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1CAN088202

Director of Nuclear Reactor Regulation
 ATTN: Mr. J. F. Stolz, Chief
 Operating Reactors Branch #4
 Division of Licensing
 U. S. Nuclear Regulatory Commission
 Washington, D. C. 20555

SUBJECT: Arkansas Nuclear One - Unit 1
 Docket No. 50-313
 License No. DPR-51
 Questions on the Emergency
 Feedwater System Upgrade
Reliability Analysis

Gentlemen:

Your letter of April 21, 1982, (1CNA048212) requested additional information pertaining to the report "Emergency Feedwater (EFW) System Upgrade Reliability Analysis for Arkansas Nuclear One, Unit No. 1". In AP&L's letter of May 26, 1982, (1CAN058211) we proposed to submit the requested information by August 15, 1982. Therefore, attached is our response.

Very truly yours,

John R. Marshall
 Manager, Licensing

A001
 1/20
 Oper. Dist

JRM:MCS:sc
 Attachments

8208170129 820811
 PDR ADOCK 05000313
 P PDR

ADDITIONAL INFORMATION
CONCERNING
EMERGENCY FEEDWATER UPRAGE RELIABILITY ANALYSIS
FOR
ARKANSAS NUCLEAR ONE, UNIT NO. 1
DOCKET NO. 50-313

Question 1

"The report's results are not presented in a manner that lends itself to a "NUREG-0611-type" comparison. For example, unavailability given LOOP is not tabulated. LOOP appears as a basic event on the fault tree; was this entered as the probability of LOOP given LMFW? How was this handled?"

Response 1

The presentation of these results in the format of NUREG-0611 does not imply that comparisons to NUREG-0611 are appropriate. Because the scope and assumptions of the analysis are different than for the NUREG-0611 analysis; there is no common basis for comparison. For example, the assumptions used for power availability illustrate the differences. NUREG-0611 assumed perfect DC power (i.e., failure probability of 0.0) for all cases, and one of two perfect diesel generators for this LOOP case. The analysis of ANO-1 EFW reliability evaluated power reliability in detail and assumed realistic probabilities for DC power and diesel generator failure.

The attached figure 1.1 "Reliability of ANO-1 EFW System" supplies the results of the report "Emergency Feedwater System Upgrade Reliability Analysis for the Arkansas Nuclear One Nuclear Generating Station Unit No. 1, April 1981" in the format of NUREG-0611. The attached table (Figure 1.2) "Unavailabilities for ANO-1 EFW" supplies the numerical results broken down into the three cases; loss of main feedwater (LMFW), loss of offsite power (LOOP), and loss of AC power (LOAC).

Question 2

"A narrative description of cut sets was provided, but no quantitative details were given. What were the contributions from the dominant cut sets?"

Response 2

The attached pages A-1 through A-3 explain the code used for the cut sets. The attached pages B-1 through B-36 supply the computer listing of

dominant cut sets for all of the analyzed cases. Each 8 letter code describes a basic event which can be found on the fault trees in Appendix B of the April 1981 Reliability Report.

Question 3

"Failure data were not given. What are they?"

Response 3

The attached pages C-1 through C-4 provide the basic event failure data used in the computer analysis of ANO-1 EFW Reliability.

Question 4

"The following questions pertain to the scenario discussed in point 4 of Section 3.2.1."

- a. "At the bottom of p. 3-1, it is stated that "...AC powered valves CV-X2 and CV-X3 will not open." (Fig. D-7 seems to indicate that CV-X3 is DC-powered. Is this correct?) In paragraph D.2.3 (p. D-3), it is stated that "The flow of EFW to each SG is controlled by redundant normally-open modulating solenoid motor operated control valves in parallel paths." The fact that loss of AC fails the control valves closed suggests that they are normally closed, but the subsequent discussion says that they are normally open. What are the normal positions of all valves in the four discharge paths? In this scenario, why were they presumed closed?"
- b. "Section 3.2.1.4 also talks about the opening of recirculation valves CV-2815 and CV-2816 during the loss-of-all AC power event which causes portion of turbine driven pump flow bypassing to the condensate storage tank. The ANO report recommends that an analysis be done to determine if adequate flow will be available to the SGs with this bypass flow. Has the analysis been performed? How serious is the bypass in degrading the total flow to the SGs?"

Response 4a

Attached figure 4 is the latest P&ID for the EFW System, this figure will be referenced in response to the remaining questions. Figure 4 indicates that four modulating control valves are normally open and fail open on loss of control signal or motive power. The four motor operated isolation valves are also normally open and fail "as is".

Response 4b

The recirculation piping will be changed to that shown on figure 4. This will eliminate the common recirculation flow path and resolve the concerns expressed in this question. The analysis will therefore not be done. The recirculation flow will not significantly degrade flow to the SG. This is due to the automatic nature of the recirculation valves to

be installed versus the constant flow nature of the existing design. Pump recirculation will occur only during periods of low total flow, and was considered in pump capacity calculations.

Question 5

"What physical measurement(s) actually regulate the recirculation valves: (CV-2815 and CV-2816)? According to the text (p. D-3, paragraph D.2.5), flow elements upstream of the control valves are used to decide whether flow is being demanded from each pump; however, the diagram suggests that the positions of the control valves (CV-X2 and CV-X3) are sensed."

Response 5

The recirculation flow piping will be changed according to figure 4. All valves in the recirculation flow path will be normally open and recirculation flow controlled by FW10A and FW10B. FW10A & B use pump flow to regulate recirculation flow. These valves consist of a set of interlocked check valves. One check valve is in the discharge path to the OTSG, the other is in the recirculation path. When the discharge path check valves closes due to reduced flow, the interlock will open the check valve in the recirculation line. This method does not require electric measurement and interlocks to establish recirculation and by design eliminates common (P7A and B) recirculation flow control.

Question 6

"If actual flow is the parameter to determine the recirculation then a simple failure of the EMD pump will also cause the recirculation in the TD pump flow (to increase) during the loss of main feed pump event. This failure mode should be included in the fault tree."

Response 6

This question no longer applies because the new recirculation control valves and piping design make pump recirculation flow independent of each other.

Question 7

"Pump Trip: Under what conditions do the pumps trip? Are there trips which are supposed to operate during a test but not during an emergency?"

"The fault tree takes credit for operator recovery of suction source in the event that it had been inappropriately left valved off after maintenance? How much time was assumed to be available for this before pump damage occurred?"

Response 7

The electric pump trips on overcurrent.

The turbine pump trips on overspeed.

There are no trip functions which are bypassed during an emergency.

Recovery of the suction source was assumed to occur before pump damage occurred.

Question 8

"What valves are closed for pump maintenance? Are any of the discharge valves disabled for this purpose?"

"What action is taken to isolate steam from the turbine driven pump during maintenance."

Response 8

During maintenance activities all suction and discharge valves are closed and tagged out of service per ANO procedures. In addition the steam inlet valves to the turbine pump are closed and the circuit breaker for the electric pump is opened and tagged out of service.

Question 9

"Providing steam to the turbine pump: One "steam unavailable" scenario involves the following: One of the valves in the pressure reducing station fails open, and one or the other of the relief valves fails to reseal. According to the fault tree, the relief capacity is such that there is insufficient pressure to drive the turbine if a relief valve is stuck open. It seems likely that given a wide-open control valve, the relief valve will cycle open and closed, so that even a small cyclic failure probability will lead to a substantial overall failure probability as the valve is repetitively cycled. Doesn't this scenario therefore have essentially the probability of either of the control valves failing high?"

Response 9

As part of the EFW upgrade project, the existing turbine is being replaced with a high pressure model. This eliminates the need for pressure reducing and safety valves.

Question 10

- a. "Isolation of the discharge paths: Are there single failures in the vector logic that can isolate both discharge paths from a given pump? Example: Channel D logic can isolate both discharge paths from the turbine driven pump. Are there failures in Channel D (e.g., power failures) that isolate both paths?"
- b. "Are these valves commanded open by vector logic given a simple LMFV, or does the logic assume that they are already open as they are supposed to be?"

Response 10a

It is possible for a channel, in this case Channel C, to fail. It is conceivable that such a failure could isolate both discharge paths from the turbine driven EFW pump. However, the single failure criterion as applied to the EFW system requires that at least one pump be able to supply EFW to at least one steam generator. Isolation of the turbine driven pump would require the following additional failures before the EFW system would be inoperable:

1. Loss of offsite power (LOOP)
2. Loss of both Diesel Generators (LOAC)

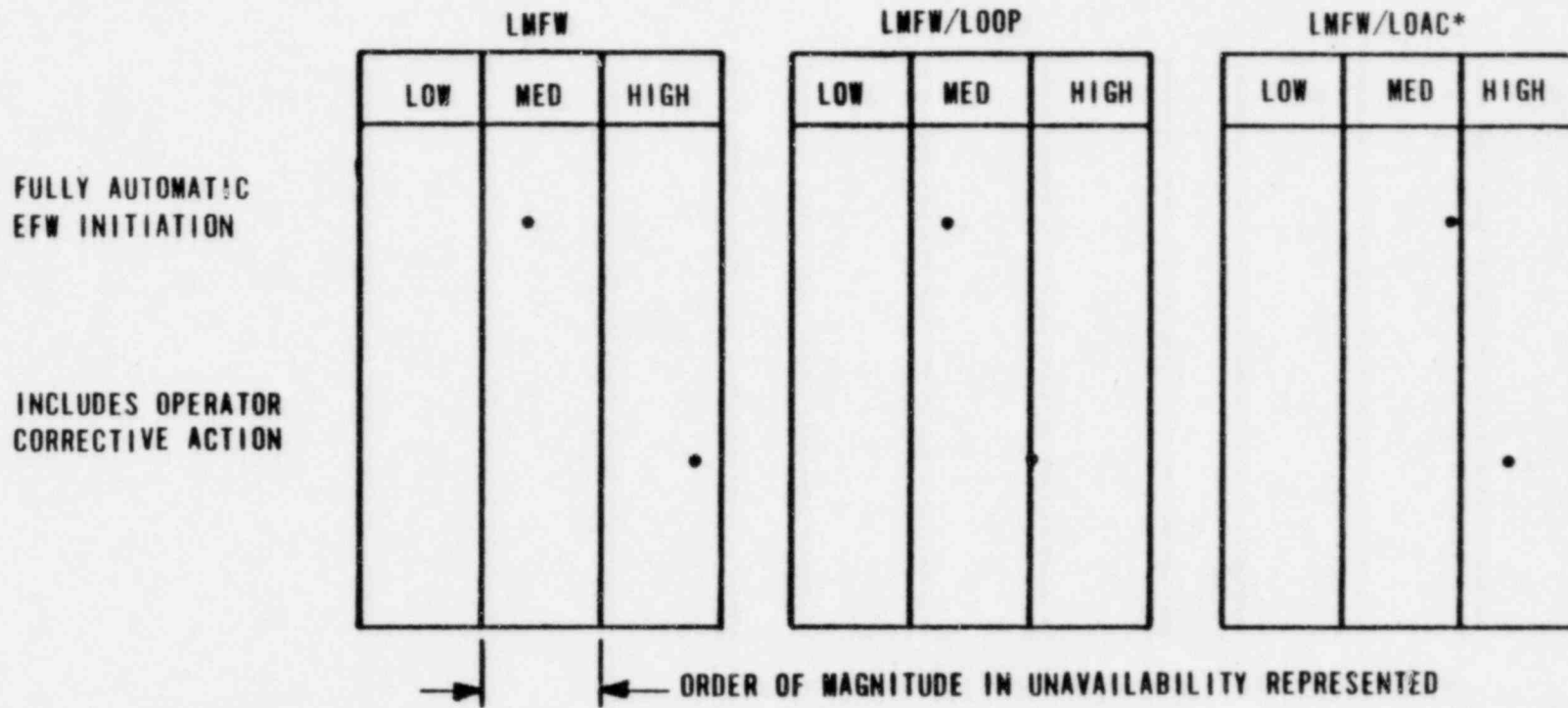
Thus the single failure of channel C would not render EFW inoperable.

Response 10b

These valves are normally open and commanded open by the vector logic. This is due to the system requirement that these valves must be closed during pump testing. An EFW initiation during a test will open these valves and close the test isolation valves, thus terminating the test and providing proper EFW system alignment.

The EFW vector logic commands the valves closed in the event of steam generator overfill or main steam isolation.

RELIABILITY OF AND-1 EFW SYSTEM



NOTE: ASSUMPTIONS AND SCOPE FOR THIS ANALYSIS ARE DIFFERENT THAN THOSE USED IN NUREG-0611 AND COMPARISON WITH NUREG-0611 RESULTS IS INAPPROPRIATE.

* NOTE: THE SCALE FOR THIS EVENT IS NOT THE SAME AS THAT FOR THE LMFW AND LMFW/LOOP.

FIG 1.1

UNAVAILABILITIES FOR ANO-1 EFW

	Case 1 LMFW	Case 2 LOOP	Case 3 LOAC
<u>EFW Initiate</u> includes failure to initiate EFW due to fluid system failure, spurious isolation by FOGG or overfill protection, and EFIC initiation failure.			
Fully automatic initiation	3.6×10^{-4}	5.2×10^{-4}	1.4×10^{-2}
Includes operator corrective action within 20 minutes.	1.4×10^{-5}	9.1×10^{-5}	5.7×10^{-3}
<u>EFIC Control</u>			
Fully Automatic control	8.0×10^{-3}	8.0×10^{-3}	9.7×10^{-3}
Includes operator corrective action within 20 minutes.	1.3×10^{-6}	1.3×10^{-6}	2.6×10^{-6}
<u>FOGG</u>			
A > 600 psi B < 600 psi (feed only A)	3.8×10^{-4}	3.8×10^{-4}	3.8×10^{-4}
A < 600 psi B > 600 psi (feed only B)	3.8×10^{-4}	3.8×10^{-4}	3.8×10^{-4}
A < 600 psi B < 600 psi A 150 psi > B (feed only A)	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}
A < 600 psi B < 600 psi B 150 psi > A (feed only B)	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}
<u>EFW Overfill Protection</u>	6.2×10^{-4}	6.2×10^{-4}	3.1×10^{-3}

FIG 1.2

BASIC EVENT IDENTIFICATION CODE

XXYYYYFM

XX - Component Identification Code

YYYY - Unique Component Identifier

FM - Failure Mode

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PAGE NO. A-1

COMPONENT IDENTIFICATION CODE

COMPONENT	CODE
Buffer amp or battery (batteries have numbers, e.g., BAD07)	BA
Breaker	BR
Cabinet main circuit breaker	CB
Charger	CH
Controller	CN
Pressure sensor, delta P	DP
FOGG module	FC
FOGG module	FG
Inverter	IN
Level sensor	LS
Level transmitter	LT
Valve or human operator	OP
Proportioner	PR
Resistor	RE
Rate follower	RF
Relay	RY
Setpoint signal	SP
Sensor power supply transformer	SPT
Subtractor	SU
Trip cabinet	TC
Timer circuit	TI
Valve stem	VS

COMPONENT FAILURE MODES
IDENTIFICATION CODE

FAILURE MODE	CODE
All Modes	AM
Catastrophic Failure	CF
Erroneously Trips	ET
Flow Blockage	FB
Fails Closed	FC
Fails to Energize	FE
Fails to Reinitialize	FI
Fails Low	FL
Fails Open	FO
Fails to Run	FR
Fails to Start	FS
Fails to Switch	FW
Indicates Trip	IT
Left Closed	LC
Left Open	LO
Mechanical Failure	MF
Miscalibrated High	MH
Miscalibrated Low	ML
No Signal	NS
In Preventive Maintenance	PM
Fails to Reseat	RS
Spuriously Closes	SC
Shorts	SH
Spurious Signal	SS
Fails to Close	TC
Fails to Detect Trip	TD
Fails to Open	TO
In Test	TS
Unable to Trip	UT

DOMINANT CUT SETS

FOR

ANO-1 EFW UNAVAILABILITY

for

LMFW: Loss of Main Feedwater

LOOP: Loss of Offsite Power

LOAC: Loss of AC Power

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PAGE NO. B-1

*LMFW
Initiate
Automatic*

P7AZZFS .4100000E-02	P7BZZFR .3460000E-03	
P7AZZFS .4100000E-02	P7BZZFS .5300000E-03	
CST41ZAM .2000000E-05	SWSUCTOP .1000000E+01	
CS98ZZFB .1100000E-03	SWSUCTOP .1000000E+01	
CS99ZZFB .1100000E-03	SWSUCTOP .1000000E+01	
P7AZZFR .3460000E-03	P7BRECCA .1000000E+01	P7BRECL0 .3300000E-02
P7AZZFS .4100000E-02	P7BRECCA .1000000E+01	P7BRECL0 .3300000E-02
P7AZZPM .7590000E-03	P7BRECCA .1000000E+01	P7BRECL0 .3300000E-02
P7ARECCA .1000000E+01	P7ARECL0 .3300000E-02	P7BZZFR .3460000E-03
P7ARECCA .1000000E+01	P7ARECL0 .3300000E-02	P7BZZFS .5300000E-03
P7AZZFS .4100000E-02	P7BRECOP .1000000E+01	P7BZZTS .1390000E-02
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BZZFR .3460000E-03
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BZZFS .5300000E-03
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZFR .3460000E-03
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZFS .4100000E-02

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CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZZPM .7590000E-03	
P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	P7BRECOP .1000000E+01	P7BZZZTS .1390000E-02
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BRECOP .1000000E+01	P7BZZZTS .1390000E-02
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7ARECCA .1000000E+01	P7ARECLO .3300000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	CV2802LC .3300000E-02	CV2802RE .1000000E+01
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	CV2800LC .3300000E-02	CV2800RE .1000000E+01

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LMFW
Initiate
with operator Corrective Action

P7AZZZFR .3460000E-03	P7BZZZFR .3460000E-03	
P7AZZZFS .4100000E-02	P7BZZZFR .3460000E-03	
P7AZZZPM .7590000E-03	P7BZZZFR .3460000E-03	
P7AZZZFR .3460000E-03	P7BZZZFS .5300000E-03	
P7AZZZFS .4100000E-02	P7BZZZFS .5300000E-03	
P7AZZZPM .7590000E-03	P7BZZZFS .5300000E-03	
FW10AZFB .1100000E-03	P7AZZZFS .4100000E-02	
CS98ZZFB .1100000E-03	SWSUCTOP .4000000E-01	
CS99ZZFB .1100000E-03	SWSUCTOP .4000000E-01	
CSVSGARS .1840000E-01	CSVGBRS .1840000E-01	P7BZZZFR .3460000E-03
CSVSGARS .1840000E-01	CSVGBRS .1840000E-01	P7BZZZFS .5300000E-03
CV2800LC .3300000E-02	CV2800RE .1900000E-01	P7AZZZFS .4100000E-02

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LMFW
Control
Automatic

OPEM02X1	OPFAILPT
.2000000E-02	.1000000E+01
OPEM02X2	OPFAILPT
.2000000E-02	.1000000E+01
OPEM02X3	OPFAILPT
.2000000E-02	.1000000E+01
OPEM02X4	OPFAILPT
.2000000E-02	.1000000E+01

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LMFW
Control
with operator corrective action

OPEM02X1 .2000000E-02	OPFAILPT .1500000E-03
OPEM02X2 .2000000E-02	OPFAILPT .1500000E-03
OPEM02X3 .2000000E-02	OPFAILPT .1500000E-03
OPEM02X4 .2000000E-02	OPFAILPT .1500000E-03
BA02X1FL .9100000E-04	OPFAILPT .1500000E-03
BA02X2FL .9100000E-04	OPFAILPT .1500000E-03
BA02X3FL .9100000E-04	OPFAILPT .1500000E-03
BA02X4FL .9100000E-04	OPFAILPT .1500000E-03

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LMFW
 F066
 A < 600 B > 600

DPATCBFH .5500000E-02	DPATCCFH .5500000E-02
DPATCAFH .5500000E-02	DPATCDFH .5500000E-02
DPATCDFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCBFH .5500000E-02	DPBTCCFL .5500000E-02
DPBTCBFL .5500000E-02	DPBTCCFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCDFL .5500000E-02
DPBTCAFL .5500000E-02	DPBTCDFL .5500000E-02
BIDPAAML .2800000E-02	DPATCDFH .5500000E-02
BIDPAAML .2800000E-02	DPBTCDFL .5500000E-02
BIDPABML .2800000E-02	DPATCCFH .5500000E-02
BIDPABML .2800000E-02	DPBTCCFL .5500000E-02
BIDPACML .2800000E-02	DPATCBFH .5500000E-02
BIDPACML .2800000E-02	DPBTCBFL .5500000E-02
BIDPABML .2800000E-02	BIDPACML .2800000E-02
BIDPADML .2800000E-02	DPATCAFH .5500000E-02
BIDPADML .2800000E-02	DPBTCAFL .5500000E-02
BIDPAAML .2800000E-02	BIDPADML .2800000E-02

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LMFW
FOGG

A < 600, B < 600, B150 > A

DPATCAFH .5500000E-02	DPATCBFH .5500000E-02
DPATCAFH .5500000E-02	DPATCCFH .5500000E-02
DPATCBFH .5500000E-02	DPATCCFH .5500000E-02
DPATCAFH .5500000E-02	DPATCDFH .5500000E-02
DPATCBFH .5500000E-02	DPATCDFH .5500000E-02
DPATCCFH .5500000E-02	DPATCDFH .5500000E-02
DPATCBFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCBFL .5500000E-02
DPBTCAFL .5500000E-02	DPBTCBFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCCFL .5500000E-02
DPATCBFH .5500000E-02	DPBTCCFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCCFL .5500000E-02

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DPBTC AFL DPBTC CFL
.5500000E-02 .5500000E-02

DPBTC BFL DPBTC CFL
.5500000E-02 .5500000E-02

DPATCAFH DPBTCDFL
.5500000E-02 .5500000E-02

DPATCBFH DPBTCDFL
.5500000E-02 .5500000E-02

DPATCCFH DPBTCDFL
.5500000E-02 .5500000E-02

DPBTC AFL DPBTCDFL
.5500000E-02 .5500000E-02

DPBTC BFL DPBTCDFL
.5500000E-02 .5500000E-02

DPBTC CFL DPBTCDFL
.5500000E-02 .5500000E-02

BIA7BAML DPATCFH
.2800000E-02 .5500000E-02

BIA7BAML DPBTCDFL
.2800000E-02 .5500000E-02

BIA7BBML DPATCCFH
.2800000E-02 .5500000E-02

BIA7BBML DPBTC CFL
.2800000E-02 .5500000E-02

BIA7BCML DPATCBFH
.2800000E-02 .5500000E-02

BIA7BCML DPBTC BFL
.2800000E-02 .5500000E-02

BIA7BBML BIA7BCML
.2800000E-02 .2800000E-02

BIA7BDML DPATCAFH
.2800000E-02 .5500000E-02

BIA7BDML DPBTC AFL
.2800000E-02 .5500000E-02

BIA7BAML CIA7BDML
.2800000E-02 .2800000E-02

BIB7AAAH DPATCFH
.2800000E-02 .5500000E-02

BIB7AAAH DPBTCDFL

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.2800000E-02	.5500000E-02
BIA7BDML	BIB7AAMH
.2800000E-02	.2800000E-02
BIB7ABMH	DPATCCFH
.2800000E-02	.5500000E-02
BIB7ABMH	DPBTCCFL
.2800000E-02	.5500000E-02
BIA7BCML	BIB7ABMH
.2800000E-02	.2800000E-02
BIB7ACMH	DPATCBFH
.2800000E-02	.5500000E-02
BIB7ACMH	DPBTCBFL
.2800000E-02	.5500000E-02
BIA7BBML	BIB7ACMH
.2800000E-02	.2800000E-02
BIB7ABMH	BIB7ACMH
.2800000E-02	.2800000E-02
BIB7ADMH	DPATCAFH
.2800000E-02	.5500000E-02
BIB7ADMH	DPBTC AFL
.2800000E-02	.5500000E-02
BIA7BAML	BIB7ADMH
.2800000E-02	.2800000E-02
BIB7AAMH	BIB7ADMH
.2800000E-02	.2800000E-02
BIDPAAML	DPATCBFH
.2800000E-02	.5500000E-02
BIDPAAML	DPATCCFH
.2800000E-02	.5500000E-02
BIDPAAML	DPATCBFH
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCBFL
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCCFL
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCDFL
.2800000E-02	.5500000E-02
BIA7BDML	BIDPAAML
.2800000E-02	.2800000E-02

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BIB7ADMH BIDPAAML
2800000E-02 2800000E-02

BIDPABML DPATCAFH
2800000E-02 5500000E-02

BIDPABML DPATCCFH
2800000E-02 5500000E-02

BIDPABML DPATCDFH
2800000E-02 5500000E-02

BIDPABML DPBTCAFL
2800000E-02 5500000E-02

BIDPABML DPBTCCFL
2800000E-02 5500000E-02

BIDPABML DPBTCDFL
2800000E-02 5500000E-02

BIA7BCML BIDPABML
2800000E-02 2800000E-02

BIB7ACMH BIDPABML
2800000E-02 2800000E-02

BIDPAAML BIDPABML
2800000E-02 2800000E-02

BIDPACML DPATCAFH
2800000E-02 5500000E-02

BIDPACML DPATCBFH
2800000E-02 5500000E-02

BIDPACML DPATCDFH
2800000E-02 5500000E-02

BIDPACML DPBTCAFL
2800000E-02 5500000E-02

BIDPACML DPBTBFL
2800000E-02 5500000E-02

BIDPACML DPBTCDFL
2800000E-02 5500000E-02

BIA7B9ML BIDPACML
2800000E-02 2800000E-02

BIB7ABMH BIDPACML
2800000E-02 2800000E-02

BIDPAAML BIDPACML
2800000E-02 2800000E-02

BIDPABML BIDPACML

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.2800000E-02	.2800000E-02
BIDPADML	DPATCAFH
.2800000E-02	.5500000E-02
BIDPADML	DPATCBFH
.2800000E-02	.5500000E-02
BIDPADML	DPATCCFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCAFL
.2800000E-02	.5500000E-02
BIDPADML	DPBTCBFL
.2800000E-02	.5500000E-02
BIDPADML	DPBTCCFL
.2800000E-02	.5500000E-02
BIA7BAML	BIDPADML
.2800000E-02	.2800000E-02
BIB7AAMH	BIDPADML
.2800000E-02	.2800000E-02
BIDPAFML	BIDPADML
.2800000E-02	.2800000E-02
BIDPABML	BIDPADML
.2800000E-02	.2800000E-02
BIDPACML	BIDPADML
.2800000E-02	.2800000E-02

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LMFW - Overfill Protection

DPOFABXX
5.5 x 10⁻³

DPOFDBFL
5.5 x 10⁻³

BAOFABXX
9.1 x 10⁻⁵

DPOFDBFL
5.5 x 10⁻³

BIOFABMH
2 x 10⁻³

DPOFDBFL
5.5 x 10⁻³

DPOFABXX
5.5 x 10⁻³

BIOFDBMH
2 x 10⁻³

BAOFABXX
9.1 x 10⁻⁵

BIOFDBMH
2 x 10⁻³

BIOFABMH
2 x 10⁻³

BIOFDBMH
2 x 10⁻³

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LOOP
Initiate
Automatic

P7AZZZFS .410000E-02	P7BZZZFR .346000E-03	
P7AZZZFS .410000E-02	P7BZZZFS .530000E-03	
DG1ZZZFS .134000E-01	P7AZZZFR .346000E-03	
DG1ZZZFS .134000E-01	P7AZZZFS .410000E-02	
DG1ZZZFS .134000E-01	P7AZZZPM .759000E-03	
DG1ZZZFS .134000E-01	FW10BZFB .110000E-03	
CST41ZAM .200000E-05	SWSUCTOP .100000E+01	
CS98ZZFB .110000E-03	SWSUCTOP .100000E+01	
CS99ZZFB .110000E-03	SWSUCTOP .100000E+01	
P7AZZZFR .346000E-03	P7BRECCA .100000E+01	P7BRECL0 .330000E-02
P7AZZZFS .410000E-02	P7BRECCA .100000E+01	P7BRECL0 .330000E-02
P7AZZZPM .759000E-03	P7BRECCA .100000E+01	P7BRECL0 .330000E-02
P7ARECCA .100000E+01	P7ARECL0 .330000E-02	P7BZZZFR .346000E-03
P7ARECCA .100000E+01	P7ARECL0 .330000E-02	P7BZZZFS .530000E-03
P7AZZZFS .410000E-02	P7BRECOP .100000E+01	P7BZZZTS .139000E-02

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GENERAL CALCULATIONS

CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BZZZFR .3460000E-03	
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BZZZFS .5300000E-03	
DG1ZZZFS .1340000E-01	P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	
DG1ZZZFS .1340000E-01	P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02	
CV2802LC .3300000E-02	CV2802RE .1000000E+01	DG1ZZZFS .1340000E-01	
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	DG1ZZZFS .1340000E-01	
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZZFR .3460000E-03	
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZZFS .4100000E-02	
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7AZZZPM .7590000E-03	
P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	P7BRECOP .1000000E+01	P7BZZZTS .1390000E-02
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
CV2802LC .3300000E-02	CV2802RE .1000000E+01	P7BRECOP .1000000E+01	P7BZZZTS .1390000E-02
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	P7BRECCA .1000000E+01	P7BRECLO .3300000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7ARECCA .1000000E+01	P7ARECLO .3300000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02
CV2800LC .3300000E-02	CV2800RE .1000000E+01	CV2802LC .3300000E-02	CV2802RE .1000000E+01
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	CV2800LC .3300000E-02	CV2800RE .1000000E+01

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LOOP
Initiate
with operator corrective action

P7AZZZFR .3460000E-03	P7BZZZFR .3460000E-03	
P7AZZZFS .4100000E-02	P7BZZZFR .3460000E-03	
P7AZZZPM .7590000E-03	P7BZZZFR .3460000E-03	
P7AZZZFR .3460000E-03	P7BZZZFS .5300000E-03	
P7AZZZFS .4100000E-02	P7BZZZFS .5300000E-03	
P7AZZZPM .7590000E-03	P7BZZZFS .5300000E-03	
DG1ZZZFS .1340000E-01	P7AZZZFR .3460000E-03	
DG1ZZZFS .1340000E-01	P7AZZZFS .4100000E-02	
DG1ZZZFS .1340000E-01	P7AZZZPM .7590000E-03	
FW10AZFB .1100000E-03	P7AZZZFS .4100000E-02	
DG1ZZZFS .1340000E-01	FW10BZFB .1100000E-03	
CS98ZZFB .1100000E-03	SWSUCTOP .4000000E-01	
CS99ZZFB .1100000E-03	SWSUCTOP .4000000E-01	
CV2802LC .3300000E-02	CV2802RE .1100000E-01	DG1ZZZFS .1340000E-01
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	P7BZZZFR .3460000E-03
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	P7BZZZFS .5300000E-03
CSVSGARS .1840000E-01	CSVSGBRS .1840000E-01	DG1ZZZFS .1340000E-01
CV2800LC .3300000E-02	CV2800RE .1900000E-01	P7AZZZFS .4100000E-02

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Loop
Control
Automatic

OPEM20X1 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X2 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X3 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X4 .2000000E-02	OPFAILPT .1000000E+01

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LOOP
Control
with operator corrective action

LS20X4NS .8700000E-04	OPFAILPT .1500000E-03
OPEM20X1 .2000000E-02	OPFAILPT .1500000E-03
OPEM20X2 .2000000E-02	OPFAILPT .1500000E-03
OPEM20X3 .2000000E-02	OPFAILPT .1500000E-03
OPEM20X4 .2000000E-02	OPFAILPT .1500000E-03
OPESEL28 .1000000E-03	OPFAILPT .1500000E-03
LS20X1NS .8700000E-04	OPFAILPT .1500000E-03
LS20X2NS .8700000E-04	OPFAILPT .1500000E-03
LS20X3NS .8700000E-04	OPFAILPT .1500000E-03
BA20X1FL .9100000E-04	OPFAILPT .1500000E-03
BA20X2FL .9100000E-04	OPFAILPT .1500000E-03
BA20X3FL .9100000E-04	OPFAILPT .1500000E-03
BA20X4FL .9100000E-04	OPFAILPT .1500000E-03

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LOOP
F066
A < 600, B > 600

DPATCBFH .5500000E-02	DPATCCFH .5500000E-02
DPATCAFH .5500000E-02	DPATCDFH .5500000E-02
DPATCDFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCBFH .5500000E-02	DPBTCCFL .5500000E-02
DPBTCBFL .5500000E-02	DPBTCCFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCDFL .5500000E-02
DPBTCAFL .5500000E-02	DPBTCDFL .5500000E-02
BIDPAAML .2800000E-02	DPATCDFH .5500000E-02
BIDPAAML .2800000E-02	DPBTCDFL .5500000E-02
BIDPABML .2800000E-02	DPATCCFH .5500000E-02
BIDPABML .2800000E-02	DPBTCCFL .5500000E-02
BIDPACML .2800000E-02	DPATCBFH .5500000E-02
BIDPACML .2800000E-02	DPBTCBFL .5500000E-02
BIDPABML .2800000E-02	BIDPACML .2800000E-02
BIDPADML .2800000E-02	DPATCAFH .5500000E-02
BIDPADML .2800000E-02	DPBTCAFL .5500000E-02
BIDPAAML .2800000E-02	BIDPADML .2800000E-02

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LOOP
FOSS
A < 600, B < 600, B 150 > A

DPATCAFH .5500000E-02	DPATCBFH .5500000E-02
DPATCAFH .5500000E-02	DPATCCFH .5500000E-02
DPATCBFH .5500000E-02	DPATCCFH .5500000E-02
DPATCAFH .5500000E-02	DPATCDFH .5500000E-02
DPATCBFH .5500000E-02	DPATCDFH .5500000E-02
DPATCCFH .5500000E-02	DPATCDFH .5500000E-02
DPATCBFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCBFL .5500000E-02
DPBTCAFL .5500000E-02	DPBTCBFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCCFL .5500000E-02
DPATCBFH .5500000E-02	DPBTCCFL .5500000E-02
DPATCDFH .5500000E-02	DPBTCCFL .5500000E-02

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DPBTCAFL DPBTCCFL
.5500000E-02 .5500000E-02

DPBTCBFL DPBTCCFL
.5500000E-02 .5500000E-02

DPATCAFH DPBTCDFL
.5500000E-02 .5500000E-02

DPATCBFH DPBTCDFL
.5500000E-02 .5500000E-02

DPATCCFH DPBTCDFL
.5500000E-02 .5500000E-02

DPBTCAFL DPBTCDFL
.5500000E-02 .5500000E-02

DPBTCBFL DPBTCDFL
.5500000E-02 .5500000E-02

DPBTCCFL DPBTCDFL
.5500000E-02 .5500000E-02

BIA7BAML DPATCFH
.2800000E-02 .5500000E-02

BIA7BAML DPBTCDFL
.2800000E-02 .5500000E-02

BIA7BBML DPATCCFH
.2800000E-02 .5500000E-02

BIA7B9ML DPBTCCFL
.2800000E-02 .5500000E-02

BIA7BCML DPATCBFH
.2800000E-02 .5500000E-02

BIA7BCML DPBTCBFL
.2800000E-02 .5500000E-02

BIA7BBML BIA7BCML
.2800000E-02 .2800000E-02

BIA7BDML DPATCAFH
.2800000E-02 .5500000E-02

BIA7BDML DPBTCAFL
.2800000E-02 .5500000E-02

BIA7BAMI BIA7BDML
.2800000E-02 .2800000E-02

BIB7AAMH DPATCFH
.2800000E-02 .5500000E-02

BIB7AAMH DPBTCDFL

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.2800000E-02	.5500000E-02
BIA7BDML .2800000E-02	BIB7AAMH .2800000E-02
BIB7ABMH .2800000E-02	DPATCCFH .5500000E-02
BIB7ABMH .2800000E-02	DPBTCFL .5500000E-02
BIA7BCML .2800000E-02	BIB7ABMH .2800000E-02
BIB7ACMH .2800000E-02	DPATCBFH .5500000E-02
BIB7ACMH .2800000E-02	DPBTCFL .5500000E-02
BIA7BBML .2800000E-02	BIB7ACMH .2800000E-02
BIB7ABMH .2800000E-02	BIB7ACMH .2800000E-02
BIB7ADMH .2800000E-02	DPATCAFH .5500000E-02
BIB7ADMH .2800000E-02	DPBTCFL .5500000E-02
BIA7BAML .2800000E-02	BIB7ADMH .2800000E-02
BIB7AAMH .2800000E-02	BIB7ADMH .2800000E-02
BIDPAAML .2800000E-02	DPATCBFH .5500000E-02
BIDPAAML .2800000E-02	DPATCCFH .5500000E-02
BIDPAAML .2800000E-02	DPATCFH .5500000E-02
BIDPAAML .2800000E-02	DPBTCFL .5500000E-02
BIDPAAML .2800000E-02	DPBTCFL .5500000E-02
BIDPAAML .2800000E-02	DPBTCFL .5500000E-02
BIA7BDML .2800000E-02	BIDPAAML .2800000E-02

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BIB7ADMH BIDPAAML
.2800000E-02 .2800000E-02

BIDPABML DPATCAFH
.2800000E-02 .5500000E-02

BIDPABML DPATCCFH
.2800000E-02 .5500000E-02

BIDPABML DPATCDFH
.2800000E-02 .5500000E-02

BIDPABML DPBTCAFL
.2800000E-02 .5500000E-02

BIDPABML DPBTCCFL
.2800000E-02 .5500000E-02

BIDPABML DPBTCDFL
.2800000E-02 .5500000E-02

BIA7BCML BIDPABML
.2800000E-02 .2800000E-02

BIB7ACMH BIDPABML
.2800000E-02 .2800000E-02

BIDPAAML BIDPABML
.2800000E-02 .2800000E-02

BIDPACML DPATCAFH
.2800000E-02 .5500000E-02

BIDPACML DPATCBFH
.2800000E-02 .5500000E-02

BIDPACML DPATCDFH
.2800000E-02 .5500000E-02

BIDPACML DPBTCAFL
.2800000E-02 .5500000E-02

BIDPACML DPBTCBFL
.2800000E-02 .5500000E-02

BIDPACML DPBTCDFL
.2800000E-02 .5500000E-02

BIA7BBML BIDPACML
.2800000E-02 .2800000E-02

BIB7ADMH BIDPACML
.2800000E-02 .2800000E-02

BIDPAAML BIDPACML
.2800000E-02 .2800000E-02

BIDPABML BIDPACML

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.2800000E-02	.2800000E-02
BIDPADML	DPATCAFH
.2800000E-02	.5500000E-02
BIDPADML	DPATCBFH
.2800000E-02	.5500000E-02
BIDPADML	DPATCCFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCAFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCBFL
.2800000E-02	.5500000E-02
BIDPADML	DPBTCCFL
.2800000E-02	.5500000E-02
BIA7BAML	BIDPADML
.2800000E-02	.2800000E-02
BIB7AAMH	BIDPADML
.2800000E-02	.2800000E-02
BIDPAAML	BIDPADML
.2800000E-02	.2800000E-02
BIDPABML	BIDPADML
.2800000E-02	.2800000E-02
BIDPACML	BIDPADML
.2800000E-02	.2800000E-02

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LOOP - overflow protection

DPOFABXX
 5.5×10^{-3}

DPOFDBFL
 5.5×10^{-3}

BAOFABXX
 9.1×10^{-5}

DPOFDBFL
 5.5×10^{-3}

BIOFABMH
 2×10^{-3}

DPOFDBFL
 5.5×10^{-3}

DPOFABXX
 5.5×10^{-3}

BIOFDBMH
 2×10^{-3}

BAOFABXX
 9.1×10^{-5}

BIOFDBMH
 2×10^{-3}

BIOFABMH
 2×10^{-3}

BIOFDBMH
 2×10^{-3}

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LOAC
Initiate
Automatic

F7AZZZFR .3460000E-03		
P7AZZZFS .4100000E-02		
P7AZZZPH .7590000E-03		
FWTUBZFB .1100000E-03		
P7ARECCA .1000000E+01	P7ARECLO .3300000E-02	
P7ARECOP .1000000E+01	P7AZZZTS .1390000E-02	
CV2802LC .3300000E-02	CV2802RE .1000000E+01	
CST41ZAM .2000000E-05	SWSUCTOP .1000000E+01	
CSVSGARS .1840000E-01	W6ZZZZFB .1100000E-03	
CSVGBRS .1840000E-01	W5ZZZZFB .1100000E-03	
CSVSGARS .1840000E-01	CSVGBRS .1840000E-01	
CS98ZZFB .1100000E-03	SWSUCTOP .1000000E+01	
CS99ZZFB .1100000E-03	SWSUCTOP .1000000E+01	
BAD06ZAM .8460000E-03	CV2802LC .3300000E-02	
CVY1Y2OP .1000000E+01	CVY1ZZTO .4000000E-02	CVY2ZZTO .4000000E-02
BAD06ZAM .8460000E-03	CVY1Y2OP .1000000E+01	CVY2ZZTO .4000000E-02
BAD07ZAM .8460000E-03	CVY1Y2OP .1000000E+01	CVY1ZZTO .4000000E-02

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LOAC

Initiate, with operator corrective action

P7AZZZFR	
.3460000E-03	
P7AZZZFS	
.4100000E-02	
P7AZZZPH	
.7590000E-03	
FWTUBZFB	
.1100000E-03	
P7ARECCA	P7ARECL0
.2100000E-02	.3300000E-02
P7ARECOP	P7AZZZTS
.4000000E-02	.1390000E-02
CV2802LC	CV2802RE
.3300000E-02	.1100000E-01
CSVSGARS	W6ZZZZFB
.1840000E-01	.1100000E-03
CSVSGBRS	W5ZZZZFB
.1840000E-01	.1100000E-03
CSVSGARS	CSVSGBRS
.1840000E-01	.1540000E-01
CS98ZZFB	SWSUCTOP
.1100000E-03	.4000000E-01
CS98ZZFB	CV2806MF
.1100000E-03	.4000000E-02
CS98ZZFB	CV3851MF
.1100000E-03	.4000000E-02
CS99ZZFB	SWSUCTOP
.1100000E-03	.4000000E-01
CS99ZZFB	CV2806MF
.1100000E-03	.4000000E-02
CS99Z. 3	CV3851MF
.1100000E-03	.4000000E-02
CVY3ZZFH	PV6601RS
.2070000E-03	.2300000E-02
CVY3ZZFH	PV6602RS
.2070000E-03	.2300000E-02
CVY4ZZFH	PV6601RS
.2070000E-03	.2300000E-02
CVY4ZZFH	PV6602RS
.2070000E-03	.2300000E-02
BAD06ZAM	CV2802LC
.8460000E-03	.3300000E-02

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LOAC
Control
Automatic

OPEM20X1 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X2 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X3 .2000000E-02	OPFAILPT .1000000E+01
OPEM20X4 .2000000E-02	OPFAILPT .1000000E+01
BAD06ZAM .8460000E-03	OPFAILPH .1000000E+01
BAD07ZAM .8460000E-03	OPFAILPH .1000000E+01

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LOAC
Control
with operator corrective action

LS20X4NS	OPFAILPT
.8700000E-04	.1500000E-03
OPEH20X1	OPFAILPT
.2000000E-02	.1500000E-03
OPEH20X2	OPFAILPT
.2000000E-02	.1500000E-03
OPEH20X3	OPFAILPT
.2000000E-02	.1500000E-03
OPEH20X4	OPFAILPT
.2000000E-02	.1500000E-03
OPESEL28	OPFAILPT
.1000000E-03	.1500000E-03
LS20X1NS	OPFAILPT
.8700000E-04	.1500000E-03
LS20X2NS	OPFAILPT
.8700000E-04	.1500000E-03
LS20X3NS	OPFAILPT
.8700000E-04	.1500000E-03
BAD06ZAM	OPFAILPH
.8460000E-03	.7500000E-03
BAD07ZAM	OPFAILPH
.8460000E-03	.7500000E-03
BA20X1FL	OPFAILPT
.9100000E-04	.1500000E-03
BA20X2FL	OPFAILPT
.9100000E-04	.1500000E-03
BA20X3FL	OPFAILPT
.9100000E-04	.1500000E-03
BA20X4FL	OPFAILPT
.9100000E-04	.1500000E-03

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LOAC
 FOSG
 A < 600, B > 600

DPATCBFH .5500000E-02	DPATCCFH .5500000E-02
DPATCAFH .5500000E-02	DPATCDFH .5500000E-02
DPATCDFH .5500000E-02	DPBTCAFL .5500000E-02
DPATCCFH .5500000E-02	DPBTCBFL .5500000E-02
DPATCBFH .5500000E-02	DPBTCCFL .5500000E-02
DPBTCBFL .5500000E-02	DPBTCCFL .5500000E-02
DPATCAFH .5500000E-02	DPBTCDFL .5500000E-02
DPBTCAFL .5500000E-02	DPBTCDFL .5500000E-02
BIDPAAML .2800000E-02	DPATCDFH .5500000E-02
BIDPAAML .2800000E-02	DPBTCDFL .5500000E-02
BIDPABML .2800000E-02	DPATCCFH .5500000E-02
BIDPABML .2800000E-02	DPBTCCFL .5500000E-02
BIDPACML .2800000E-02	DPATCBFH .5500000E-02
BIDPACML .2800000E-02	DPBTCBFL .5500000E-02
BIDPABML .2800000E-02	BIDPACML .2800000E-02
BIDPADML .2800000E-02	DPATCAFH .5500000E-02
BIDPADML .2800000E-02	DPBTCAFL .5500000E-02
BIDPAAML .2800000E-02	BIDPADML .2800000E-02

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LOAC
FOG 6
A < 600, B < 600, B 150 > A

DPATCAFH	DPATCBFH
.5500000E-02	.5500000E-02
DPATCAFH	DPATCCFH
.5500000E-02	.5500000E-02
DPATCBFH	DPATCCFH
.5500000E-02	.5500000E-02
DPATCAFH	DPATCDFH
.5500000E-02	.5500000E-02
DPATCBFH	DPATCDFH
.5500000E-02	.5500000E-02
DPATCCFH	DPATCDFH
.5500000E-02	.5500000E-02
DPATCBFH	DPBTCAFL
.5500000E-02	.5500000E-02
DPATCCFH	DPBTCAFL
.5500000E-02	.5500000E-02
DPATCDFH	DPBTCAFL
.5500000E-02	.5500000E-02
DPATCAFH	DPBTCBFL
.5500000E-02	.5500000E-02
DPATCCFH	DPBTCBFL
.5500000E-02	.5500000E-02
DPATCDFH	DPBTCBFL
.5500000E-02	.5500000E-02
DPBTCAFL	DPBTCBFL
.5500000E-02	.5500000E-02
DPATCAFH	DPBTCCFL
.5500000E-02	.5500000E-02
DPATCBFH	DPBTCCFL
.5500000E-02	.5500000E-02
DPATCDFH	DPBTCCFL
.5500000E-02	.5500000E-02

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<u>DPBTCAFL</u> <u>.5500000E-02</u>	<u>DPBTCCFL</u> <u>.5500000E-02</u>
<u>DPBTCBFL</u> <u>.5500000E-02</u>	<u>DPBTCCFL</u> <u>.5500000E-02</u>
<u>DPATCAFH</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>DPATCBFH</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>DPATCCFH</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>DPBTCAFL</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>DPBTCBFL</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>DPBTCCFL</u> <u>.5500000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>BIA7BAML</u> <u>.2800000E-02</u>	<u>DPATCFH</u> <u>.5500000E-02</u>
<u>BIA7BAML</u> <u>.2800000E-02</u>	<u>DPBTCDFL</u> <u>.5500000E-02</u>
<u>BIA7BBML</u> <u>.2800000E-02</u>	<u>DPATCCFH</u> <u>.5500000E-02</u>
<u>BIA7BBML</u> <u>.2800000E-02</u>	<u>DPBTCCFL</u> <u>.5500000E-02</u>
<u>BIA7BCML</u> <u>.2800000E-02</u>	<u>DPATCBFH</u> <u>.5500000E-02</u>
<u>BIA7BCML</u> <u>.2800000E-02</u>	<u>DPBTCBFL</u> <u>.5500000E-02</u>
<u>BIA7BDML</u> <u>.2800000E-02</u>	<u>BIA7BCML</u> <u>.2800000E-02</u>
<u>BIA7BDML</u> <u>.2800000E-02</u>	<u>DPATCAFH</u> <u>.5500000E-02</u>
<u>BIA7BDML</u> <u>.2800000E-02</u>	<u>DPBTCAFL</u> <u>.5500000E-02</u>
<u>BIA7BAML</u> <u>.2800000E-02</u>	<u>BIA7BDML</u> <u>.2800000E-02</u>
<u>BIB7AANH</u> <u>.2800000E-02</u>	<u>DPATCFH</u> <u>.5500000E-02</u>
<u>BIB7AANH</u>	<u>DPBTCDFL</u>

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.2800000E-02	.5500000E-02
BIA7B0ML	BIB7AAMH
.2800000E-02	.2800000E-02
BIB7AEMH	DPATCCFH
.2800000E-02	.5500000E-02
BIB7A5MH	DPBTCCFL
.2800000E-02	.5500000E-02
BIA7B0ML	BIB7ABMH
.2800000E-02	.2800000E-02
BIB7ACHH	DPATCBFH
.2800000E-02	.5500000E-02
BIB7ACHH	DPBTCBFL
.2800000E-02	.5500000E-02
BIA7BBML	BIB7ACHH
.2800000E-02	.2800000E-02
BIB7ABMH	BIB7ACHH
.2800000E-02	.2800000E-02
BIB7ADMH	DPATCAFH
.2800000E-02	.5500000E-02
BIB7ADMH	DPBTCAFL
.2800000E-02	.5500000E-02
BIA7BAML	BIB7ADMH
.2800000E-02	.2800000E-02
BIB7AAMH	BIB7ADMH
.2800000E-02	.2800000E-02
BIDPAAML	DPATCBFH
.2800000E-02	.5500000E-02
BIDPAAML	DPATCCFH
.2800000E-02	.5500000E-02
BIDPAAML	DPATCDFH
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCBFL
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCCFL
.2800000E-02	.5500000E-02
BIDPAAML	DPBTCDFL
.2800000E-02	.5500000E-02
BIA7B0ML	BIDPAAML
.2800000E-02	.2800000E-02

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BIB7ADMH .2800000E-02	BIDFAML .2800000E-02
BIDPABML .2800000E-02	DPATCAFH .5500000E-02
BIDPABML .2800000E-02	DPATCCFH .5500000E-02
BIDPAEML .2800000E-02	DPATCDFH .5500000E-02
BIDPABML .2800000E-02	DPBTCAFL .5500000E-02
BIDPABML .2800000E-02	DPBTCCFL .5500000E-02
BIDPABML .2800000E-02	DPBTCDFL .5500000E-02
BIA7BCML .2800000E-02	BIDPABML .2800000E-02
BIB7ACMH .2800000E-02	BIDPABML .2800000E-02
BIDPAAML .2800000E-02	BIDPABML .2800000E-02
BIDPACML .2800000E-02	DPATCAFH .5500000E-02
BIDPACML .2800000E-02	DPATCBFH .5500000E-02
BIDPACML .2800000E-02	DPATCDFH .5500000E-02
BIDPACML .2800000E-02	DPBTCAFL .5500000E-02
BIDPACML .2800000E-02	DPBTCBFL .5500000E-02
BIDPACML .2800000E-02	DPBTCDFL .5500000E-02
BIA7BBML .2800000E-02	BIDPACML .2800000E-02
BIB7ASHH .2800000E-02	BIDPACML .2800000E-02
BIDPAAML .2800000E-02	BIDPACML .2800000E-02
BIDPABML	BIDPACML

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.2800000E-02	.2800000E-02
BIDPADML	DPATCAFH
.2800000E-02	.5000000E-02
BIDPADML	DPATCBFH
.2800000E-02	.5000000E-02
BIDPADML	DPATCCFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCAFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCBFH
.2800000E-02	.5500000E-02
BIDPADML	DPBTCCFH
.2800000E-02	.5500000E-02
BIA7BAML	BIDPADML
.2800000E-02	.2600000E-02
BIB7AAMH	BYDPADML
.2600000E-02	.2800000E-02
BIDPAAML	BIDPADML
.2800000E-02	.2000000E-02
BIDPABML	BIDPADML
.2800000E-02	.2800000E-02
BIDPACML	BIDPADML
.2800000E-02	.2800000E-02

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LOAC - Overfill Protection

DPOFABXX
5.5 x 10⁻³

DPOFDBFL
5.5 x 10⁻³

BAOFABXX
9.1 x 10⁻⁵

DPOFDBFL
5.5 x 10⁻³

BIOFABMH
2 x 10⁻³

DPOFDBFL
5.5 x 10⁻³

DPOFABXX
5.5 x 10⁻³

BIOFDBMH
2 x 10⁻³

BAOFABXX
9.1 x 10⁻⁵

BICFDBMH
2 x 10⁻³

BIOFABMH
2 x 10⁻³

BIOFDBMH
2 x 10⁻³

BADO7ZAM
8.46 x 10⁻⁴

DPOFDBFL
5.5 x 10⁻³

BADO7ZAM
8.46 x 10⁻⁴

BIOFDBMH
2 x 10⁻³

BADO7ZAM
8.46 x 10⁻⁴

DPOFDAFL
5.5 x 10⁻³

BADO7ZAM
8.46 x 10⁻⁴

BIOFDAMH
2 x 10⁻³

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Nuclear Power Generation Division

GENERAL CALCULATIONS

Basic Event Unavailabilities

AFHTRPOP	.100000E-02	BAARYAEO	.910000E-04	BAARYBFO	.910000E-04	BABRYAFO	.910000E-04
BABRYBFO	.910000E-04	BADJ6ZAM	.846000E-03	BADJ7ZAM	.846000E-03	BA0FAAFL	.910000E-04
BA0FABFL	.910000E-04			BA0F0AFL	.910000E-04	BA0F0BFL	.910000E-04
BA02X1FL	.910000E-04	BA02X2FL	.910000E-04	BA02X3FL	.910000E-04	BA02X4FL	.910000E-04
BA20X1FL	.910000E-04	BA20X2FL	.910000E-04	BA20X3FL	.910000E-04	BA20X4FL	.910000E-04
BIA7BAET	.220000E-04	BIA7BAML	.280000E-02	BIA7BBET	.220000E-04	BIA7BBML	.280000E-02
BIA7BCET	.220000E-04	BIA7BCML	.280000E-02	BIA7BDET	.220000E-04	BIA7BDML	.280000E-02
BIB7AAMH	.280000E-02	BIB7AAUT	.870000E-04	BIB7ABMH	.280000E-02	BIB7ABUT	.870000E-04
BIB7ACMH	.280000E-02	BIB7ACUT	.870000E-04	BIB7ADMH	.280000E-02	BIB7ADUT	.870000E-04
BIDFAAML	.280000E-02	BIDFAAUT	.870000E-04	BIDFABML	.280000E-02	BIDFABUT	.870000E-04
BIDFACML	.280000E-02	BIDFACUT	.870000E-04	BIDPADML	.280000E-02	BIDPADUT	.870000E-04
BIDFBAET	.220000E-04	BIDFBAMH	.280000E-02	BIDFBAML	.280000E-02	BIDFBSET	.220000E-04
BIDFEBMH	.280000E-02	BIDFBBML	.280000E-02	BIDPBCEM	.220000E-04	BIDPBCEH	.280000E-02
BIDF6"ML	.280000E-02	BIDF6DET	.220000E-04	BIDPBDMH	.280000E-02	BIDPBDML	.280000E-02
BIOFAAFL	.870000E-04	BIOFABFL	.870000E-04	BIOF0AFL	.870000E-04	BIOF0BFL	.870000E-04

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Nuclear Power Generation Division

GENERAL CALCULATIONS

BRCP7FO	.1720000E-06	BRB51ZFO	.1720000E-06	BRB61ZFO	.1720000E-06	BRCAP1FO	.1720000E-06
BRD12ZFO	.1720000E-06	BRD01ZFO	.1720000E-06	BRD02ZFO	.1720000E-06	BRD11HFO	.1720000E-06
CHD0AZAM	.1390000E-03	BRD21NFO	.1720000E-06	BRP7BZFO	.1720000E-06	CHD03ZAM	.4010000E-04
CM3MERFO	.1720000E-06	CNAMBRFO	.1720000E-06	CNARYAIC	.7000000E-05	CNARYCTC	.7000000E-05
CSFTSDAH	.1720000E-04	CMBRYAIC	.7000000E-05	CNBRYCTC	.7000000E-05	CSVSG6RS	.1840000E-01
CS98ZFB	.1100000E-03	CSATZAM	.2000000E-05	CSVSGARS	.1840000E-01	CVX1VSFH	.7600000E-05
CVX1ZZSC	.4560000E-06	CS99ZFB	.1100000E-03	CVX1E1FL	.5490000E-05	CVX2INAM	.1230000E-04
CVX2VSFH	.7600000E-05	CVX1ZZFO	.1540000E-04	CVX2E1FL	.5490000E-05	CVX3E1FL	.5490000E-05
CVX3INAM	.1230000E-04	CVXZZSC	.4560000E-06	CVX3ZZSC	.4560000E-06	CVX3ZZTO	.1540000E-04
CVX4E1FL	.5490000E-05	CVX3VSFH	.7600000E-05	CVX4ZZSC	.4560000E-06	CVX4ZZTO	.1540000E-04
CVT1RYTC	.7000000E-05	CVX4VSFH	.7600000E-05	CVY1ZZTO	.4000000E-02	CVY2RYTC	.7000000E-05
CVY2ZZTO	.4000000E-02	CVY3ZZFH	.2070000E-03	CVY4ZZFH	.2070000E-03	CVZ620FC	.4560000E-06
CVZ626FC	.4560000E-06	CVZ627FC	.4560000E-06	CVZ7ZFHF	.4560000E-06	CVZ800LC	.3300000E-02
CVZ800HF	.4560000E-06	CVZ800RE	.1900000E-01	CVZ8ZLFC	.3300000E-02	CVZ802HF	.4560000E-06
CVZ803RE	.1100000E-01	CVZ803CA	.4000000E-02	CVZ803ZL	.3000000E-04	CVZ803LA	.4000000E-02
CVZ803MF	.4000000E-02	CVZ806CA	.4000000E-02	CVZ806HS	.1000000E-04	CVZ806LA	.4000000E-02
CVZ806MF	.4000000E-02	CV3850CA	.4000000E-02	CV3850HF	.4000000E-02	CV3851CA	.4000000E-02
CV3851MF	.4000000E-02	CG1ZZFS	.1340000E-01	CG2ZZFS	.1340000E-01	DPATCAFH	.5500000E-02
DPATCAFL	.5500000E-02	DPATCBFH	.5500000E-01	DPATCBFL	.5500000E-02	DPATCCFH	.5500000E-02
DPATCCFL	.5500000E-02	DPATCBFH	.5500000E-02	DPATCOFL	.5500000E-02	DPBTCAF	.5500000E-02
DPBTCBFL	.5500000E-02	DPBTCCFL	.5500000E-02	DPBTCDFL	.5500000E-02	DPBFCAF	.5500000E-02
DPBFABFL	.5500000E-02	DPBTCCFL	.5500000E-02	DPBTDFL	.5500000E-02	DPF0FAFL	.5500000E-02
FCCVX1S5	.1200000E-05	FCCVX2S5	.1200000E-05	FCCVX3FE	.4700000E-05	FCCVX4FE	.4700000E-05
FC2620SS	.1200000E-05	FC2626SS	.1200000E-05	FC2627FE	.4700000E-05	FC2670FE	.4700000E-05
FG0FAAFE	.4700000E-05	FG0FABFE	.4700000E-05	FG0FDAFE	.4700000E-05	FG0FDBFE	.4700000E-05
FH10AZFB	.1100000E-03	FM10BZFB	.1100000E-03	FM13AZFB	.1100000E-03	FM13BZFB	.1100000E-03
INCAPZAM	.1230000E-04	INCBPZAM	.1230000E-04	INCPZAM	.1230000E-04	INY2AZAM	.1230000E-04
LFMLOOP	.8450000E+00	L00PZZZ	.1550000E+00	LS20X1NS	.8700000E-04	LS20X2NS	.8700000E-04
LS20X3NS	.8700000E-04	LS20X4NS	.8700000E-04	LTCVX1FL	.5500000E-02	LTCVX2FL	.5500000E-02
LTCVX3FL	.5500000E-02	LTCVX4FL	.5500000E-02	OPEM02X1	.2000000E-02	OPEM02X2	.2000000E-02
OPEM02X3	.2000000E-02	OPEM02Y4	.2000000E-02	OPEM20X1	.2000000E-02	OPEM20X2	.2000000E-02
OPEM20X3	.2000000E-02	OPEM20Y4	.2000000E-02	OPESEL28	.1000000E-03	OPFAILPH	.7500000E-03
OPFAILPT	.1500000E-03	OPFAILSM	.6100000E-02	PRO2X1FL	.1840000E-06	PRO2X2FL	.1840000E-06
PRO2X3FL	.1840000E-06	PRO2X4FL	.1840000E-06	PR20X1FL	.1840000E-06	PR20X2FL	.1840000E-06
PR20X3FL	.1840000E-06	PR20X4FL	.1840000E-06	PV6601RS	.2300000E-02	PV6602RS	.2300000E-02
P7ARECCA	.2100000E-02	P7ARECLO	.3400000E-02	P7ARECF	.4000000E-02	P7AZZZFR	.3460000E-03
P7AZZZFS	.4100000E-02	P7AZZZPM	.7590000E-03	P7AZZZTS	.1390000E-02	P7BRECCA	.2100000E-02
P7BRECCLO	.3300000E-02	P7BRECOP	.4000000E-02	P7BZZZFR	.3460000E-03	P7BZZZFS	.5300000E-03
P7BZZZPM	.2060000E-04	P7BZZZTS	.1390000E-02	REARYASH	.3000000E-07	REARYBSH	.3000000E-07
REPRYASH	.3000000E-07	REBYBSH	.3000000E-07	REDEBASH	.3000000E-07	REDPBBSH	.3000000E-07

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BAOFABXX	9.1×10^{-5}
BIOFABMH	2×10^{-3}
BIOFDBMH	2×10^{-3}
BRA120XX	1.72×10^{-7}
CSPTSAXX	1.2×10^{-5}
DPOFABXX	5.5×10^{-3}
DPOFDBFL	5.5×10^{-3}
INY11ZXX	1.23×10^{-5}

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