INEEL

IDAHO NATIONAL ENGINEERING & ENVIRONMENTAL LABORATORY

LOCKHEED MARTIN

LOCKHEED MARTIN IDAHO TECHNOLOGIES COMPANY
FAX TRANSMITTAL

Date: 01/12/00

To: GLENN KELLY **Phone:** 301-415-1075

Company: NRC **Fax:** 301-415-3577

From: SOLI KHERICHA **Phone:** 208-526-9254

Fax Number: (208)526-2930

Number of pages INCLUDING Cover page 19

NOTE/MESSAGE

GLENN:

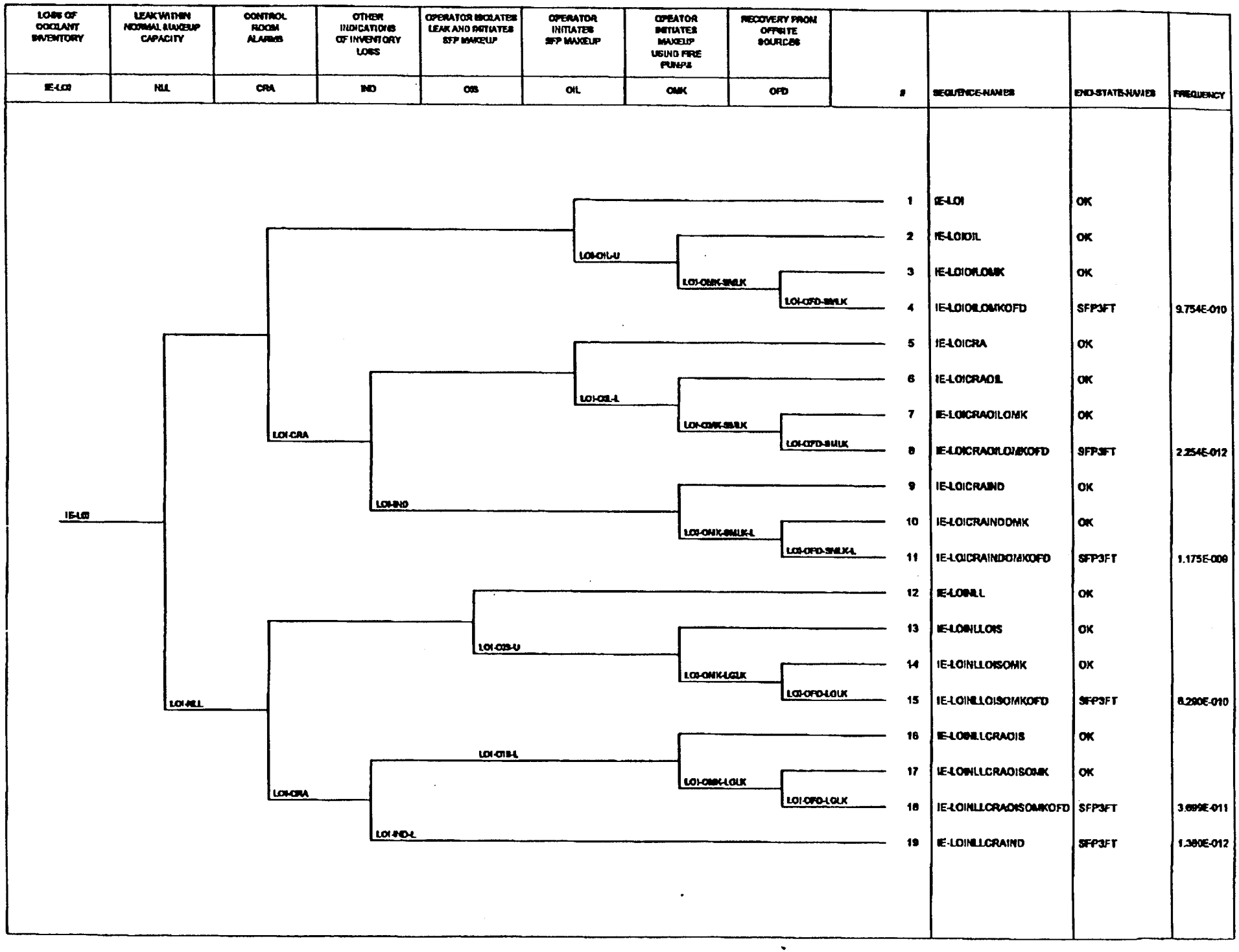
LOI ET, FTS, Cert sets

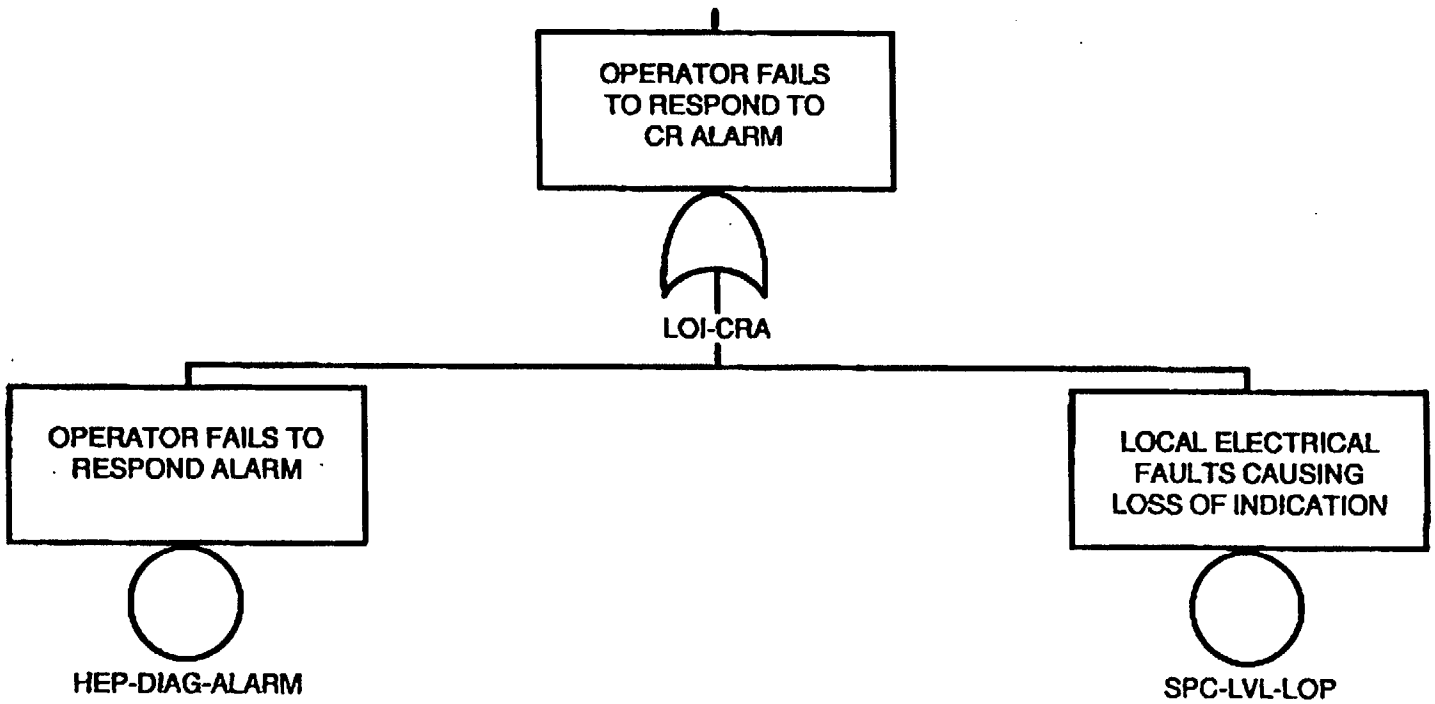
Mike and I have copies

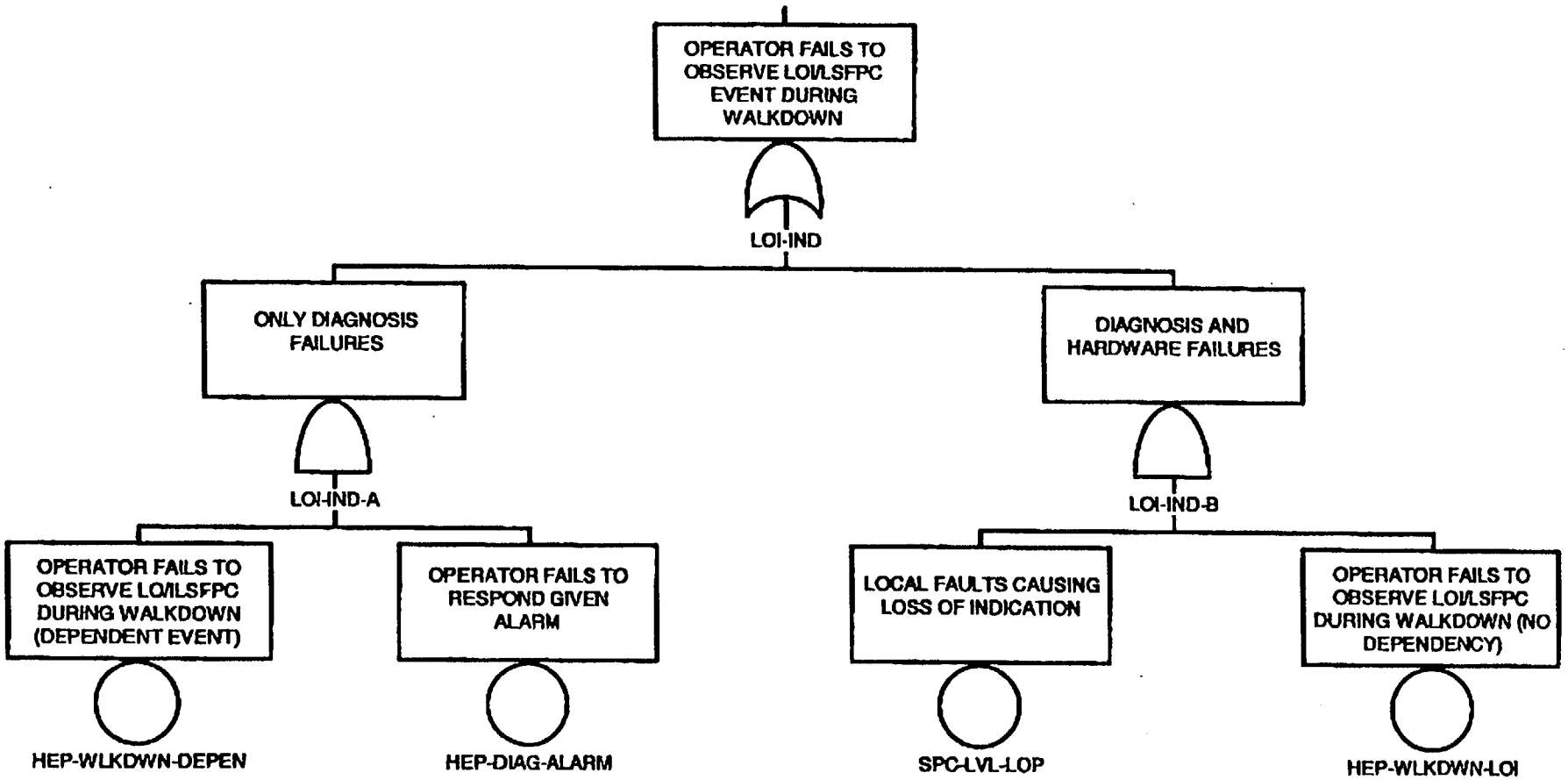
NOTE: This facsimile may contain COMPANY PRIVATE information intended only for the use of the specific individual or entity named above. If you or your employer are not the intended recipient, you are hereby notified that any unauthorized dissemination or copying of this facsimile or the information contained in it is strictly prohibited. If you have received this facsimile in error, please immediately notify the person named above at once by telephone and return the original facsimile to me at the above address via the U.S. Postal Service. Thank you.

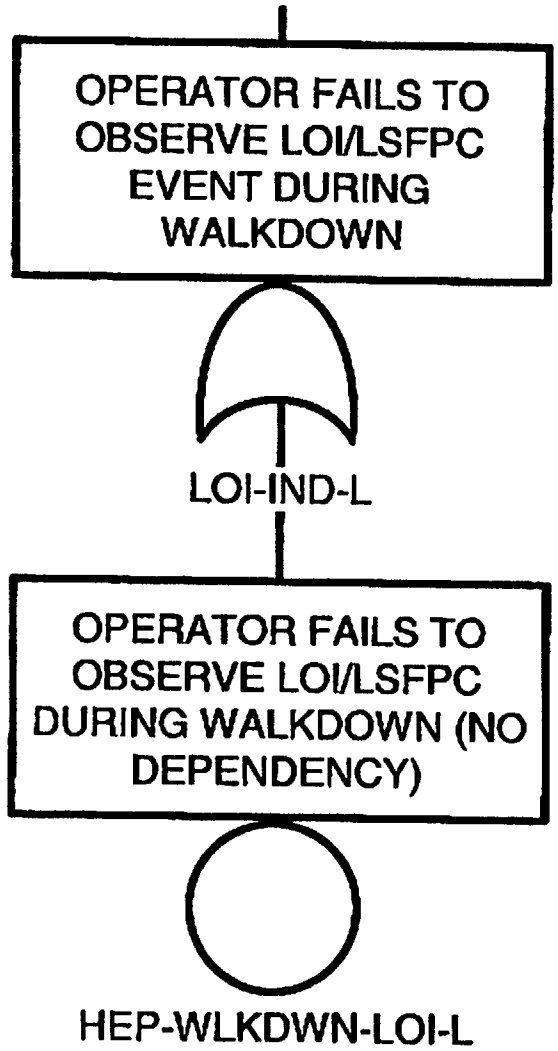
P.O. Box 1625, Idaho Falls, ID 83415-3860
For OVERNIGHT: 2525 N. Fremont Ave., Idaho Falls, ID 83415-3860

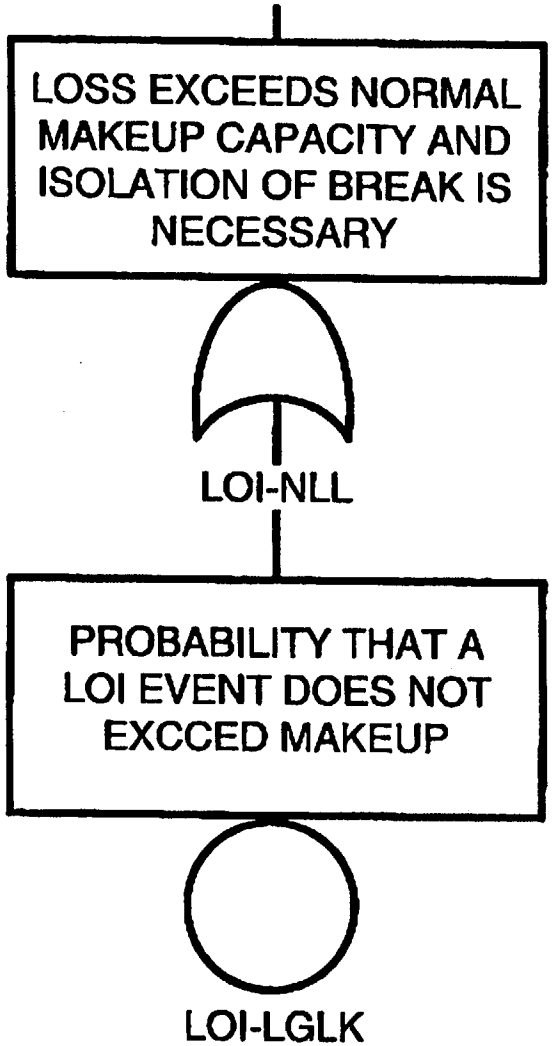
4108

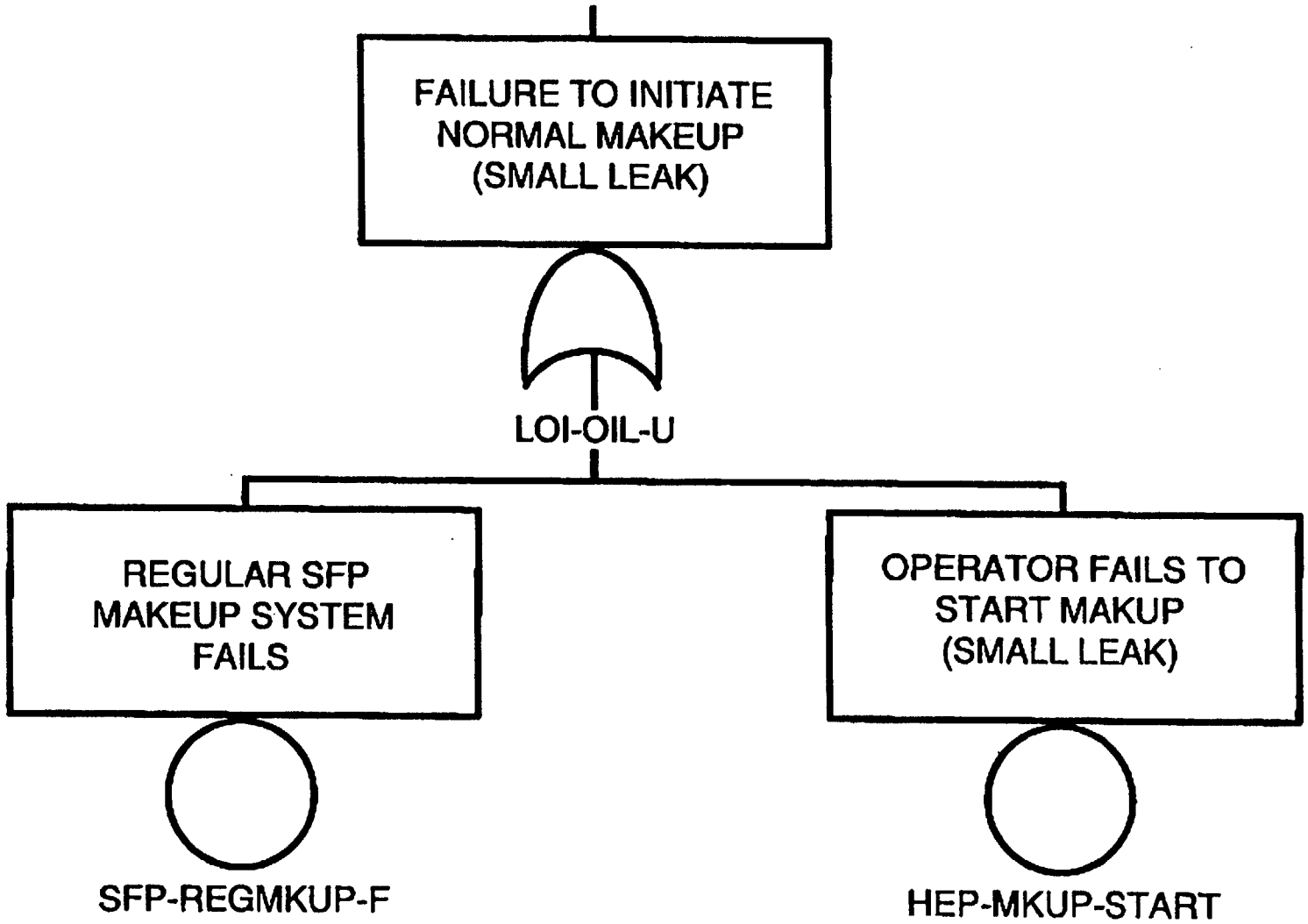

LOSS OF COOLANT INVENTORY
LEAK WITHIN NORMAL MAKEUP CAPACITY
CONTROL ROOM ALARMS
OTHER INDICATIONS OF INVENTORY LOSS
OPERATOR ISOLATES LEAK AND INITIATES SFP MAKEUP
OPERATOR INITIATES SFP MAKEUP
OPERATOR INITIATES MAKEUP USING FIRE PUMPS
RECOVERY FROM OFFSITE SOURCES
IE-LOI
NIL
CRA
IND
OIS
OIL
OMK
OFD
#
SEQUENCE-NAMES
END-STATE-NAMES
FREQUENCY
IE-LOI
LOI-NIL
LOI-CRA
LOI-IND
LOI-OIL-U
LOI-OMK-SMUK
LOI-OFD-SMUK
LOI-OIL-L
LOI-OMK-SMUK
LOI-OFD-SMUK
LOI-OMK-SMUK-L
LOI-OFD-SMUK-L
LOI-OIS-U
LOI-OMK-LGUK
LOI-OFD-LGUK
LOI-OIS-L
LOI-OMK-LGUK
LOI-OFD-LGUK
LOI-IND-L
1 IE-LOI OK
2 IE-LOIOIL OK
3 IE-LOIOILOMK OK
4 IE-LOIOILOMKOFD SFP3FT 9.754E-010
5 IE-LOICRA OK
6 IE-LOICRAOIL OK
7 IE-LOICRAOILOMK OK
8 IE-LOICRAOILOMKOFD SFP3FT 2.254E-012
9 IE-LOICRAIND OK
10 IE-LOICRAINDOMK OK
11 IE-LOICRAINDOMKOFD SFP3FT 1.175E-009
12 IE-LOINIL OK
13 IE-LOINILOIS OK
14 IE-LOINILOISOMK OK
15 IE-LOINILOISOMKOFD SFP3FT 8.290E-010
16 IE-LOINILCRAOIS OK
17 IE-LOINILCRAOISOMK OK
18 IE-LOINILCRAOISOMKOFD SFP3FT 3.699E-011
19 IE-LOINILCRAIND SFP3FT 1.380E-012

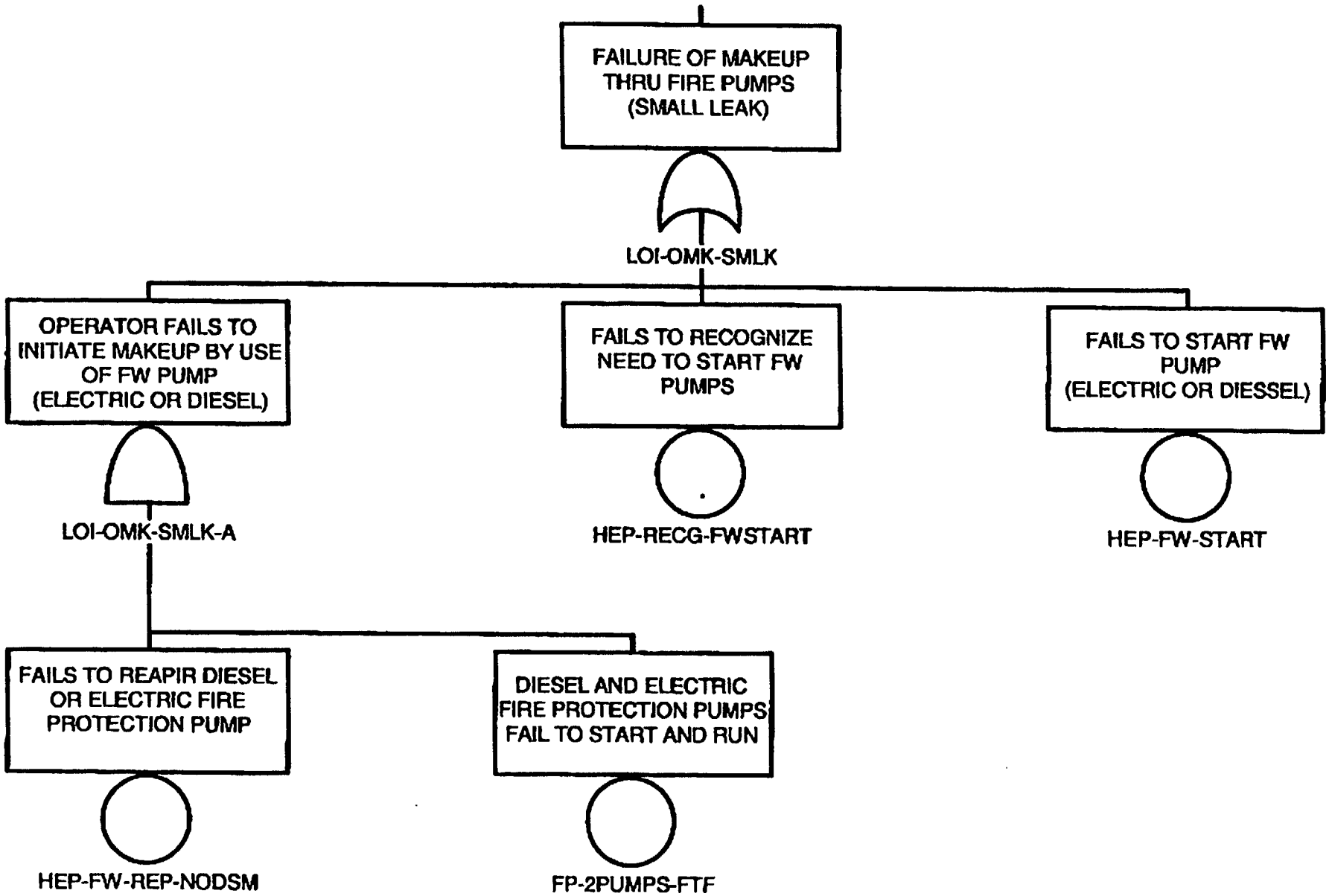

OPERATOR FAILS TO RESPOND TO CR ALARM
LOI-CRA
OPERATOR FAILS TO RESPOND ALARM
HEP-DIAG-ALARM
LOCAL ELECTRICAL FAULTS CAUSING LOSS OF INDICATION
SPC-LVL-LOP

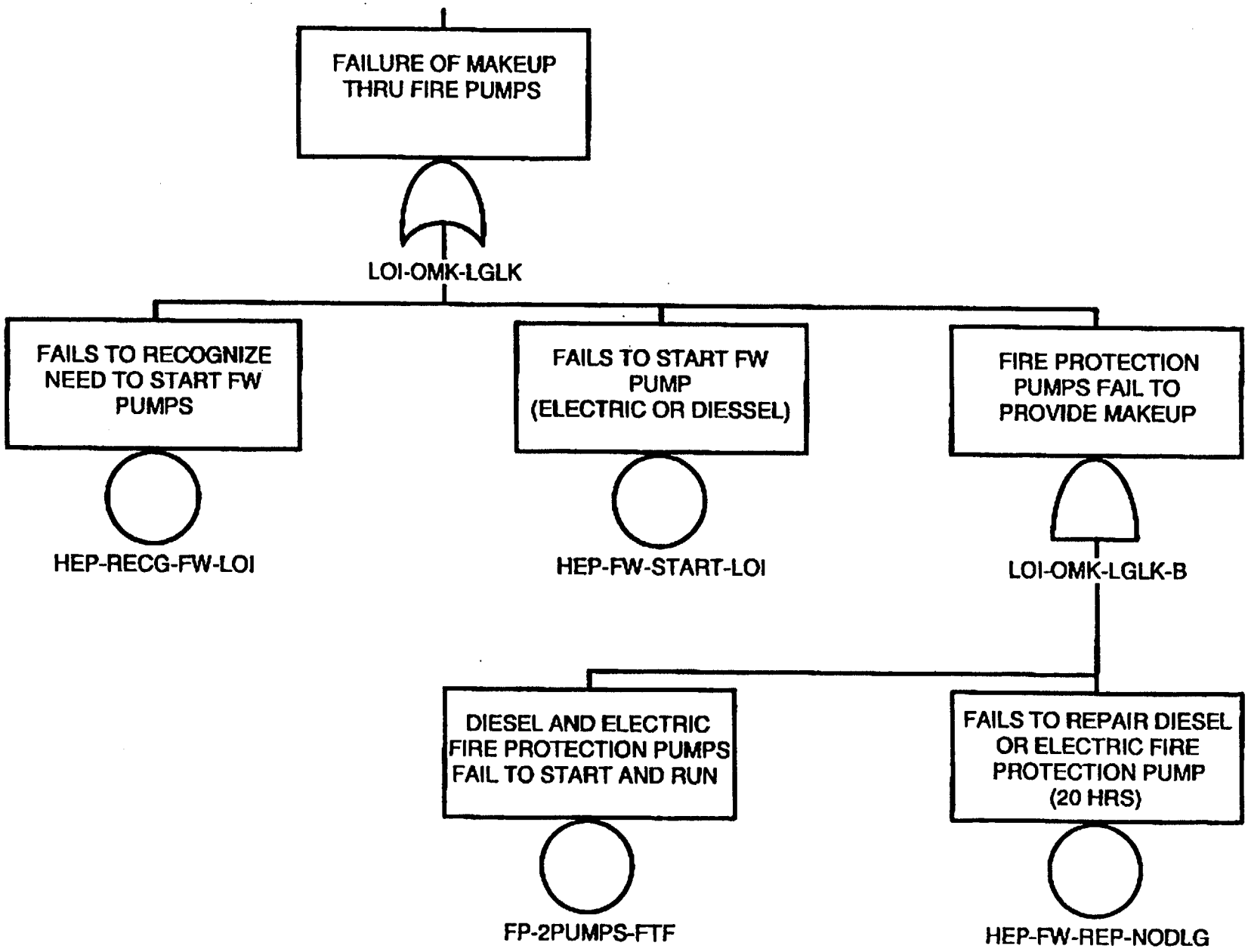

OPERATOR FAILS TO OBSERVE LOI/LSFPC EVENT DURING WALKDOWN
LOI-IND
ONLY DIAGNOSIS FAILURES
DIAGNOSIS AND HARDWARE FAILURES
LOI-IND-A
LOI-IND-B
OPERATOR FAILS TO OBSERVE LOI/LSFPC DURING WALKDOWN (DEPENDENT EVENT)
OPERATOR FAILS TO RESPOND GIVEN ALARM
LOCAL FAULTS CAUSING LOSS OF INDICATION
OPERATOR FAILS TO OBSERVE LOI/LSFPC DURING WALKDOWN (NO DEPENDENCY)
HEP-WLKDWN-DEPEN
HEP-DIAG-ALARM
SPC-LVL-LOP
HEP-WLKDWN-LOI

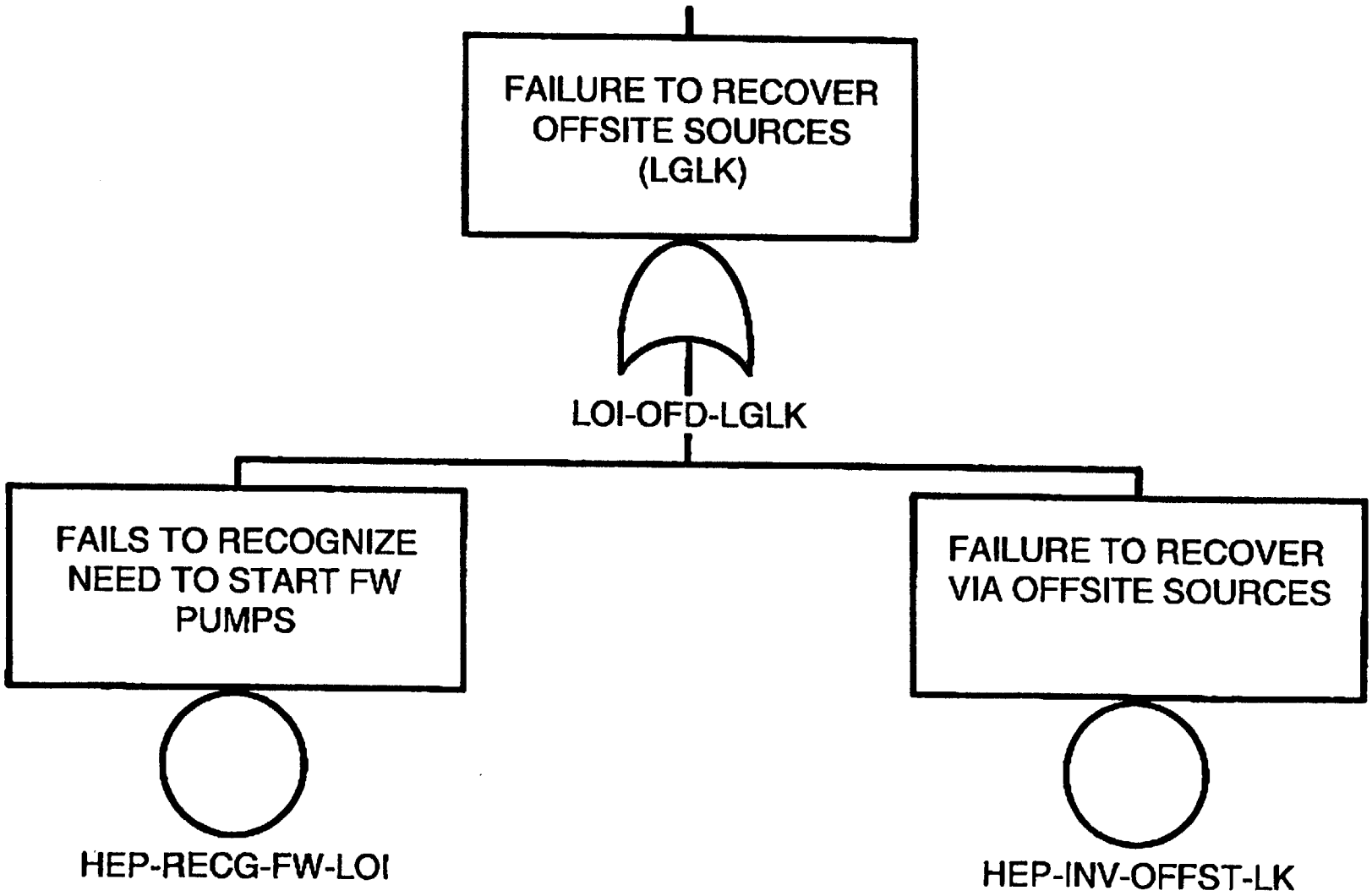

OPERATOR FAILS TO OBSERVE LOI/LSFPC EVENT DURING WALKDOWN
LOI-IND-L
OPERATOR FAILS TO OBSERVE LOI/LSFPC DURING WALKDOWN (NO DEPENDENCY)
HEP-WLKDWN-LOI-L

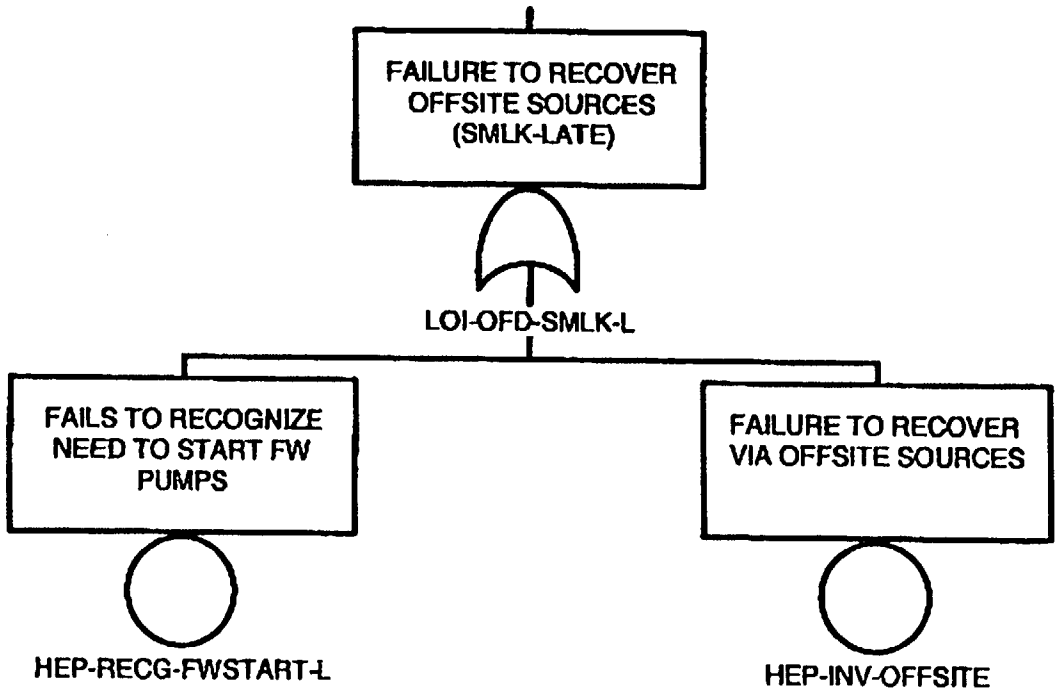

LOSS EXCEEDS NORMAL MAKEUP CAPACITY AND ISOLATION OF BREAK IS NECESSARY
LOI-NLL
PROBABILITY THAT A LOI EVENT DOES NOT EXCCED MAKEUP
LOI-LGLK

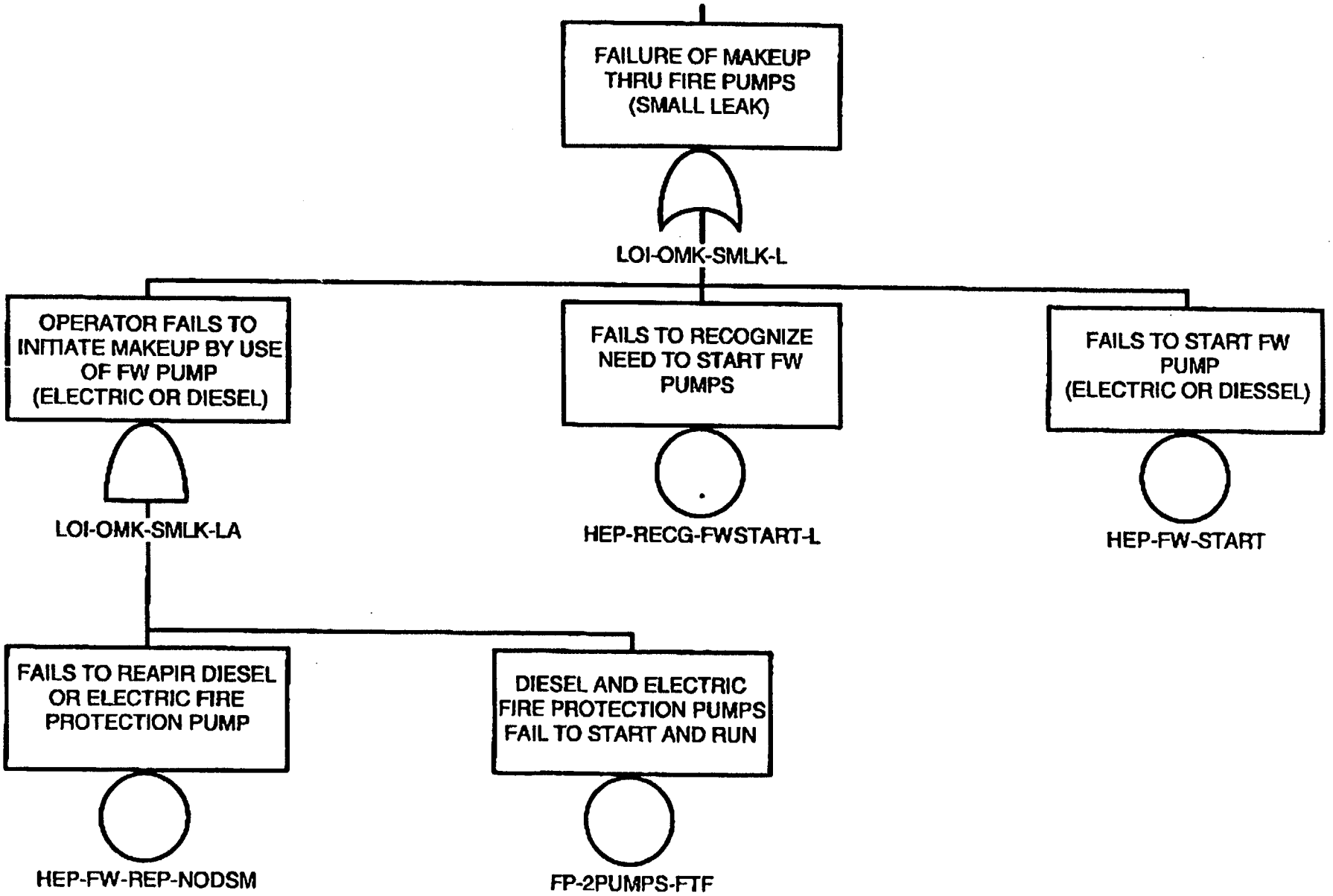

FAILURE TO INITIATE NORMAL MAKEUP (SMALL LEAK)
LOI-OIL-U
REGULAR SFP MAKEUP SYSTEM FAILS
OPERATOR FAILS TO START MAKUP (SMALL LEAK)
SFP-REGMKUP-F
HEP-MKUP-START

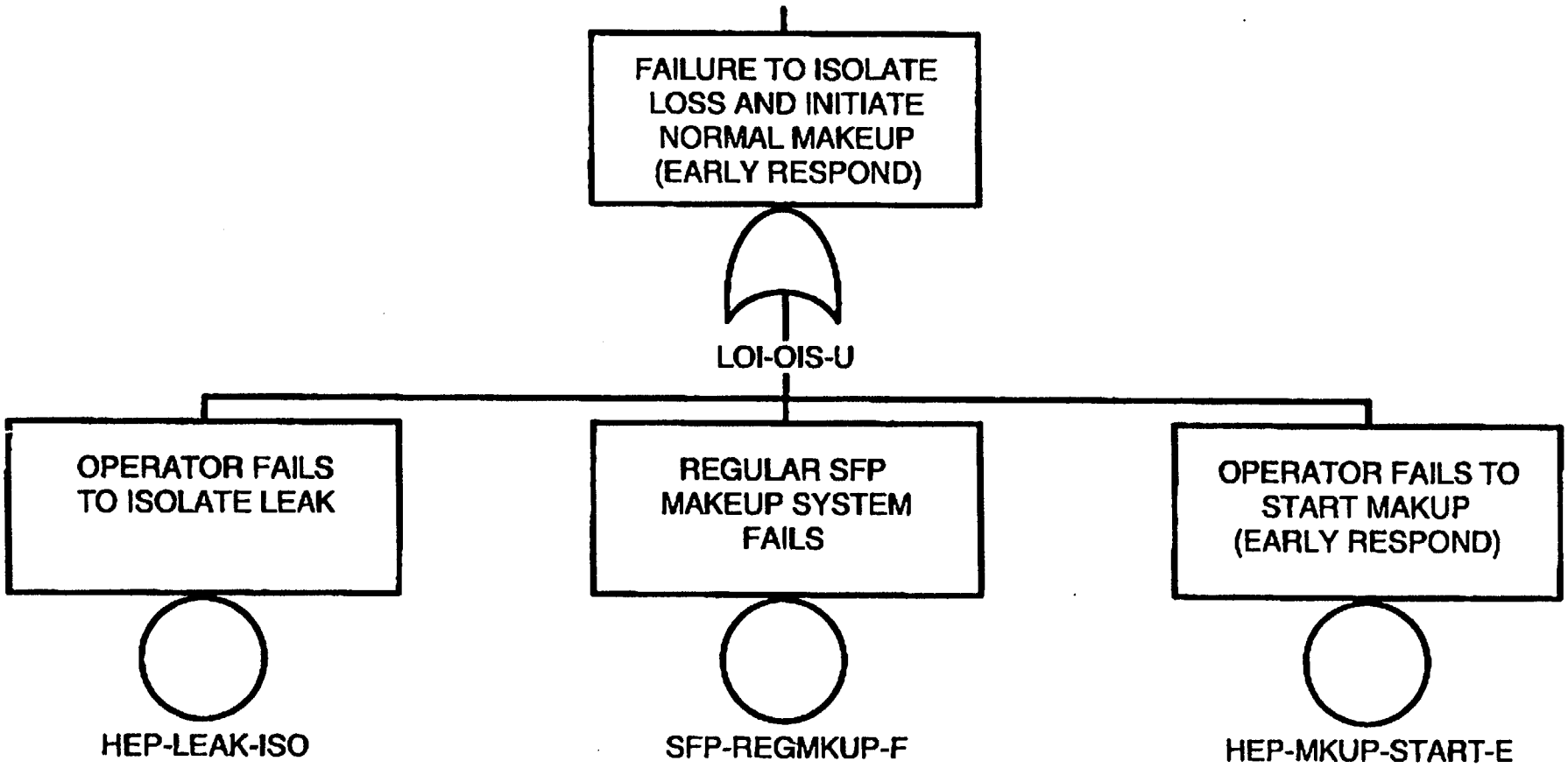

FAILURE OF MAKEUP THRU FIRE PUMPS (SMALL LEAK)
LOI-OMK-SMLK
OPERATOR FAILS TO INITIATE MAKEUP BY USE OF FW PUMP (ELECTRIC OR DIESEL)
FAILS TO RECOGNIZE NEED TO START FW PUMPS
FAILS TO START FW PUMP (ELECTRIC OR DIESSEL)
LOI-OMK-SMLK-A
HEP-RECG-FWSTART
HEP-FW-START
FAILS TO REAPIR DIESEL OR ELECTRIC FIRE PROTECTION PUMP
DIESEL AND ELECTRIC FIRE PROTECTION PUMPS FAIL TO START AND RUN
HEP-FW-REP-NODSM
FP-2PUMPS-FTF

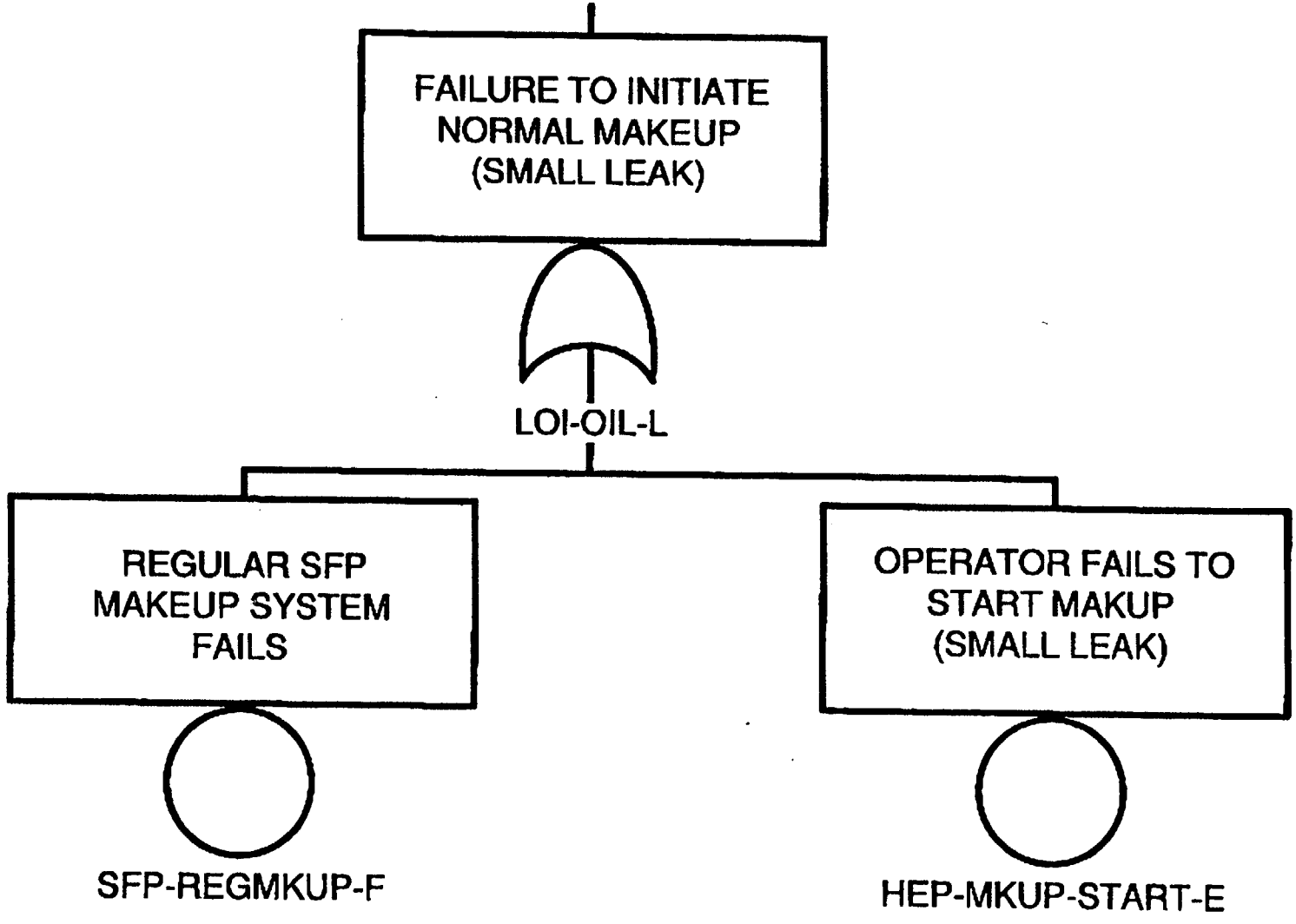

FAILURE OF MAKEUP THRU FIRE PUMPS
LOI-OMK-LGLK
FAILS TO RECOGNIZE NEED TO START FW PUMPS
HEP-RECG-FW-LOI
FAILS TO START FW PUMP (ELECTRIC OR DIESSEL)
HEP-FW-START-LOI
FIRE PROTECTION PUMPS FAIL TO PROVIDE MAKEUP
LOI-OMK-LGLK-B
DIESEL AND ELECTRIC FIRE PROTECTION PUMPS FAIL TO START AND RUN
FP-2PUMPS-FTF
FAILS TO REPAIR DIESEL OR ELECTRIC FIRE PROTECTION PUMP (20 HRS)
HEP-FW-REP-NODLG

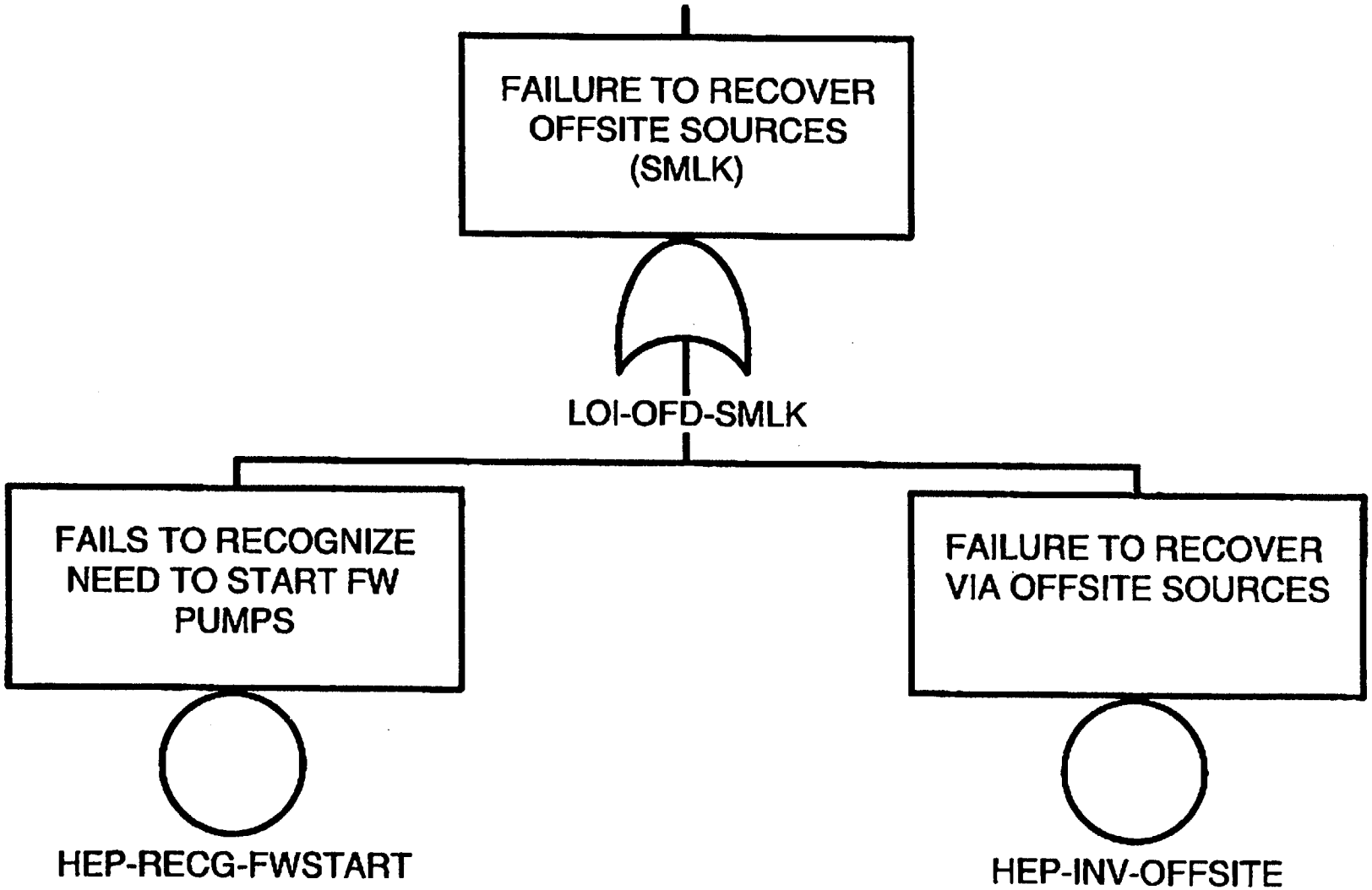

FAILURE TO RECOVER OFFSITE SOURCES (LGLK)
LOI-OFD-LGLK
FAILS TO RECOGNIZE NEED TO START FW PUMPS
FAILURE TO RECOVER VIA OFFSITE SOURCES
HEP-RECG-FW-LOI
HEP-INV-OFFST-LK


FAILURE TO RECOVER OFFSITE SOURCES (SMLK-LATE)
LOI-OFD-SMLK-L
FAILS TO RECOGNIZE NEED TO START FW PUMPS
FAILURE TO RECOVER VIA OFFSITE SOURCES
HEP-RECG-FWSTART-L
HEP-INV-OFFSITE


FAILURE OF MAKEUP THRU FIRE PUMPS (SMALL LEAK)
LOI-OMK-SMLK-L
OPERATOR FAILS TO INITIATE MAKEUP BY USE OF FW PUMP (ELECTRIC OR DIESEL)
LOI-OMK-SMLK-LA
FAILS TO RECOGNIZE NEED TO START FW PUMPS
HEP-RECG-FWSTART-L
FAILS TO START FW PUMP (ELECTRIC OR DIESSEL)
HEP-FW-START
FAILS TO REAPIR DIESEL OR ELECTRIC FIRE PROTECTION PUMP
HEP-FW-REP-NODSM
DIESEL AND ELECTRIC FIRE PROTECTION PUMPS FAIL TO START AND RUN
FP-2PUMPS-FTF


FAILURE TO ISOLATE LOSS AND INITIATE NORMAL MAKEUP (EARLY RESPOND)
LOI-OIS-U
OPERATOR FAILS TO ISOLATE LEAK
REGULAR SFP MAKEUP SYSTEM FAILS
OPERATOR FAILS TO START MAKUP (EARLY RESPOND)
HEP-LEAK-ISO
SFP-REGMKUP-F
HEP-MKUP-START-E


FAILURE TO INITIATE NORMAL MAKEUP (SMALL LEAK)
LOI-OIL-L
REGULAR SFP MAKEUP SYSTEM FAILS
OPERATOR FAILS TO START MAKUP (SMALL LEAK)
SFP-REGMKUP-F
HEP-MKUP-START-E


FAILURE TO RECOVER OFFSITE SOURCES (SMLK)
LOI-OFD-SMLK
FAILS TO RECOGNIZE NEED TO START FW PUMPS
FAILURE TO RECOVER VIA OFFSITE SOURCES
HEP-RECG-FWSTART
HEP-INV-OFFSITE

BASIC EVENTS PROBABILITY REPORT

Family: NRC-SFP

Case: CURRENT

Event Number	Primary Name	Calc Type	Mean Probability	Lamda	Tau
1	FP-2PUMPS-FTF	1	6.700E-004	+0.000E+000	+0.000E+000
2	HEP-DIAG-ALARM	1	3.000E-004	+0.000E+000	+0.000E+000
3	HEP-FW-REP-NODLG	1	9.000E-002	+0.000E+000	+0.000E+000
4	HEP-FW-REP-NODSM	1	7.500E-003	+0.000E+000	+0.000E+000
5	HEP-FW-START	1	1.000E-005	+0.000E+000	+0.000E+000
6	HEP-FW-START-LOI	1	1.300E-003	+0.000E+000	+0.000E+000
7	HEP-INV-OFFSITE	1	5.000E-002	+0.000E+000	+0.000E+000
8	HEP-INV-OFFST-LK	1	5.000E-002	+0.000E+000	+0.000E+000
9	HEP-LEAK-ISO	1	1.300E-003	+0.000E+000	+0.000E+000
10	HEP-MKUP-START	1	2.500E-006	+0.000E+000	+0.000E+000
11	HEP-MKUP-START-E	1	2.500E-004	+0.000E+000	+0.000E+000
12	HEP-RECG-FW-LOI	1	2.000E-004	+0.000E+000	+0.000E+000
13	HEP-RECG-FWSTART	1	2.000E-005	+0.000E+000	+0.000E+000
14	HEP-RECG-FWSTART-L	1	5.000E-002	+0.000E+000	+0.000E+000
15	HEP-WLKDWN-DEPEN	1	5.000E-002	+0.000E+000	+0.000E+000
16	HEP-WLKDWN-LOI	1	5.000E-003	+0.000E+000	+0.000E+000
17	HEP-WLKDWN-LOI-L	1	1.000E-005	+0.000E+000	+0.000E+000
18	IE-LOI	1	1.000E-003	+0.000E+000	+0.000E+000
19	LOI-LGLK	1	6.000E-002	+0.000E+000	+0.000E+000
20	SFP-REGMKUP-F	1	5.000E-002	+0.000E+000	+0.000E+000
21	SPC-LVL-LOP	1	2.000E-003	+0.000E+000	+0.000E+000

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : NRC-SFP Sequence : 04
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 9.754E-010

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	96.4	96.4	9.4E-010	HEP-RECG-FWSTART, /LOI-NLL, SFP-REGMKUP-F
2	98.8	2.4	2.4E-011	HEP-FW-START, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F
3	100.0	1.2	1.2E-011	FP-2PUMPS-FTF, HEP-FW-REP-NODSM, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F
4	100.0	0.0	4.7E-014	HEP-MKUP-START, HEP-RECG-FWSTART, /LOI-NLL
5	100.0	0.0	1.2E-015	HEP-FW-START, HEP-INV-OFFSITE, HEP-MKUP-START, /LOI-NLL

Family : NRC-SFP Sequence : 08
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 2.254E-012

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	83.4	83.4	1.9E-012	HEP-RECG-FWSTART, /LOI-NLL, SFP-REGMKUP-F, SPC-LVL-LOP
2	95.9	12.5	2.8E-013	HEP-DIAG-ALARM, HEP-RECG-FWSTART, /LOI-NLL, SFP-REGMKUP-F
3	98.0	2.1	4.7E-014	HEP-FW-START, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F, SPC-LVL-LOP
4	99.1	1.1	2.4E-014	FP-2PUMPS-FTF, HEP-FW-REP-NODSM, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F, SPC-LVL-LOP
5	99.5	0.4	9.4E-015	HEP-MKUP-START-E, HEP-RECG-FWSTART, /LOI-NLL, SPC-LVL-LOP
6	99.8	0.3	7.1E-015	HEP-DIAG-ALARM, HEP-FW-START, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F
7	99.9	0.2	3.5E-015	FP-2PUMPS-FTF, HEP-DIAG-ALARM, HEP-FW-REP-NODSM, HEP-INV-OFFSITE, /LOI-NLL, SFP-REGMKUP-F
8	100.0	0.1	1.4E-015	HEP-DIAG-ALARM, HEP-MKUP-START-E, HEP-RECG-FWSTART, /LOI-NLL

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : NRC-SFP Sequence : 11
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 1.175E-009

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	60.0	60.0	7.1E-010	HEP-DIAG-ALARM, HEP-RECG-FWSTART-L, HEP-WLKDWN-DEPEN, /LOI-NLL
2	100.0	40.0	4.7E-010	HEP-RECG-FWSTART-L, HEP-WLKDWN-LOI, /LOI-NLL, SPC-LVL-LOP
3	100.0	0.0	7.1E-015	HEP-DIAG-ALARM, HEP-FW-START, HEP-INV-OFFSITE, HEP-WLKDWN-DEPEN, /LOI-NLL
4	100.0	0.0	4.7E-015	HEP-FW-START, HEP-INV-OFFSITE, HEP-WLKDWN-LOI, /LOI-NLL, SPC-LVL-LOP
5	100.0	0.0	3.5E-015	FP-2PUMPS-FTF, HEP-DIAG-ALARM, HEP-FW-REP-NODSM, HEP-INV-OFFSITE, HEP-WLKDWN-DEPEN, /LOI-NLL
6	100.0	0.0	2.4E-015	FP-2PUMPS-FTF, HEP-FW-REP-NODSM, HEP-INV-OFFSITE, HEP-WLKDWN-LOI, /LOI-NLL, SPC-LVL-LOP

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : NRC-SFP Sequence : 15
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 8.290E-010

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	72.4	72.4	6.0E-010	HEP-RECG-FW-LOI, LOI-LGLK, SFP-REGMKUP-F
2	95.9	23.5	2.0E-010	HEP-FW-START-LOI, HEP-INV-OFFST-LK, LOI-LGLK, SFP-REGMKUP-F
3	97.8	1.9	1.6E-011	HEP-LEAK-ISO, HEP-RECG-FW-LOI, LOI-LGLK
4	98.9	1.1	9.1E-012	FP-2PUMPS-FTF, HEP-FW-REP-NODLG, HEP-INV-OFFST-LK, LOI-LGLK, SFP-REGMKUP-F
5	99.5	0.6	5.1E-012	HEP-FW-START-LOI, HEP-INV-OFFST-LK, HEP-LEAK-ISO, LOI-LGLK
6	99.8	0.4	3.0E-012	HEP-MKUP-START-E, HEP-RECG-FW-LOI, LOI-LGLK
7	100.0	0.1	9.8E-013	HEP-FW-START-LOI, HEP-INV-OFFST-LK, HEP-MKUP-START-E, LOI-LGLK
8	100.0	0.0	2.4E-013	FP-2PUMPS-FTF, HEP-FW-REP-NODLG, HEP-INV-OFFST-LK, HEP-LEAK-ISO, LOI-LGLK
9	100.0	0.0	4.5E-014	FP-2PUMPS-FTF, HEP-FW-REP-NODLG, HEP-INV-OFFST-LK, HEP-MKUP-START-E, LOI-LGLK

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : NRC-SFP Sequence : 18
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 3.699E-011

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	64.9	64.9	2.4E-011	HEP-RECG-FW-LOI, LOI-LGLK, SPC-LVL-LOP
2	86.0	21.1	7.8E-012	HEP-FW-START-LOI, HEP-INV-OFFST-LK, LOI-LGLK, SPC-LVL-LOP
3	95.7	9.7	3.6E-012	HEP-DIAG-ALARM, HEP-RECG-FW-LOI, LOI-LGLK
4	98.9	3.2	1.2E-012	HEP-DIAG-ALARM, HEP-FW-START-LOI, HEP-INV-OFFST-LK, LOI-LGLK
5	99.8	1.0	3.6E-013	FP-2PUMPS-FTF, HEP-FW-REP-NODLG, HEP-INV-OFFST-LK, LOI-LGLK, SPC-LVL-LOP
6	100.0	0.2	5.4E-014	FP-2PUMPS-FTF, HEP-DIAG-ALARM, HEP-FW-REP-NODLG, HEP-INV-OFFST-LK, LOI-LGLK

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : NRC-SFP Sequence : 19
Analysis : RANDOM Event Tree : IE-LOI
Case : CURRENT Init. Event : IE-LOI
Mincut Upper Bound : 1.380E-012

Cut No.	% Total	% Cut Set	Prob/ Freq.	CURRENT CUT SETS
1	87.0	87.0	1.2E-012	HEP-WLKDWN-LOI-L, LOI-LGLK, SPC-LVL-LOP
2	100.0	13.0	1.8E-013	HEP-DIAG-ALARM, HEP-WLKDWN-LOI-L, LOI-LGLK