date: _____

DESIGNATED REVIEWER

Safety Review Attached Yes No SHC Determination attached Yes No

Reviewer: _____ Date: _____

* Please return to Barbara Solomon (Waiter) after each signature *

TO: RAA
2/3/93 (1)

TO: DAD
3/17/93

DESIGNATED REVIEWER

Safety Review Attached Yes No

SHC Determination attached Yes No

Reviewer: _____ Date: _____

*4-25-85
11/13/85*

DESIGNATED REVIEWER

R.J. Schmitt (Radiological Assessment)

Safety Review Attached Yes No

SHC Determination attached Yes No

Reviewer: _____ Date: _____

3

SYSTEM MANAGER, REACTOR ENGINEERING BRANCH *Safety Analysis J.A. Blaisdell*

PTSCR review comments attached, as applicable. Yes No

System Manager, REB _____ Date: _____

4.0 MANAGER, GFL

Forward to Unit Engineering Manager for submittal to PORC/SORC.

Signature _____ Date _____

5.0 PORC/SORC

Recommend Approval/Disapproval: _____ Date _____
PORC/SORC Chair

6.0 NUCLEAR UNIT/STATION DIRECTOR

Approval/Disapprove _____ Date _____
Unit/Station Director

7.0 MANAGER, GFL

Submit PTSCR to NRB/SNRB. Signature _____ Date _____

8.0 NRB/SNRB

Recommend Approval/Disapproval: _____ Date _____
NRB/SNRB Chair

9.0 MANAGER, GFL

Submit TSCR to NRC. Forward copies to State of Connecticut and CMP Group.

INSERT

- a. With one ECCS subsystem inoperable because of the inoperability of a centrifugal charging pump, test the remaining charging pump within 2 hours; restore the inoperable pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

3/4.5 EMERGENCY CORE COOLING SYSTEMS3/4.5.1 ECCS SUBSYSTEMS - Tavg GREATER THAN OR EQUAL TO 350°FLIMITING CONDITION FOR OPERATION

3.5.1a Two independent Emergency Core Cooling Systems (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

1. One OPERABLE centrifugal charging pump,
 2. One OPERABLE High Pressure Safety Injection pump,
 3. One OPERABLE Low Pressure Safety Injection pump,
 4. One OPERABLE RHR heat exchanger,
 5. One OPERABLE RHR pump, and
 6. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a Safety Injection signal and manually transferring suction to the containment sump during the recirculation phase of operation.
- b. The flow path from the reactor cavity to the containment sump, which consists of four open reactor cavity pool seal hatches and open transfer canal drain valves shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION: a. INSERT ATTACHED

- b. ~~g.~~ With one ECCS subsystem ^{otherwise} inoperable, test the remaining High Pressure Safety Injection pump, Low Pressure Safety Injection pump, or the RHR pump within 2 hours; restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN the following 6 hours.
- c. ~~b.~~ With the flow path from the reactor cavity to the containment sump inoperable, restore the flow path to OPERABLE status within one hour or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- d. ~~e.~~ In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected Safety Injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

Proposed Tech Spec Change (TS 3.5.1a)

- a. With one ECCS subsystem inoperable because of the inoperability of a centrifugal charging pump, test the remaining charging pump within 2 hours; restore the inoperable pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

Reason for Change

Currently the Tech Spec allows an ECCS subsystem (including a charging pump) to be inoperable for a period of up to 72 hrs. Experience has shown that 72 hours may not be sufficient to accomplish repairs on an inoperable charging pump (e.g. rotating assembly or complete pump replacement). Increasing the allowed outage time to 7 days would provide sufficient time to perform such repairs. Charging pumps are not credited during the injection phase of a design basis LOCA and may be used as a backup to the HPSI pumps during the recirculation phase if power is available. The only use of charging pumps credited in the safety analysis is for two path sump recirculation, which is initiated manually.