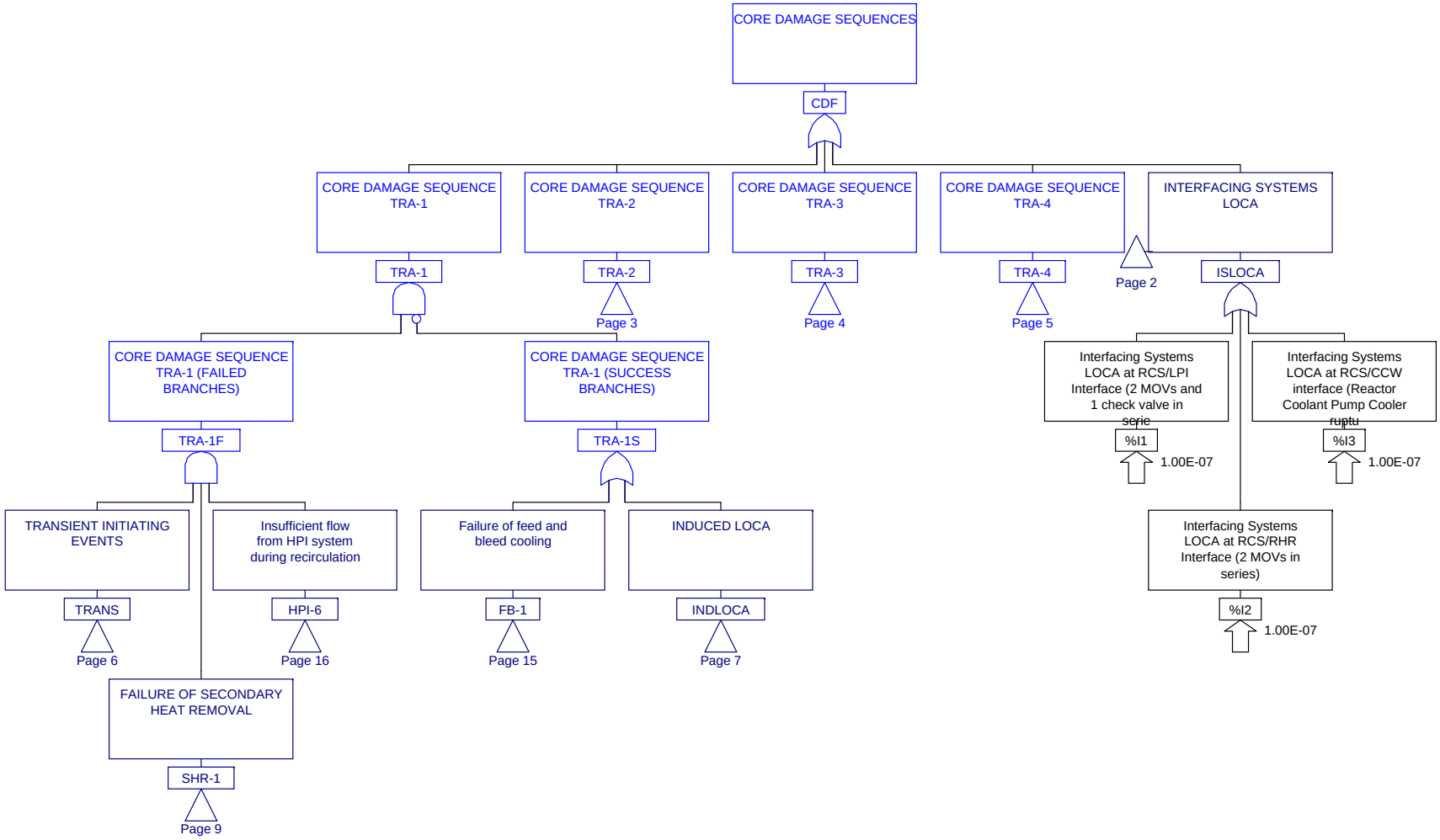
CORE DAMAGE SEQUENCES
CDF
CORE DAMAGE SEQUENCE TRA-1
CORE DAMAGE SEQUENCE TRA-2
CORE DAMAGE SEQUENCE TRA-3
CORE DAMAGE SEQUENCE TRA-4
INTERFACING SYSTEMS LOCA
TRA-1
TRA-2
TRA-3
TRA-4
Page 2
ISLOCA
Page 3
Page 4
Page 5
CORE DAMAGE SEQUENCE TRA-1 (FAILED BRANCHES)
CORE DAMAGE SEQUENCE TRA-1 (SUCCESS BRANCHES)
Interfacing Systems LOCA at RCS/LPI Interface (2 MOVs and 1 check valve in serie
Interfacing Systems LOCA at RCS/CCW interface (Reactor Coolant Pump Cooler ruptu
%I1
1.00E-07
%I3
1.00E-07
TRA-1F
TRA-1S
TRANSIENT INITIATING EVENTS
Insufficient flow from HPI system during recirculation
Failure of feed and bleed cooling
INDUCED LOCA
Interfacing Systems LOCA at RCS/RHR Interface (2 MOVs in series)
TRANS
HPI-6
FB-1
INDLOCA
%I2
1.00E-07
Page 6
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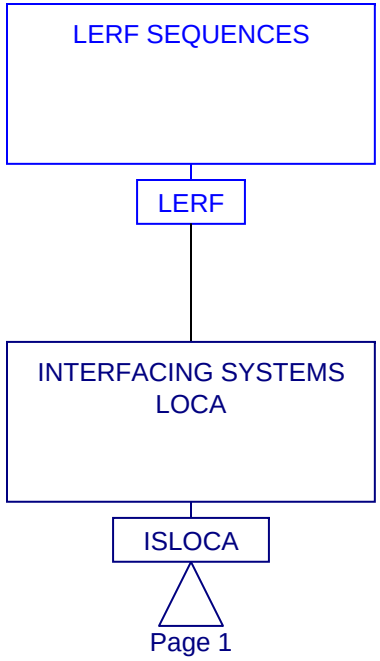
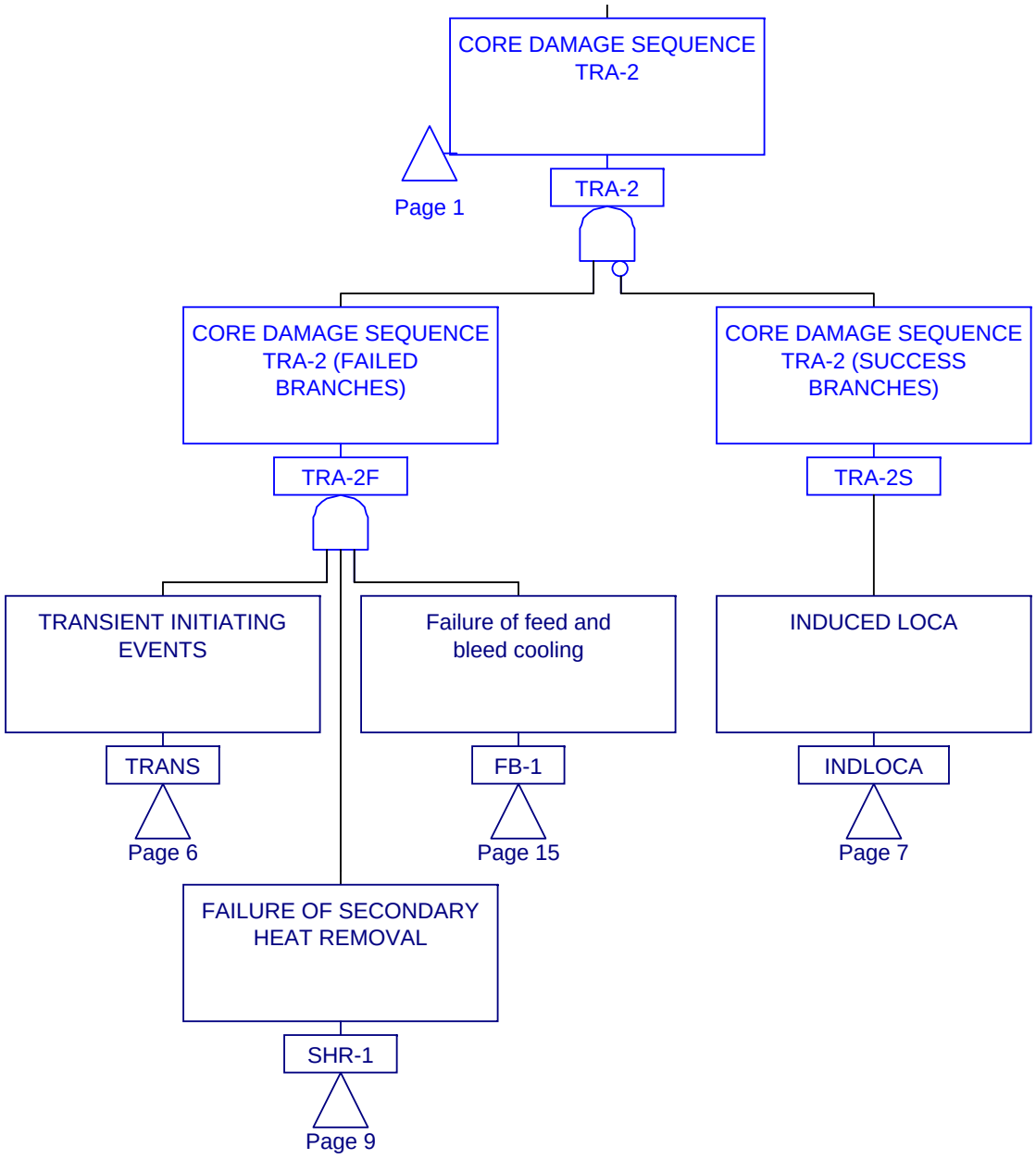
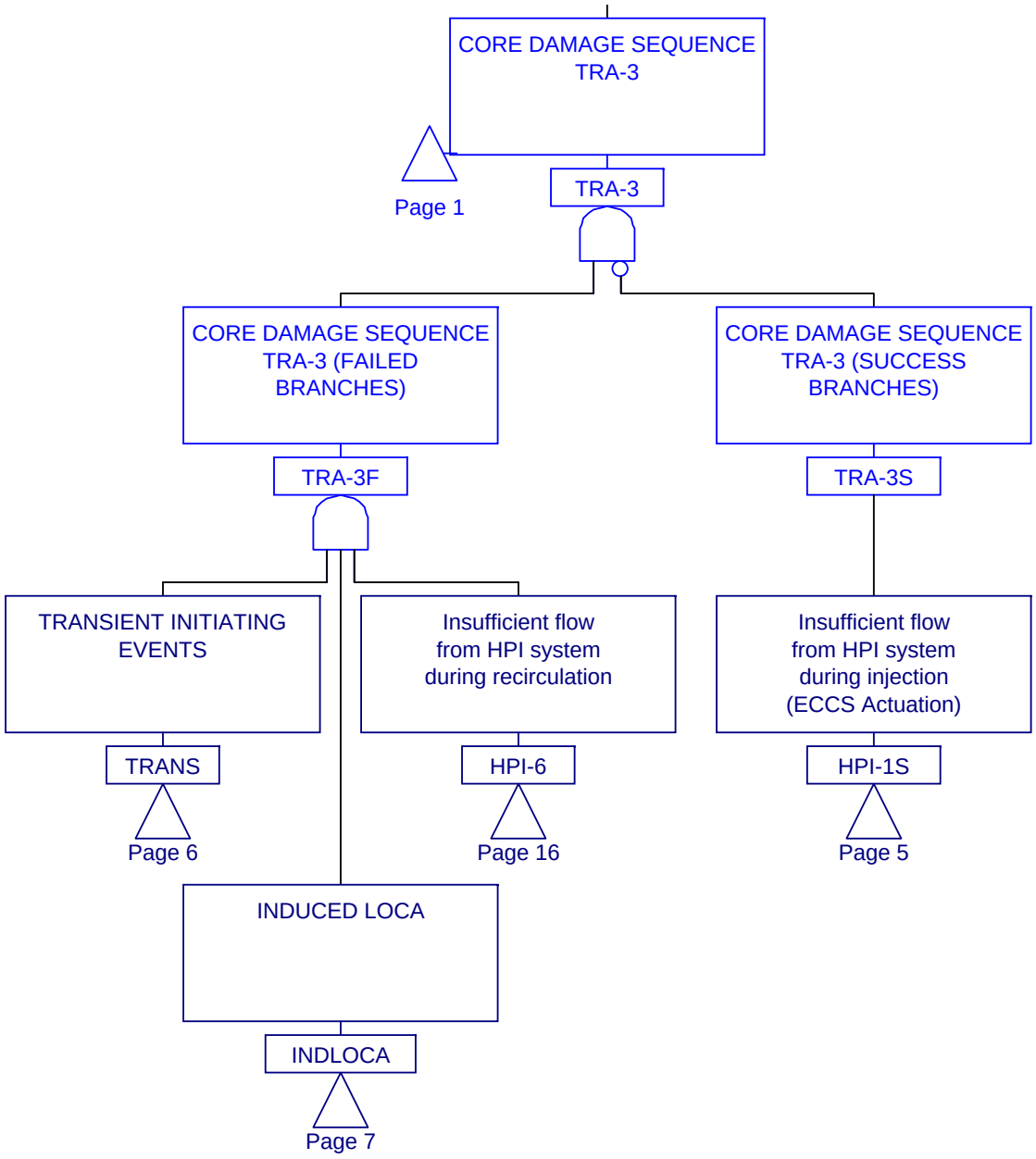
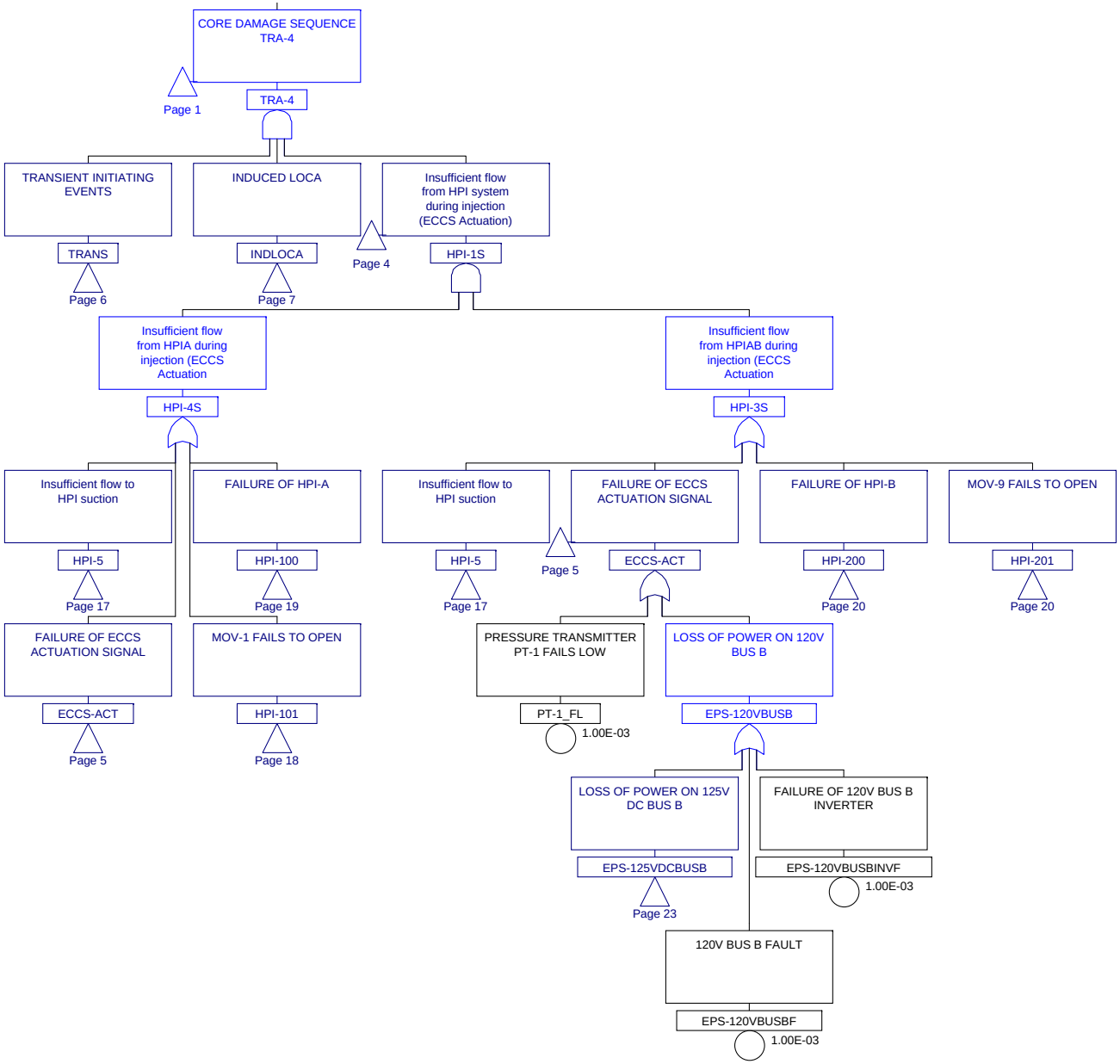
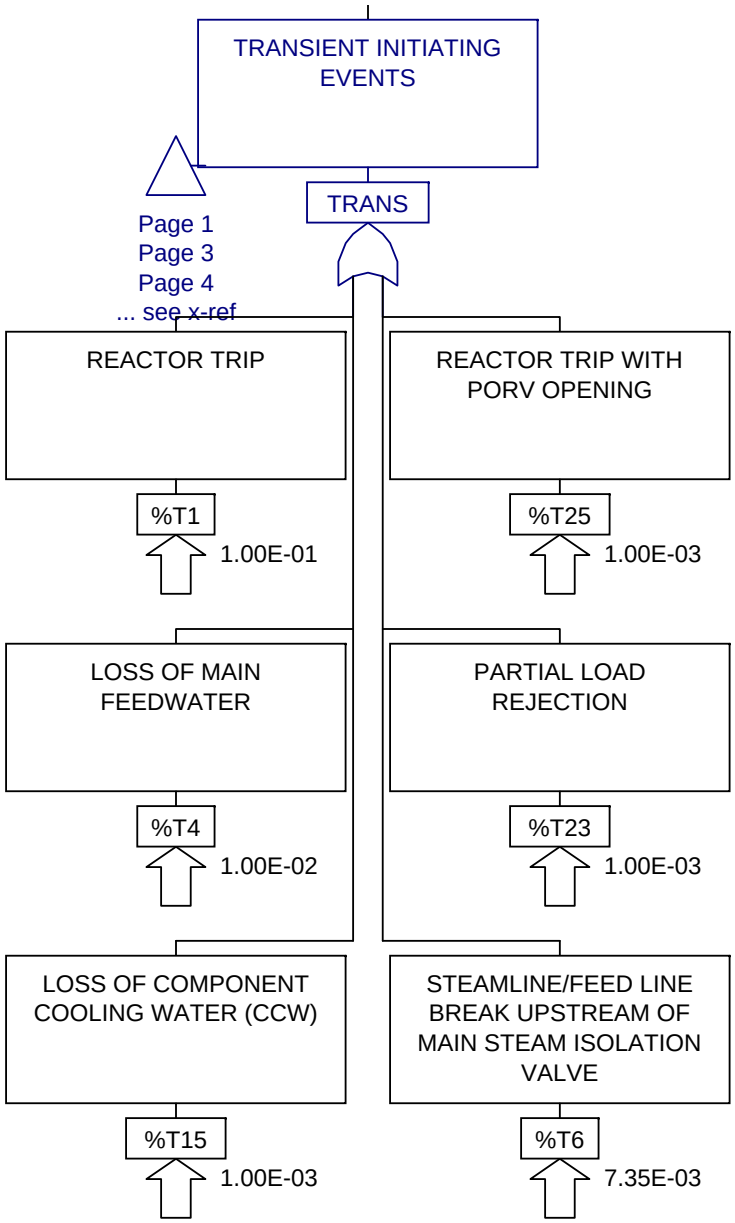
Page 15
Page 7
FAILURE OF SECONDARY HEAT REMOVAL
SHR-1
Page 9

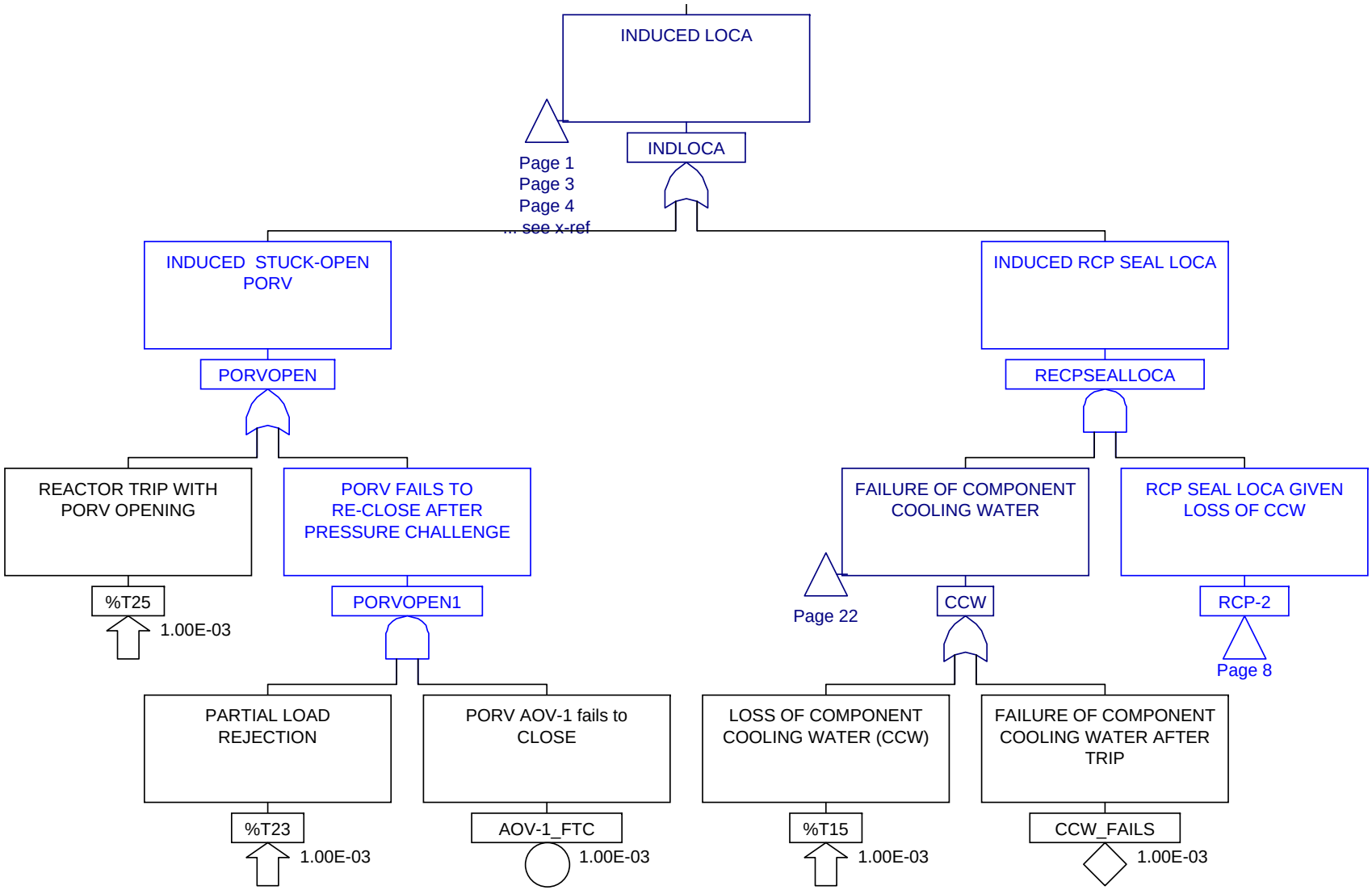

LERF SEQUENCES
LERF
INTERFACING SYSTEMS
LOCA
ISLOCA
Page 1

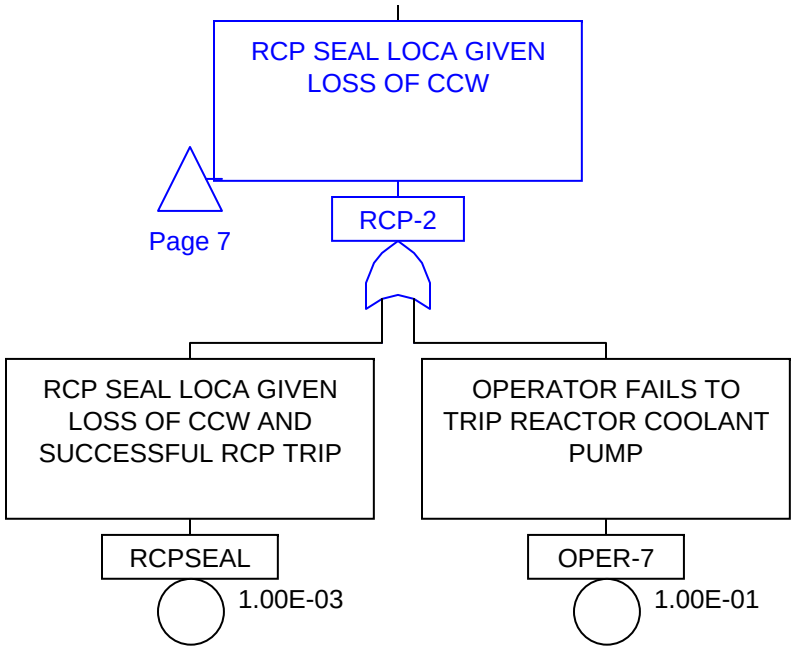

CORE DAMAGE SEQUENCE TRA-2
Page 1
TRA-2
CORE DAMAGE SEQUENCE TRA-2 (FAILED BRANCHES)
CORE DAMAGE SEQUENCE TRA-2 (SUCCESS BRANCHES)
TRA-2F
TRA-2S
TRANSIENT INITIATING EVENTS
Failure of feed and bleed cooling
INDUCED LOCA
TRANS
FB-1
INDLOCA
Page 6
Page 15
Page 7
FAILURE OF SECONDARY HEAT REMOVAL
SHR-1
Page 9

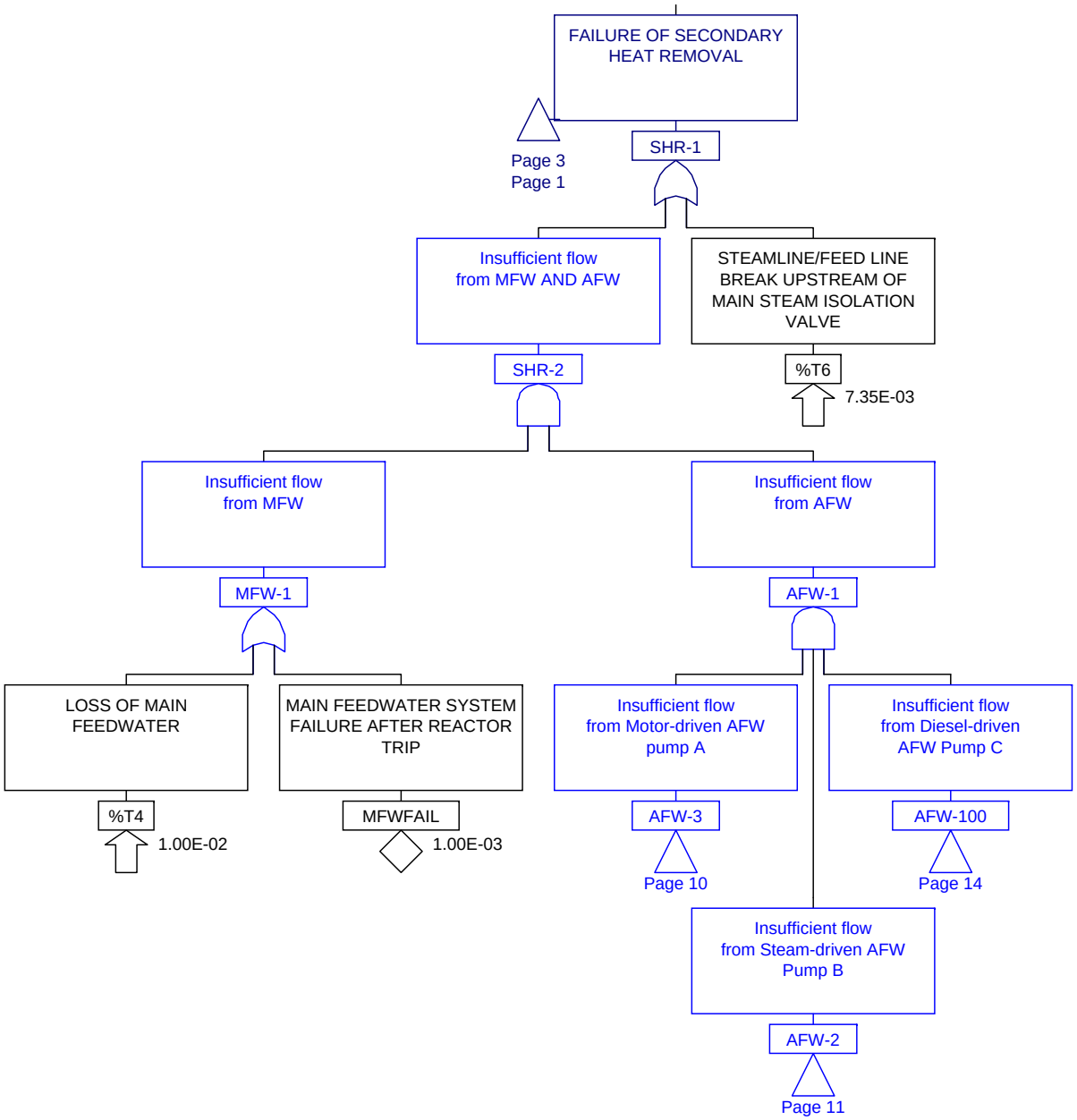

CORE DAMAGE SEQUENCE TRA-3
Page 1
TRA-3
CORE DAMAGE SEQUENCE TRA-3 (FAILED BRANCHES)
CORE DAMAGE SEQUENCE TRA-3 (SUCCESS BRANCHES)
TRA-3F
TRA-3S
TRANSIENT INITIATING EVENTS
Insufficient flow from HPI system during recirculation
Insufficient flow from HPI system during injection (ECCS Actuation)
TRANS
HPI-6
HPI-1S
Page 6
Page 16
Page 5
INDUCED LOCA
INDLOCA
Page 7

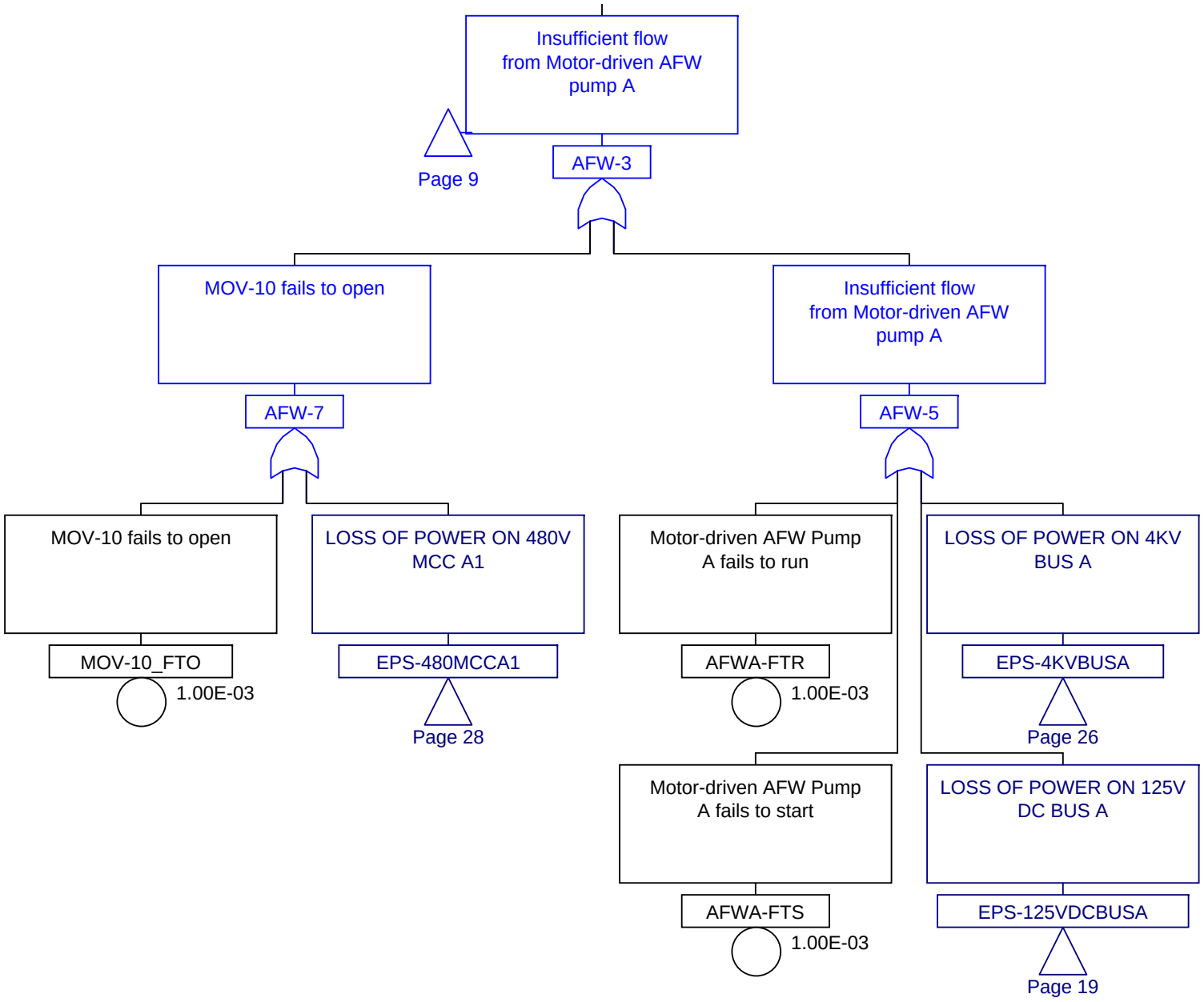

CORE DAMAGE SEQUENCE TRA-4
Page 1
TRA-4
TRANSIENT INITIATING EVENTS
INDUCED LOCA
Insufficient flow from HPI system during injection (ECCS Actuation)
TRANS
INDLOCA
Page 4
HPI-1S
Page 6
Page 7
Insufficient flow from HPIA during injection (ECCS Actuation
Insufficient flow from HPIAB during injection (ECCS Actuation
HPI-4S
HPI-3S
Insufficient flow to HPI suction
FAILURE OF HPI-A
Insufficient flow to HPI suction
FAILURE OF ECCS ACTUATION SIGNAL
FAILURE OF HPI-B
MOV-9 FAILS TO OPEN
HPI-5
HPI-100
HPI-5
Page 5
ECCS-ACT
HPI-200
HPI-201
Page 17
Page 19
Page 17
Page 20
Page 20
FAILURE OF ECCS ACTUATION SIGNAL
MOV-1 FAILS TO OPEN
PRESSURE TRANSMITTER PT-1 FAILS LOW
LOSS OF POWER ON 120V BUS B
ECCS-ACT
HPI-101
PT-1_FL
1.00E-03
EPS-120VBUSB
Page 5
Page 18
LOSS OF POWER ON 125V DC BUS B
FAILURE OF 120V BUS B INVERTER
EPS-125VDCBUSB
EPS-120VBUSBINVF
1.00E-03
Page 23
120V BUS B FAULT
EPS-120VBUSBF
1.00E-03

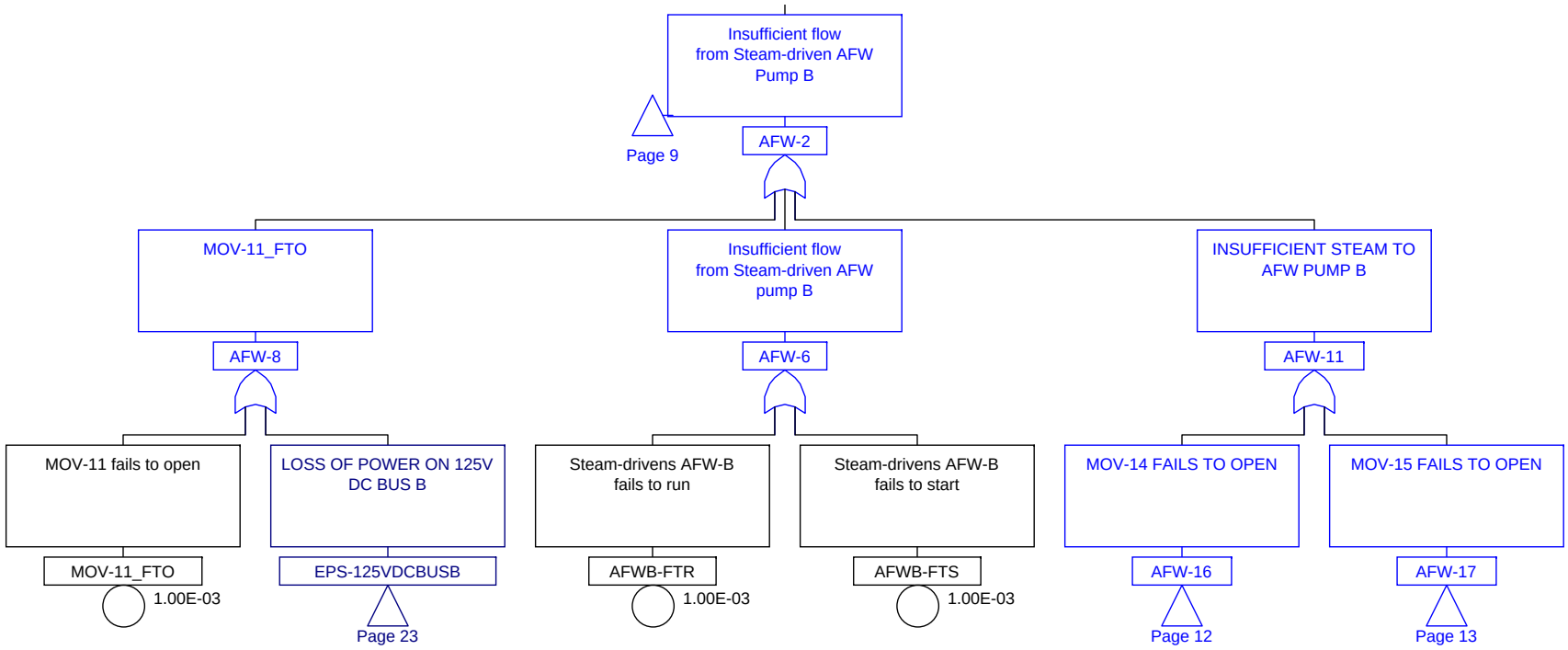

TRANSIENT INITIATING EVENTS
TRANS
Page 1
Page 3
Page 4
... see x-ref
REACTOR TRIP
%T1
1.00E-01
REACTOR TRIP WITH PORV OPENING
%T25
1.00E-03
LOSS OF MAIN FEEDWATER
%T4
1.00E-02
PARTIAL LOAD REJECTION
%T23
1.00E-03
LOSS OF COMPONENT COOLING WATER (CCW)
%T15
1.00E-03
STEAMLINE/FEED LINE BREAK UPSTREAM OF MAIN STEAM ISOLATION VALVE
%T6
7.35E-03

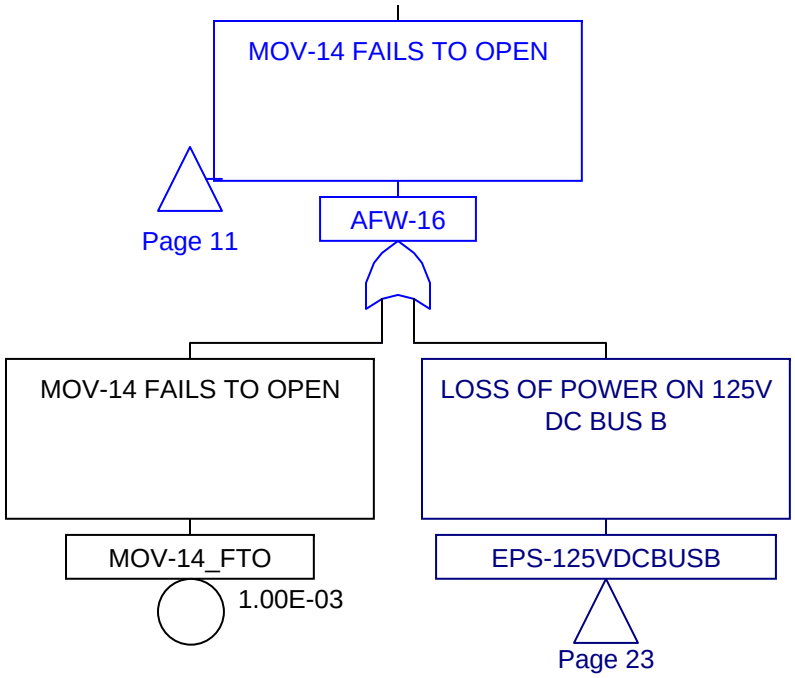

INDUCED LOCA
INDLOCA
Page 1
Page 3
Page 4
... see x-ref
INDUCED STUCK-OPEN PORV
PORVOPEN
INDUCED RCP SEAL LOCA
RECPSEALLOCA
REACTOR TRIP WITH PORV OPENING
%T25
1.00E-03
PORV FAILS TO RE-CLOSE AFTER PRESSURE CHALLENGE
PORVOPEN1
FAILURE OF COMPONENT COOLING WATER
Page 22
CCW
RCP SEAL LOCA GIVEN LOSS OF CCW
RCP-2
Page 8
PARTIAL LOAD REJECTION
%T23
1.00E-03
PORV AOV-1 fails to CLOSE
AOV-1_FTC
1.00E-03
LOSS OF COMPONENT COOLING WATER (CCW)
%T15
1.00E-03
FAILURE OF COMPONENT COOLING WATER AFTER TRIP
CCW_FAILS
1.00E-03

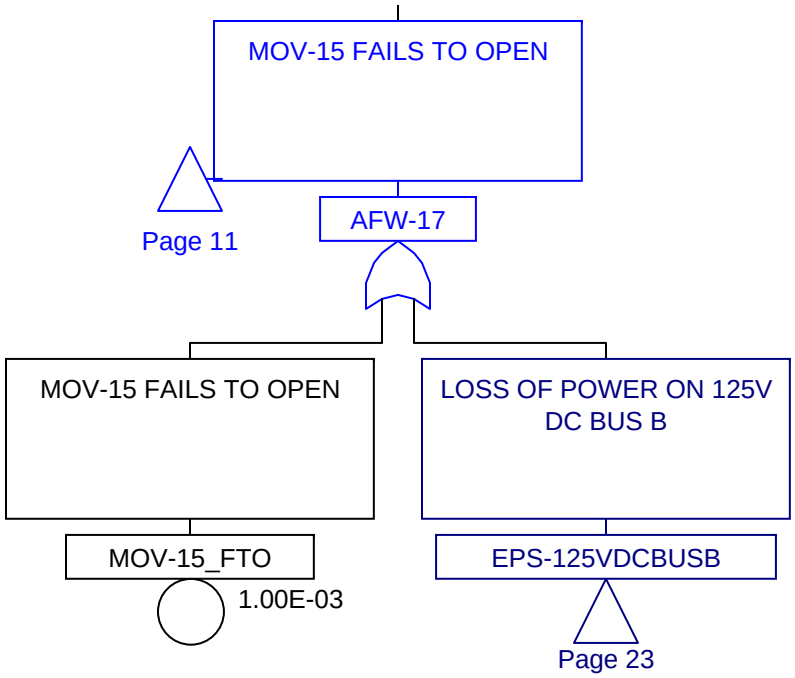

RCP SEAL LOCA GIVEN LOSS OF CCW
Page 7
RCP-2
RCP SEAL LOCA GIVEN LOSS OF CCW AND SUCCESSFUL RCP TRIP
OPERATOR FAILS TO TRIP REACTOR COOLANT PUMP
RCPSEAL
1.00E-03
OPER-7
1.00E-01

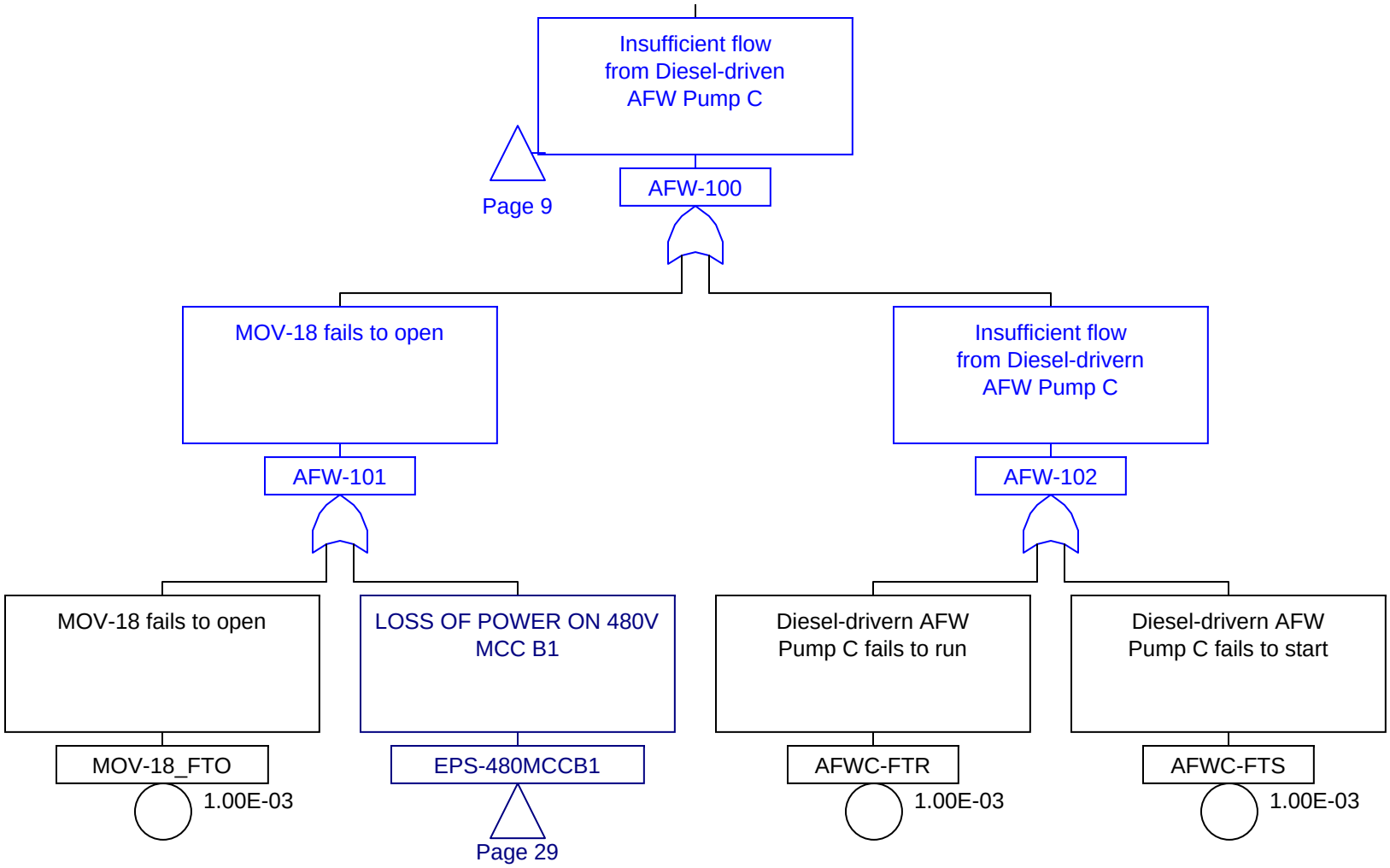

FAILURE OF SECONDARY HEAT REMOVAL
Page 3
Page 1
SHR-1
Insufficient flow from MFW AND AFW
STEAMLINE/FEED LINE BREAK UPSTREAM OF MAIN STEAM ISOLATION VALVE
SHR-2
%T6
7.35E-03
Insufficient flow from MFW
Insufficient flow from AFW
MFW-1
AFW-1
LOSS OF MAIN FEEDWATER
MAIN FEEDWATER SYSTEM FAILURE AFTER REACTOR TRIP
Insufficient flow from Motor-driven AFW pump A
Insufficient flow from Diesel-driven AFW Pump C
%T4
1.00E-02
MFWFAIL
1.00E-03
AFW-3
Page 10
AFW-100
Page 14
Insufficient flow from Steam-driven AFW Pump B
AFW-2
Page 11

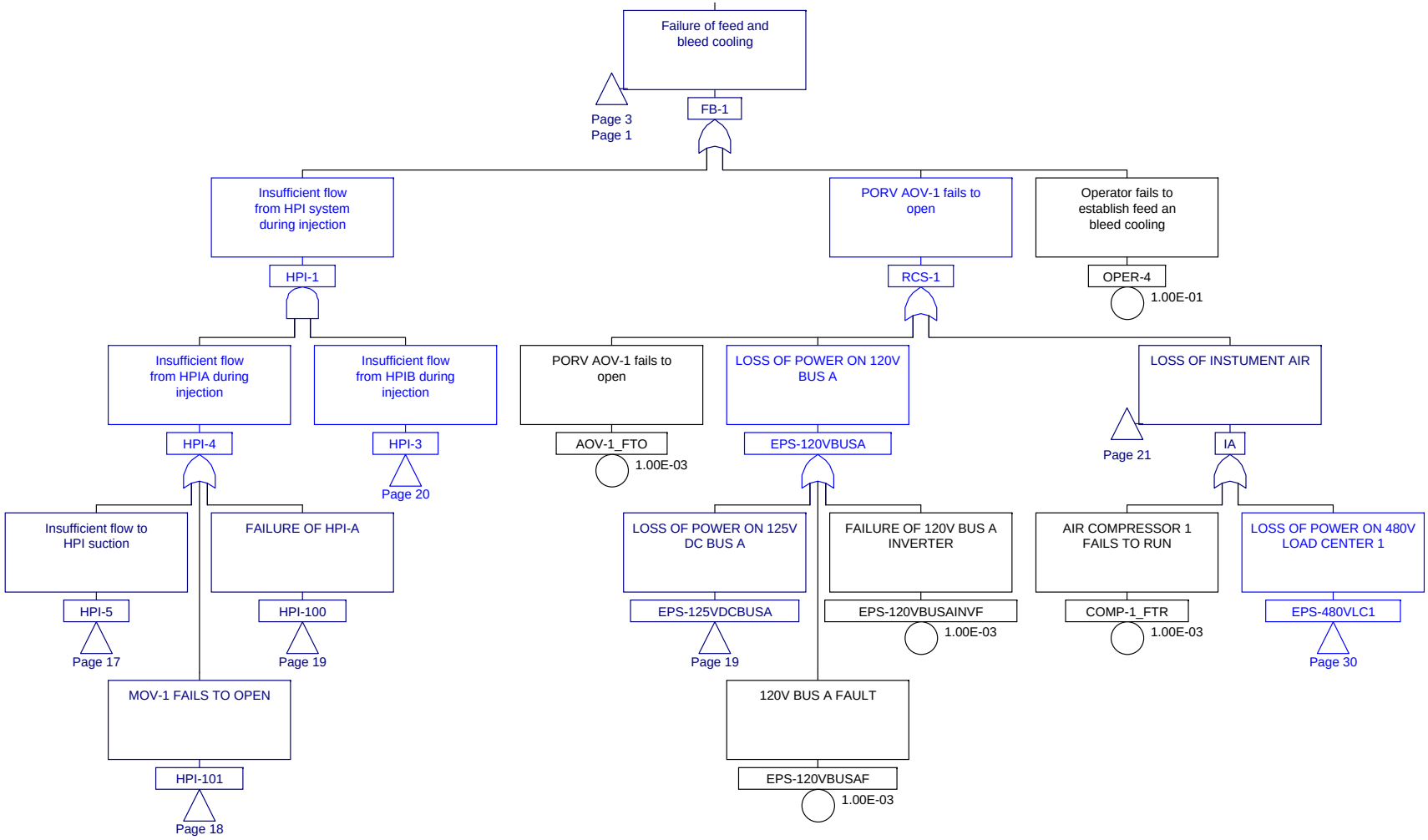

Insufficient flow from Motor-driven AFW pump A
Page 9
AFW-3
MOV-10 fails to open
AFW-7
Insufficient flow from Motor-driven AFW pump A
AFW-5
MOV-10 fails to open
MOV-10_FTO
1.00E-03
LOSS OF POWER ON 480V MCC A1
EPS-480MCCA1
Page 28
Motor-driven AFW Pump A fails to run
AFWA-FTR
1.00E-03
LOSS OF POWER ON 4KV BUS A
EPS-4KVBUSA
Page 26
Motor-driven AFW Pump A fails to start
AFWA-FTS
1.00E-03
LOSS OF POWER ON 125V DC BUS A
EPS-125VDCBUSA
Page 19

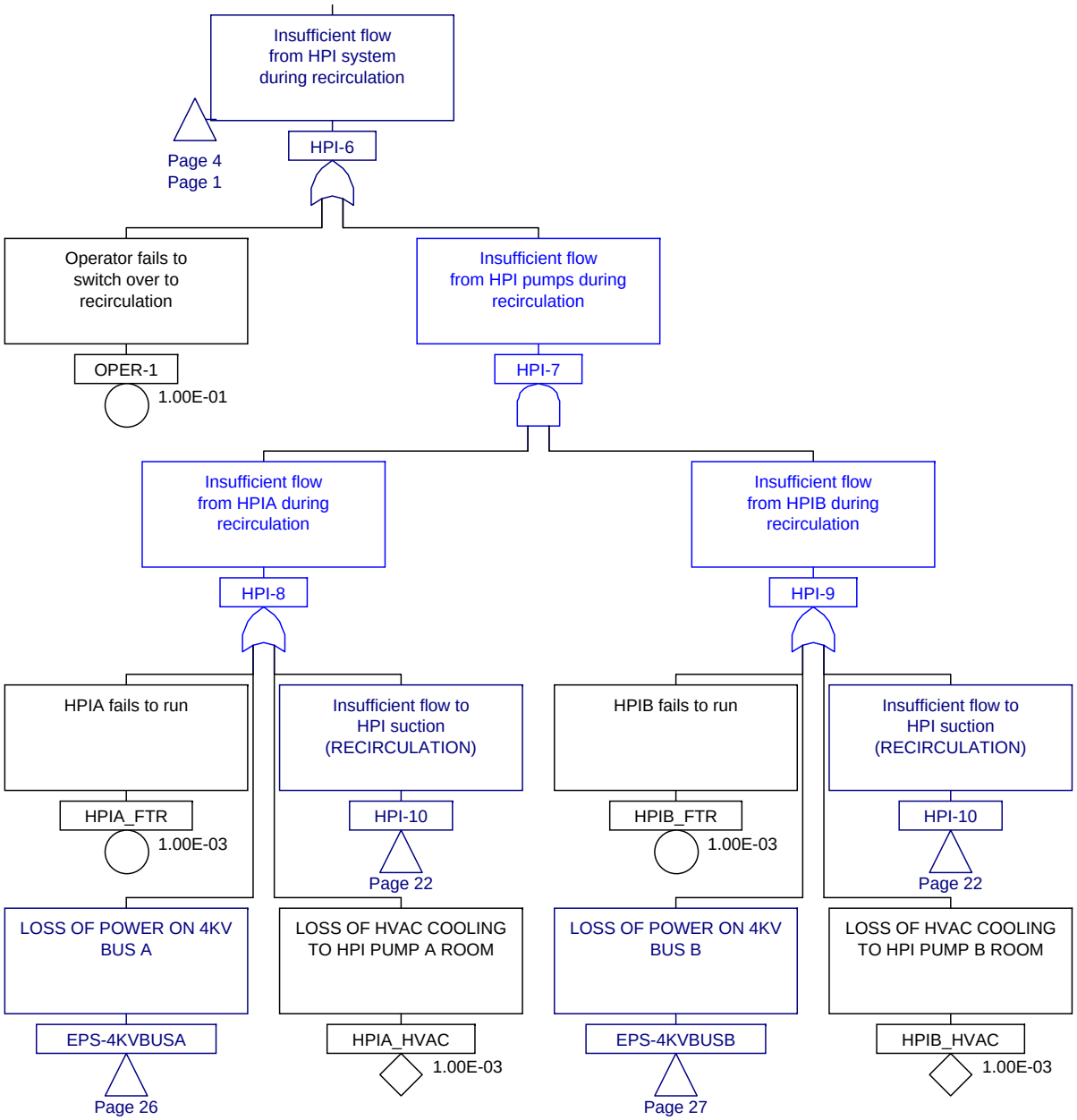

Insufficient flow from Steam-driven AFW Pump B
Page 9
AFW-2
MOV-11_FTO
Insufficient flow from Steam-driven AFW pump B
INSUFFICIENT STEAM TO AFW PUMP B
AFW-8
AFW-6
AFW-11
MOV-11 fails to open
LOSS OF POWER ON 125V DC BUS B
Steam-drivens AFW-B fails to run
Steam-drivens AFW-B fails to start
MOV-14 FAILS TO OPEN
MOV-15 FAILS TO OPEN
MOV-11_FTO
1.00E-03
EPS-125VDCBUSB
Page 23
AFWB-FTR
1.00E-03
AFWB-FTS
1.00E-03
AFW-16
Page 12
AFW-17
Page 13

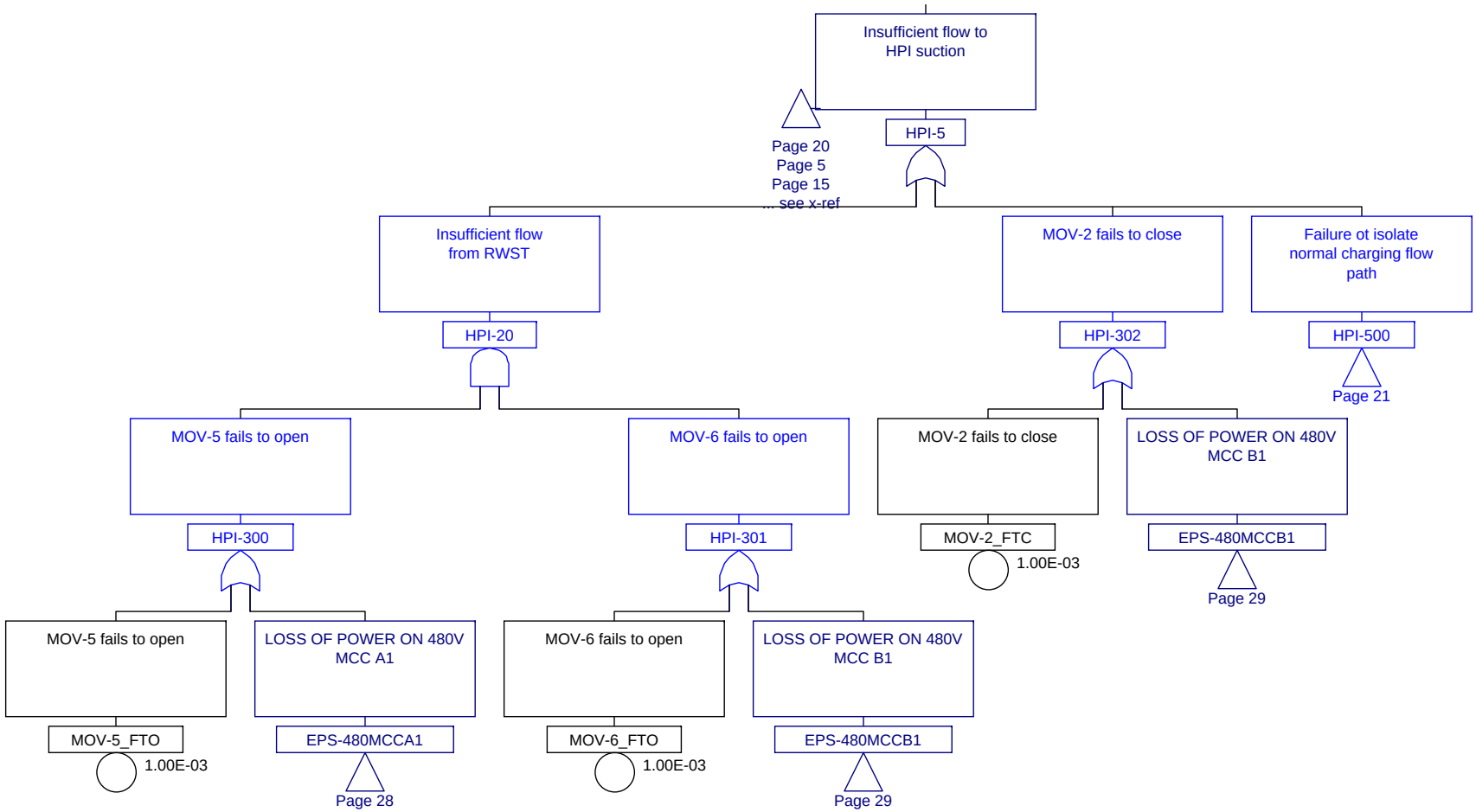

MOV-14 FAILS TO OPEN
Page 11
AFW-16
MOV-14 FAILS TO OPEN
LOSS OF POWER ON 125V DC BUS B
MOV-14_FTO
1.00E-03
EPS-125VDCBUSB
Page 23

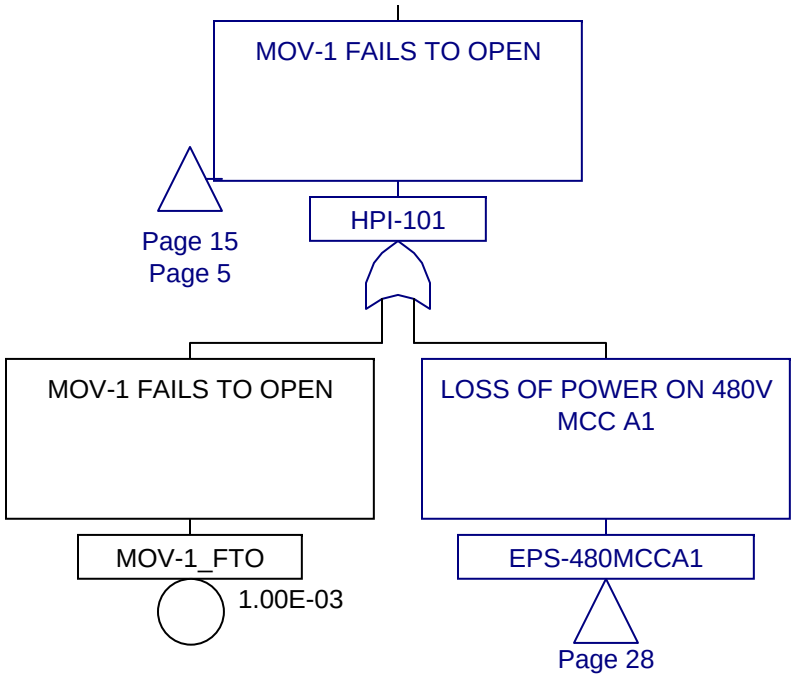

MOV-15 FAILS TO OPEN
Page 11
AFW-17
MOV-15 FAILS TO OPEN
LOSS OF POWER ON 125V DC BUS B
MOV-15_FTO
1.00E-03
EPS-125VDCBUSB
Page 23

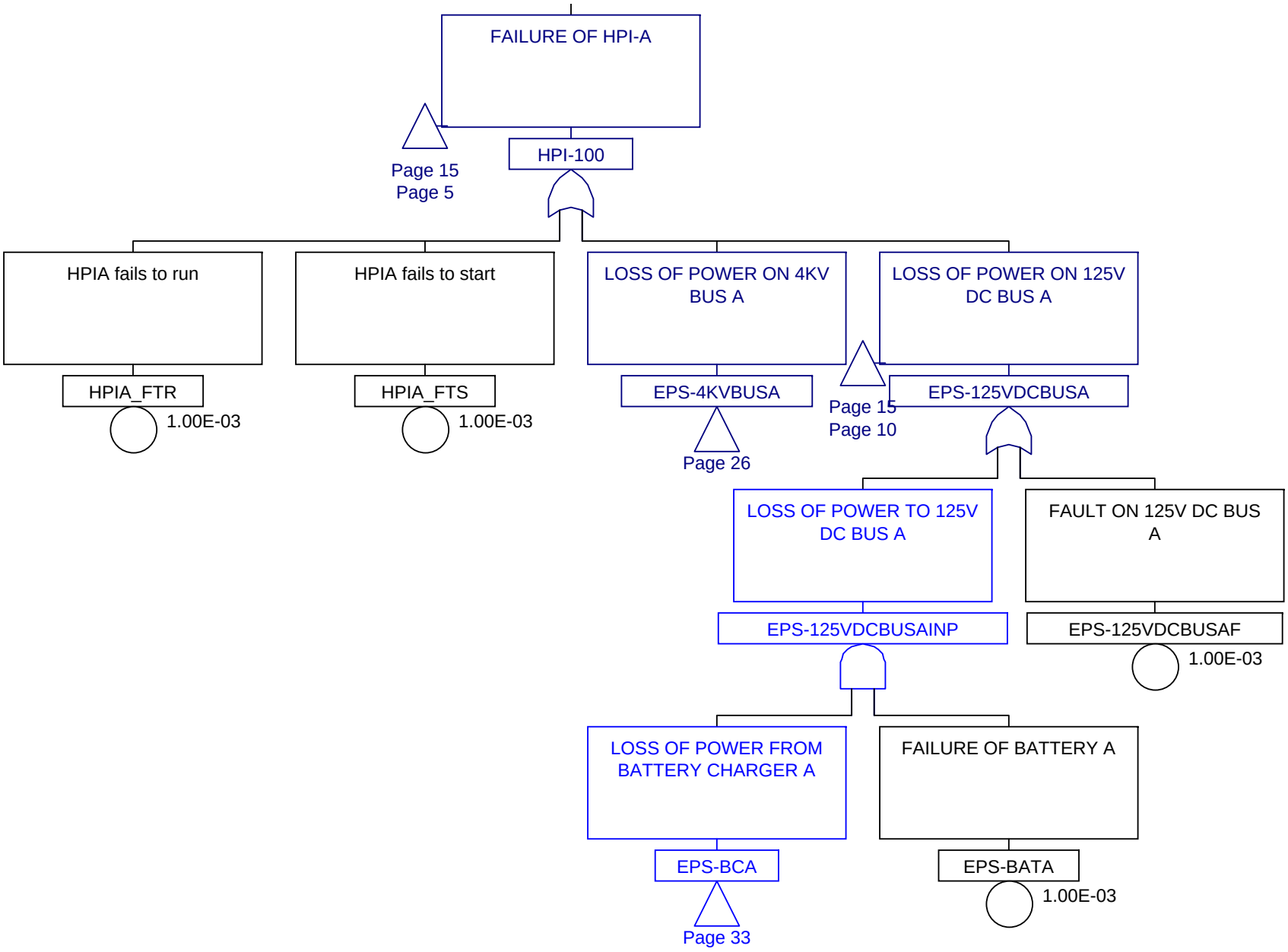

Insufficient flow from Diesel-driven AFW Pump C
Page 9
AFW-100
MOV-18 fails to open
AFW-101
Insufficient flow from Diesel-drivern AFW Pump C
AFW-102
MOV-18 fails to open
MOV-18_FTO
1.00E-03
LOSS OF POWER ON 480V MCC B1
EPS-480MCCB1
Page 29
Diesel-drivern AFW Pump C fails to run
AFWC-FTR
1.00E-03
Diesel-drivern AFW Pump C fails to start
AFWC-FTS
1.00E-03

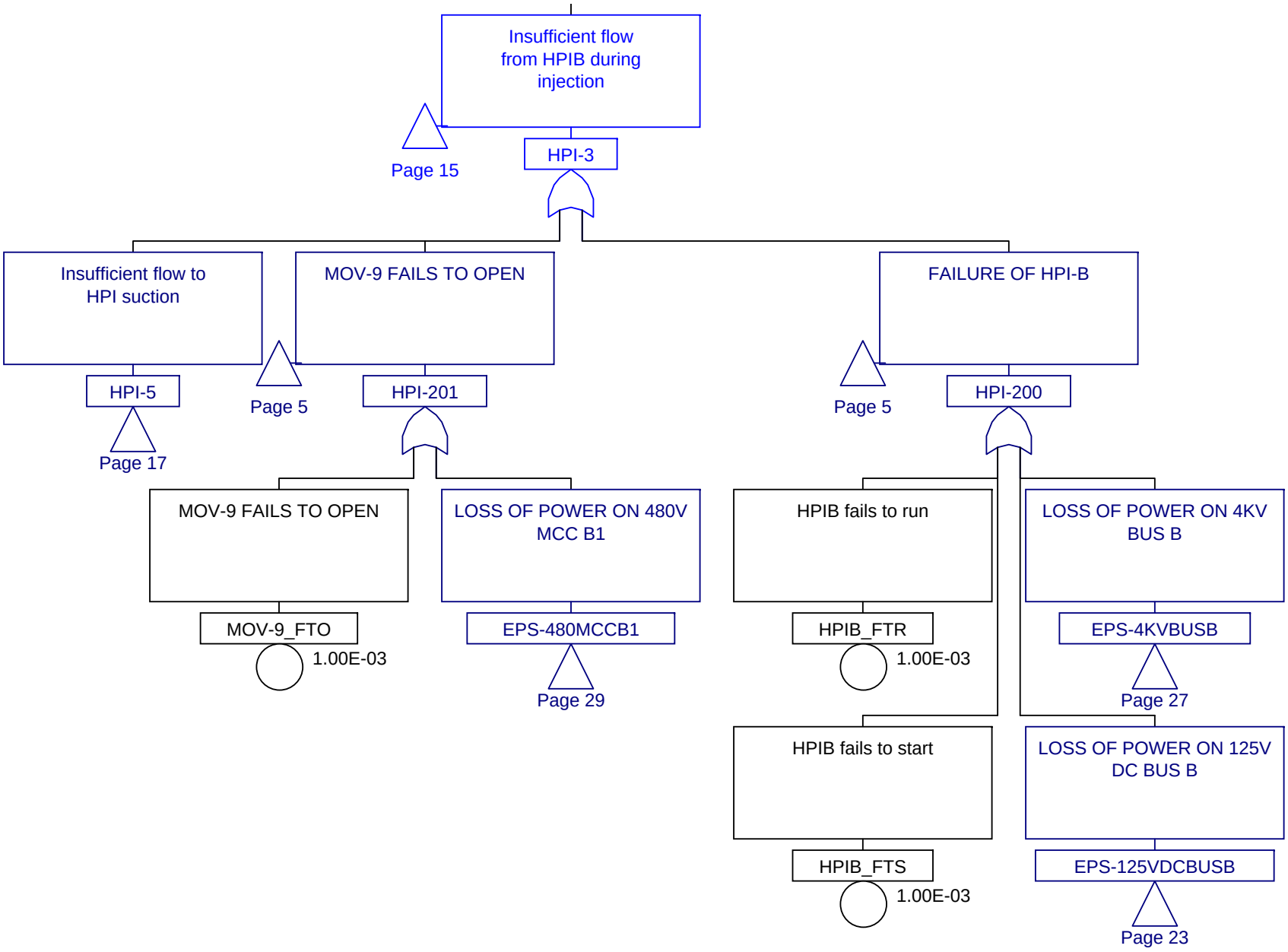

Failure of feed and bleed cooling
Page 3
Page 1
FB-1
Insufficient flow from HPI system during injection
HPI-1
PORV AOV-1 fails to open
RCS-1
Operator fails to establish feed an bleed cooling
OPER-4
1.00E-01
Insufficient flow from HPIA during injection
HPI-4
Insufficient flow from HPIB during injection
HPI-3
Page 20
PORV AOV-1 fails to open
AOV-1_FTO
1.00E-03
LOSS OF POWER ON 120V BUS A
EPS-120VBUSA
LOSS OF INSTUMENT AIR
Page 21
IA
Insufficient flow to HPI suction
HPI-5
Page 17
FAILURE OF HPI-A
HPI-100
Page 19
MOV-1 FAILS TO OPEN
HPI-101
Page 18
LOSS OF POWER ON 125V DC BUS A
EPS-125VDCBUSA
Page 19
FAILURE OF 120V BUS A INVERTER
EPS-120VBUSAINVF
1.00E-03
120V BUS A FAULT
EPS-120VBUSAF
1.00E-03
AIR COMPRESSOR 1 FAILS TO RUN
COMP-1_FTR
1.00E-03
LOSS OF POWER ON 480V LOAD CENTER 1
EPS-480VLC1
Page 30

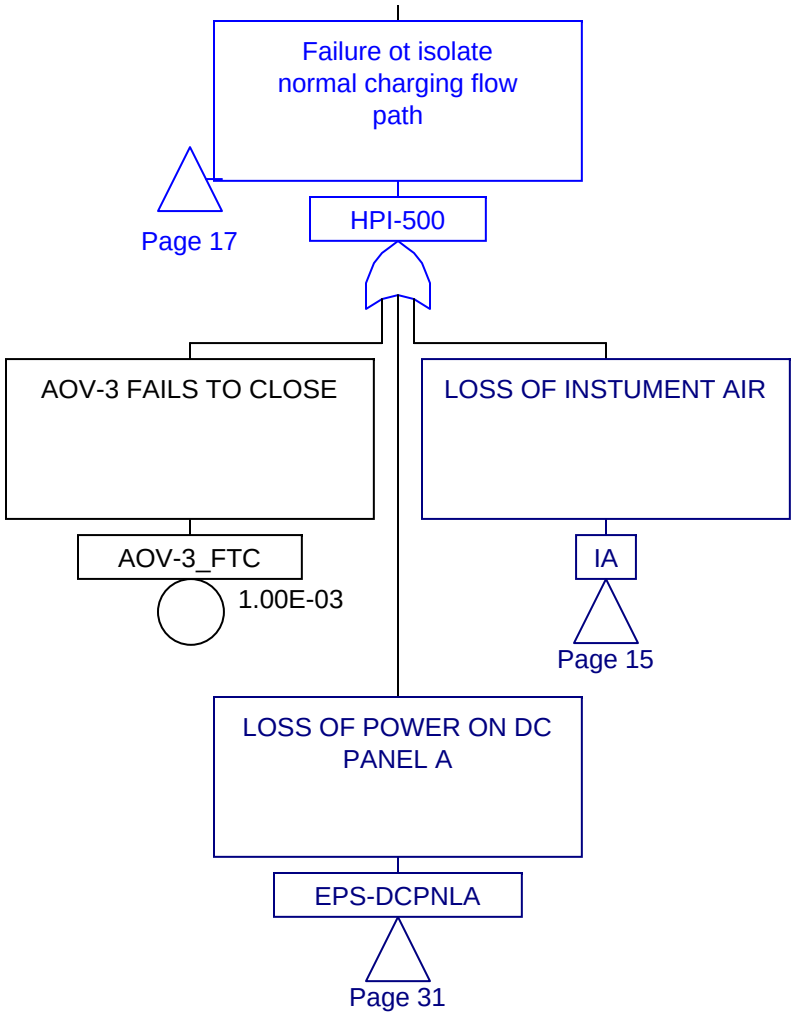

Insufficient flow from HPI system during recirculation
Page 4
Page 1
HPI-6
Operator fails to switch over to recirculation
OPER-1
1.00E-01
Insufficient flow from HPI pumps during recirculation
HPI-7
Insufficient flow from HPIA during recirculation
HPI-8
Insufficient flow from HPIB during recirculation
HPI-9
HPIA fails to run
HPIA_FTR
1.00E-03
Insufficient flow to HPI suction (RECIRCULATION)
HPI-10
Page 22
HPIB fails to run
HPIB_FTR
1.00E-03
Insufficient flow to HPI suction (RECIRCULATION)
HPI-10
Page 22
LOSS OF POWER ON 4KV BUS A
EPS-4KVBUSA
Page 26
LOSS OF HVAC COOLING TO HPI PUMP A ROOM
HPIA_HVAC
1.00E-03
LOSS OF POWER ON 4KV BUS B
EPS-4KVBUSB
Page 27
LOSS OF HVAC COOLING TO HPI PUMP B ROOM
HPIB_HVAC
1.00E-03

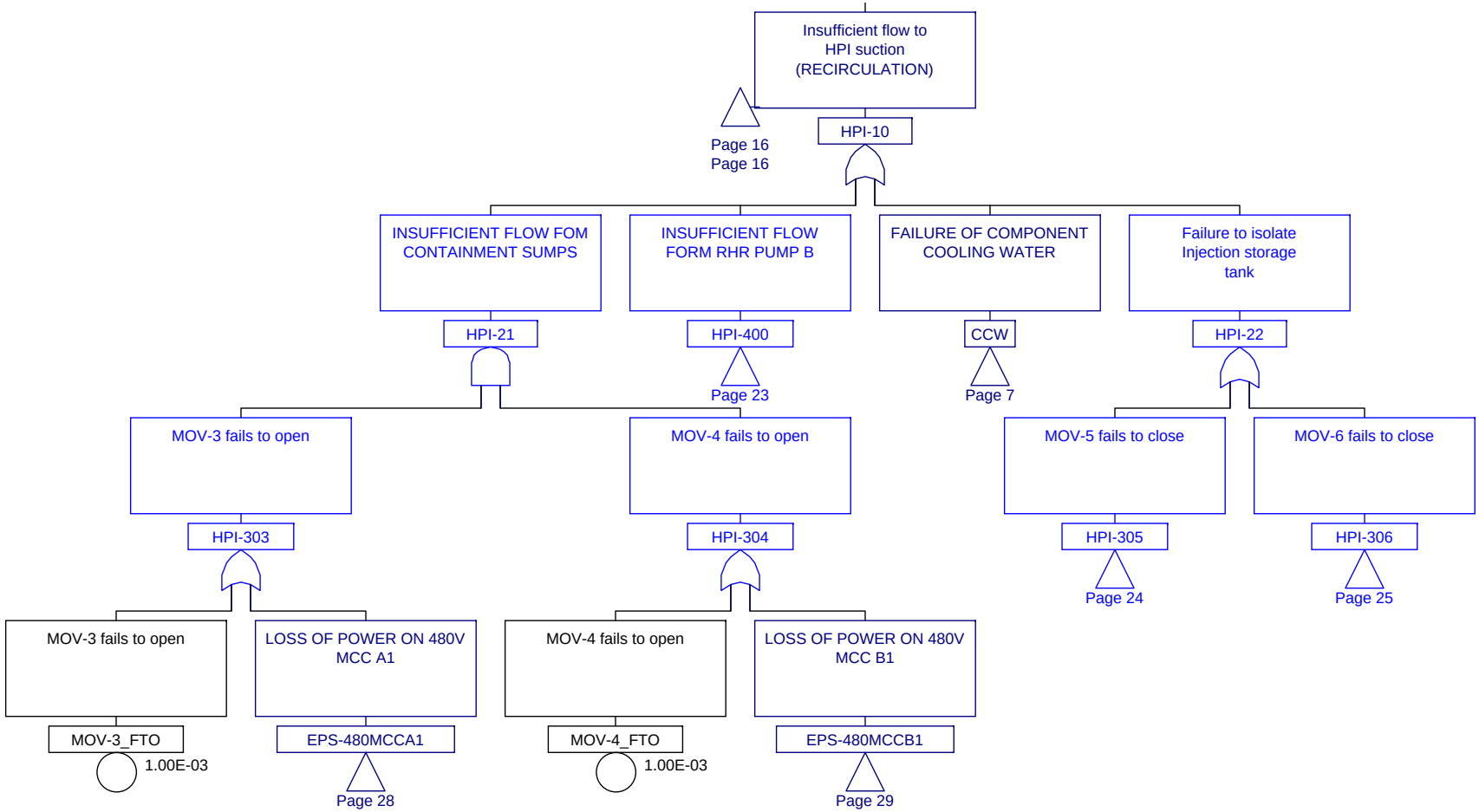

Insufficient flow to HPI suction
HPI-5
Page 20
Page 5
Page 15
... see x-ref
Insufficient flow from RWST
HPI-20
MOV-2 fails to close
HPI-302
Failure ot isolate normal charging flow path
HPI-500
Page 21
MOV-5 fails to open
HPI-300
MOV-6 fails to open
HPI-301
MOV-2 fails to close
MOV-2_FTC
1.00E-03
LOSS OF POWER ON 480V MCC B1
EPS-480MCCB1
Page 29
MOV-5 fails to open
MOV-5_FTO
1.00E-03
LOSS OF POWER ON 480V MCC A1
EPS-480MCCA1
Page 28
MOV-6 fails to open
MOV-6_FTO
1.00E-03
LOSS OF POWER ON 480V MCC B1
EPS-480MCCB1
Page 29

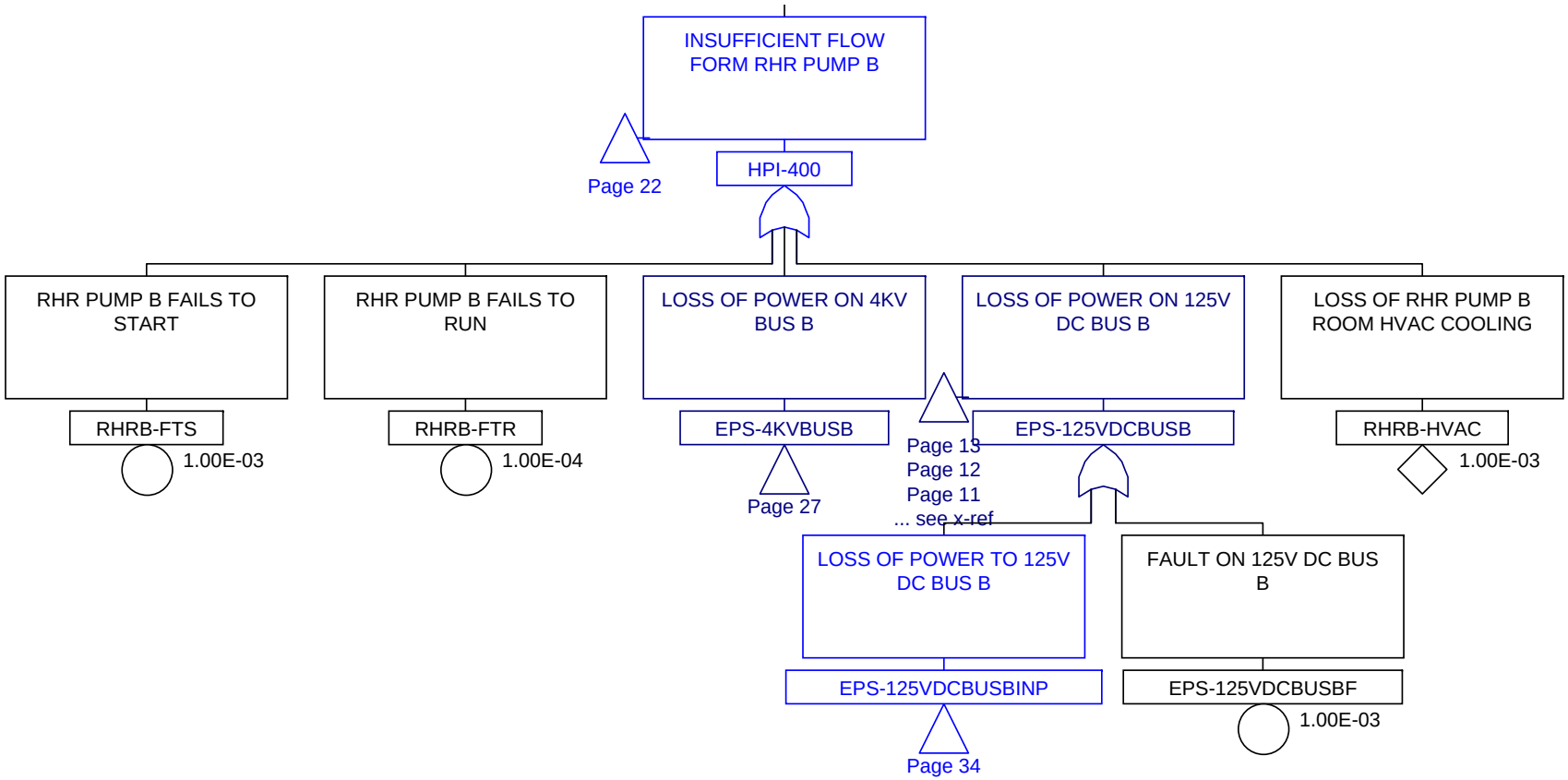

MOV-1 FAILS TO OPEN
Page 15
Page 5
HPI-101
MOV-1 FAILS TO OPEN
LOSS OF POWER ON 480V MCC A1
MOV-1_FTO
1.00E-03
EPS-480MCCA1
Page 28

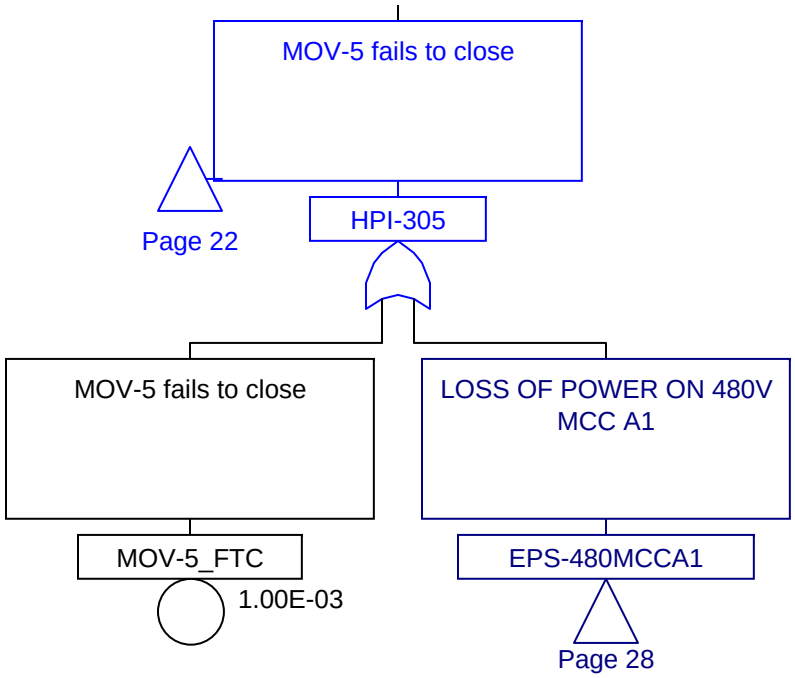

FAILURE OF HPI-A
Page 15
Page 5
HPI-100
HPIA fails to run
HPIA fails to start
LOSS OF POWER ON 4KV BUS A
LOSS OF POWER ON 125V DC BUS A
HPIA_FTR
1.00E-03
HPIA_FTS
1.00E-03
EPS-4KVBUSA
Page 26
Page 15
Page 10
EPS-125VDCBUSA
LOSS OF POWER TO 125V DC BUS A
FAULT ON 125V DC BUS A
EPS-125VDCBUSAINP
EPS-125VDCBUSAF
1.00E-03
LOSS OF POWER FROM BATTERY CHARGER A
FAILURE OF BATTERY A
EPS-BCA
Page 33
EPS-BATA
1.00E-03

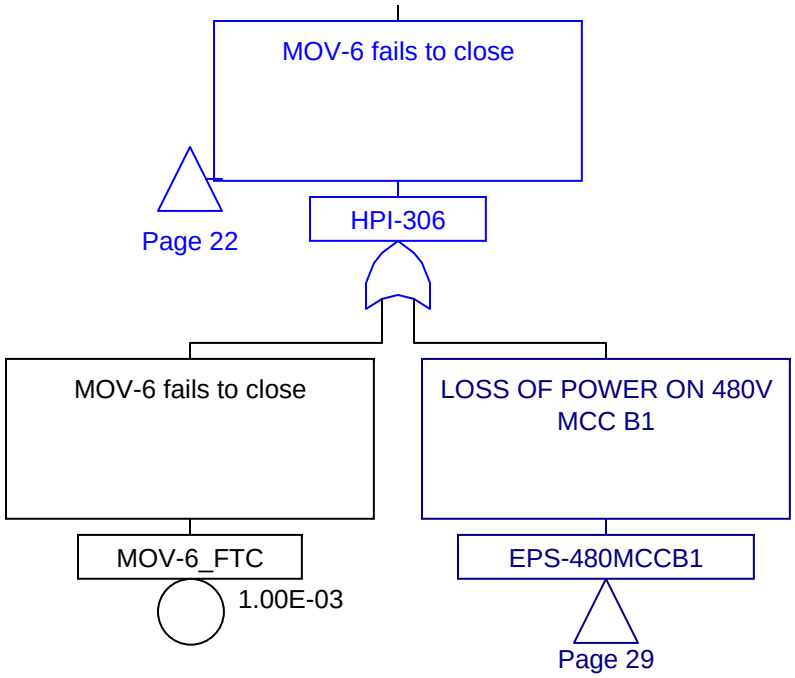

Insufficient flow from HPIB during injection
Page 15
HPI-3
Insufficient flow to HPI suction
MOV-9 FAILS TO OPEN
FAILURE OF HPI-B
HPI-5
Page 17
Page 5
HPI-201
Page 5
HPI-200
MOV-9 FAILS TO OPEN
LOSS OF POWER ON 480V MCC B1
HPIB fails to run
LOSS OF POWER ON 4KV BUS B
MOV-9_FTO
1.00E-03
EPS-480MCCB1
Page 29
HPIB_FTR
1.00E-03
EPS-4KVBUSB
Page 27
HPIB fails to start
LOSS OF POWER ON 125V DC BUS B
HPIB_FTS
1.00E-03
EPS-125VDCBUSB
Page 23

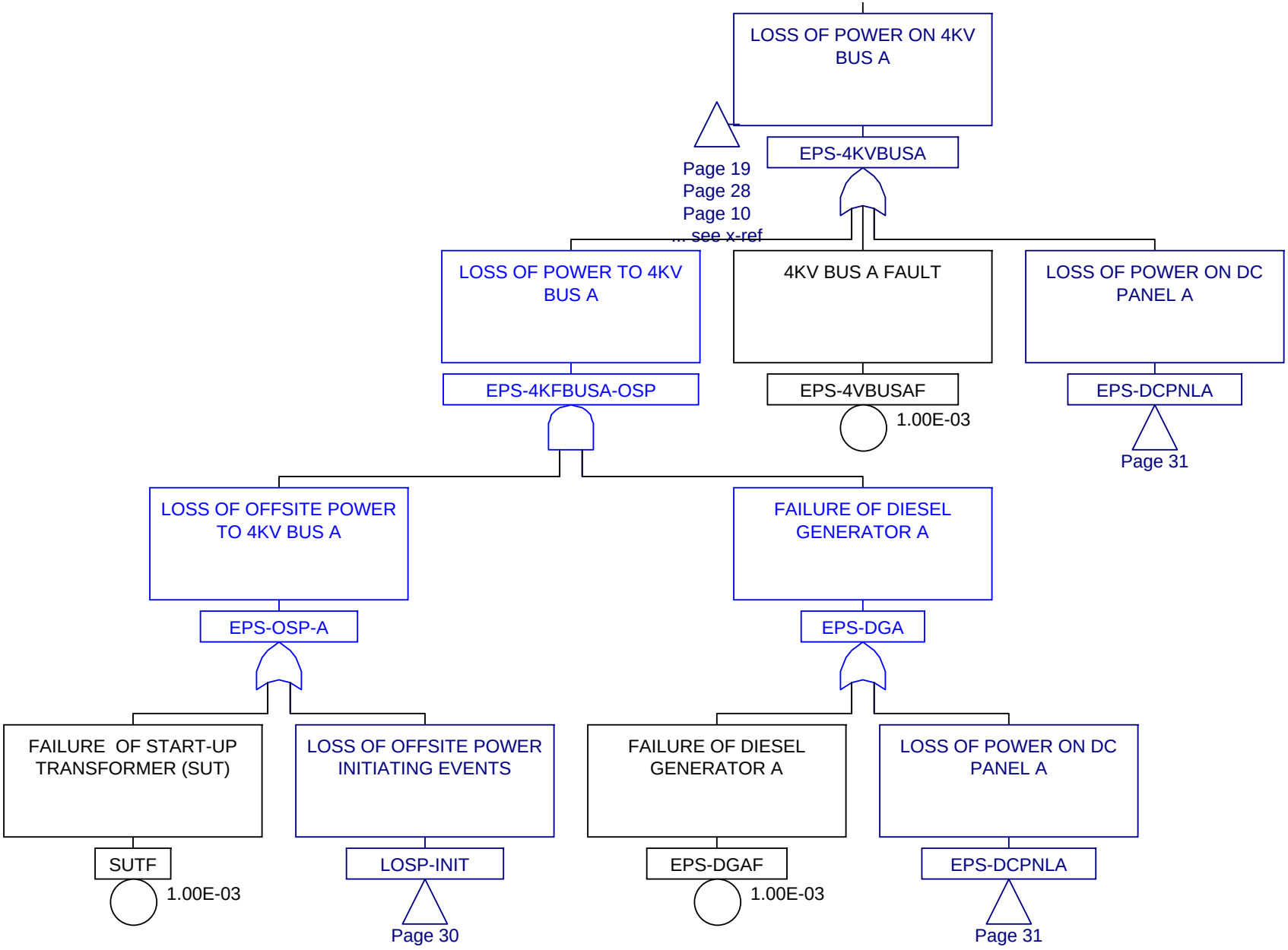

Failure ot isolate normal charging flow path
Page 17
HPI-500
AOV-3 FAILS TO CLOSE
LOSS OF INSTUMENT AIR
AOV-3_FTC
1.00E-03
IA
Page 15
LOSS OF POWER ON DC PANEL A
EPS-DCPNLA
Page 31

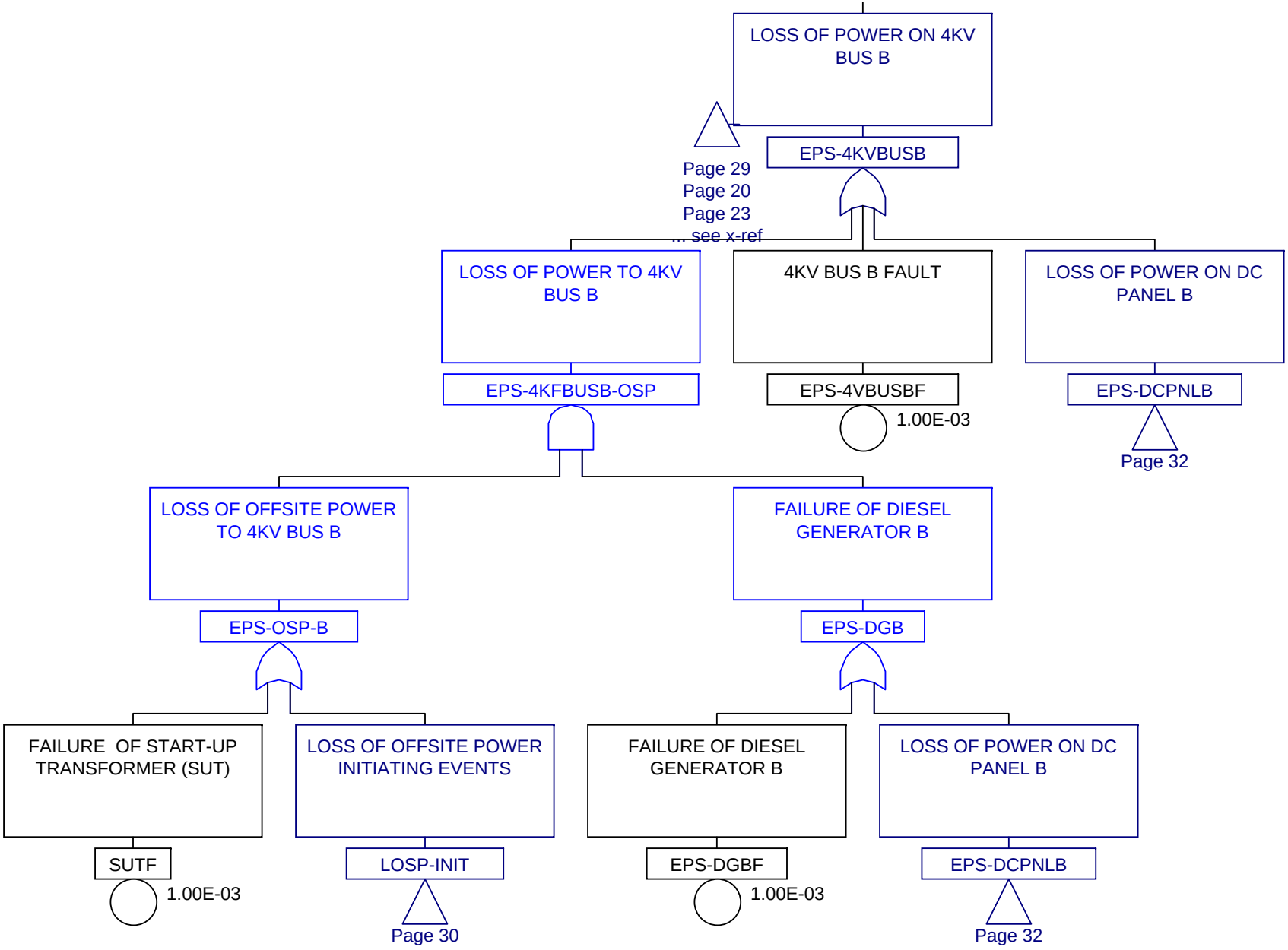

Insufficient flow to HPI suction (RECIRCULATION)
Page 16
Page 16
HPI-10
INSUFFICIENT FLOW FOM CONTAINMENT SUMPS
INSUFFICIENT FLOW FORM RHR PUMP B
FAILURE OF COMPONENT COOLING WATER
Failure to isolate Injection storage tank
HPI-21
HPI-400
Page 23
CCW
Page 7
HPI-22
MOV-3 fails to open
MOV-4 fails to open
MOV-5 fails to close
MOV-6 fails to close
HPI-303
HPI-304
HPI-305
Page 24
HPI-306
Page 25
MOV-3 fails to open
LOSS OF POWER ON 480V MCC A1
MOV-4 fails to open
LOSS OF POWER ON 480V MCC B1
MOV-3_FTO
1.00E-03
EPS-480MCCA1
Page 28
MOV-4_FTO
1.00E-03
EPS-480MCCB1
Page 29

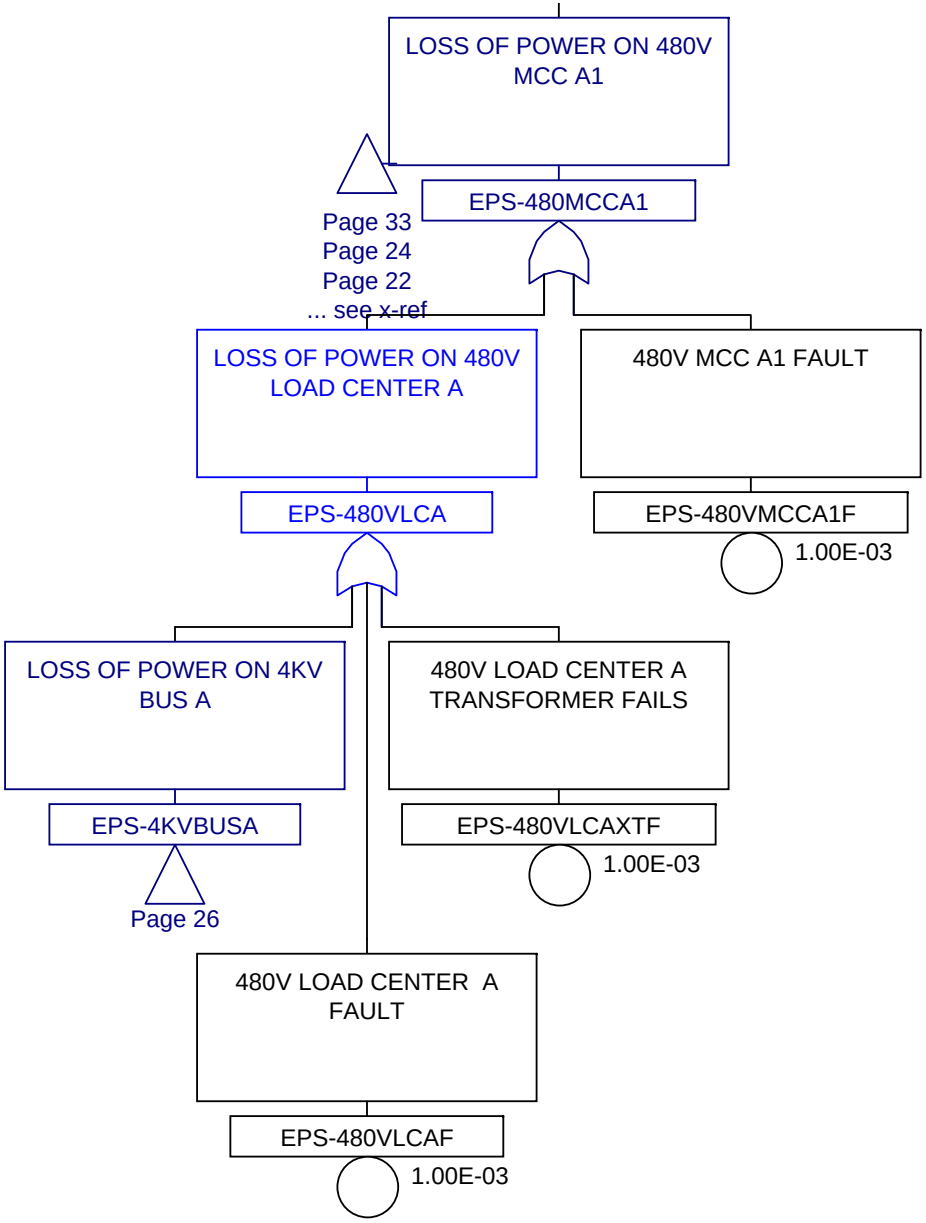

INSUFFICIENT FLOW FORM RHR PUMP B
Page 22
HPI-400
RHR PUMP B FAILS TO START
RHR PUMP B FAILS TO RUN
LOSS OF POWER ON 4KV BUS B
LOSS OF POWER ON 125V DC BUS B
LOSS OF RHR PUMP B ROOM HVAC COOLING
RHRB-FTS
1.00E-03
RHRB-FTR
1.00E-04
EPS-4KVBUSB
Page 27
Page 13
Page 12
Page 11
... see x-ref
EPS-125VDCBUSB
RHRB-HVAC
1.00E-03
LOSS OF POWER TO 125V DC BUS B
FAULT ON 125V DC BUS B
EPS-125VDCBUSBINP
Page 34
EPS-125VDCBUSBF
1.00E-03

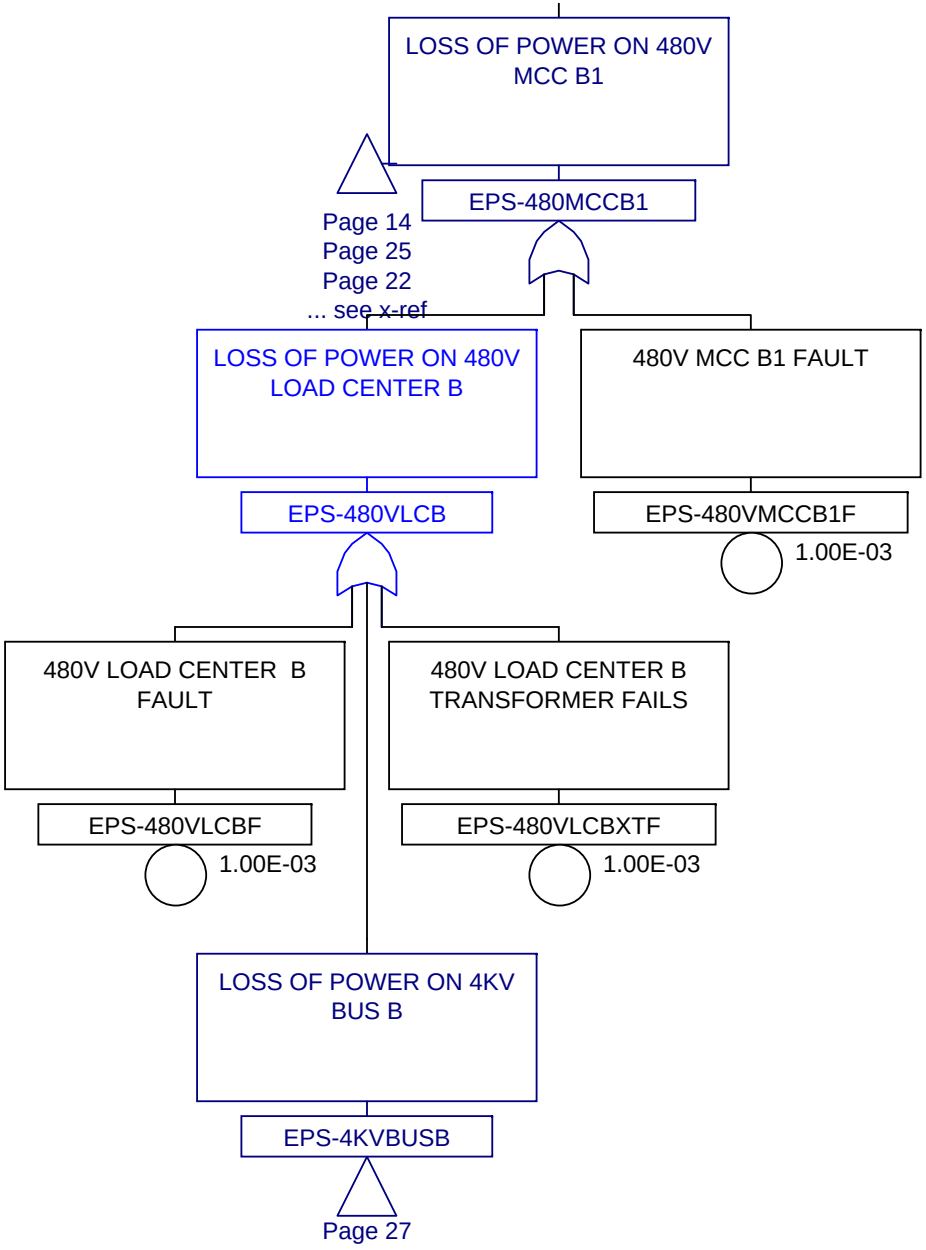

MOV-5 fails to close
Page 22
HPI-305
MOV-5 fails to close
LOSS OF POWER ON 480V MCC A1
MOV-5_FTC
1.00E-03
EPS-480MCCA1
Page 28

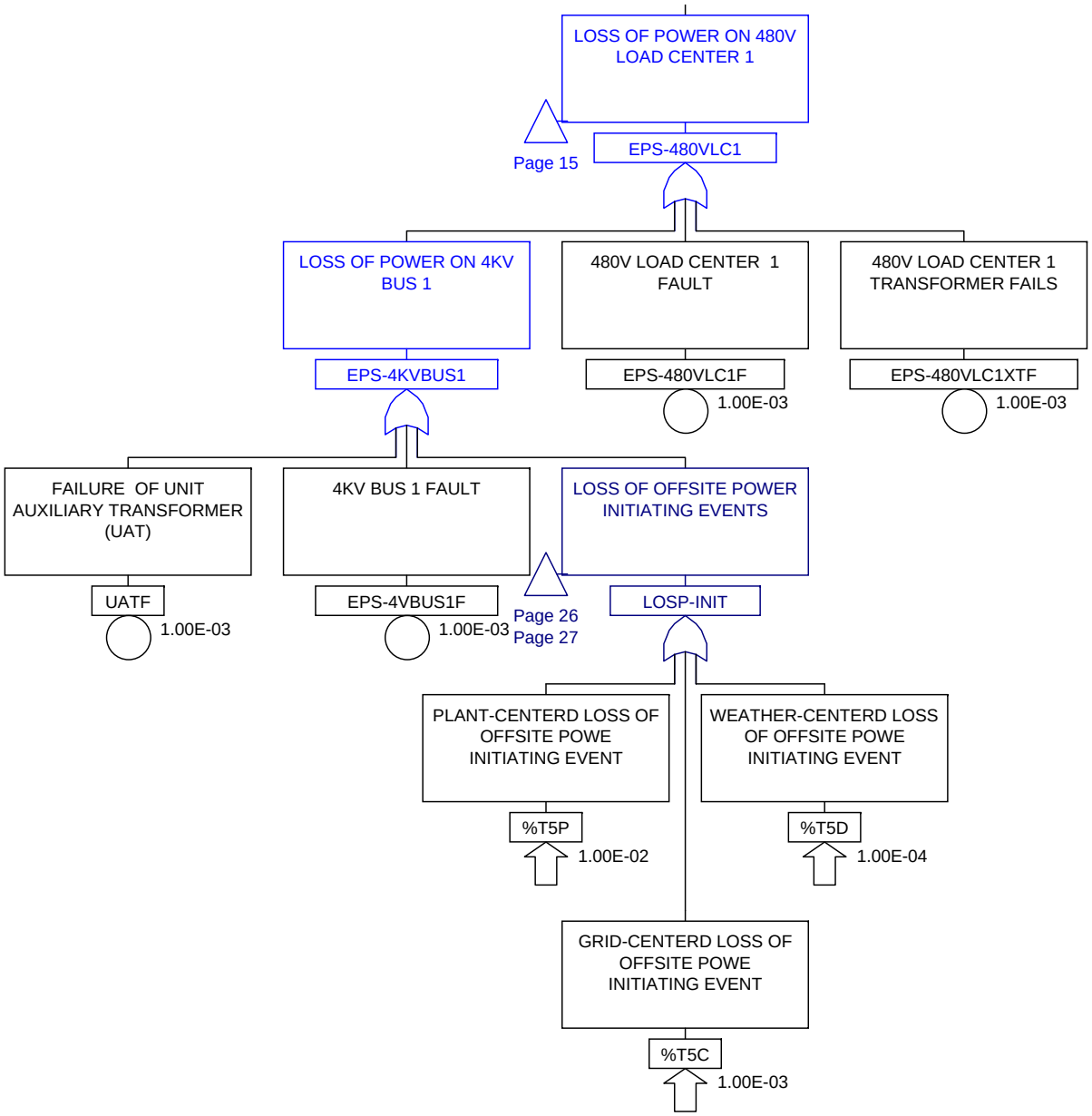

MOV-6 fails to close
Page 22
HPI-306
MOV-6 fails to close
LOSS OF POWER ON 480V MCC B1
MOV-6_FTC
1.00E-03
EPS-480MCCB1
Page 29

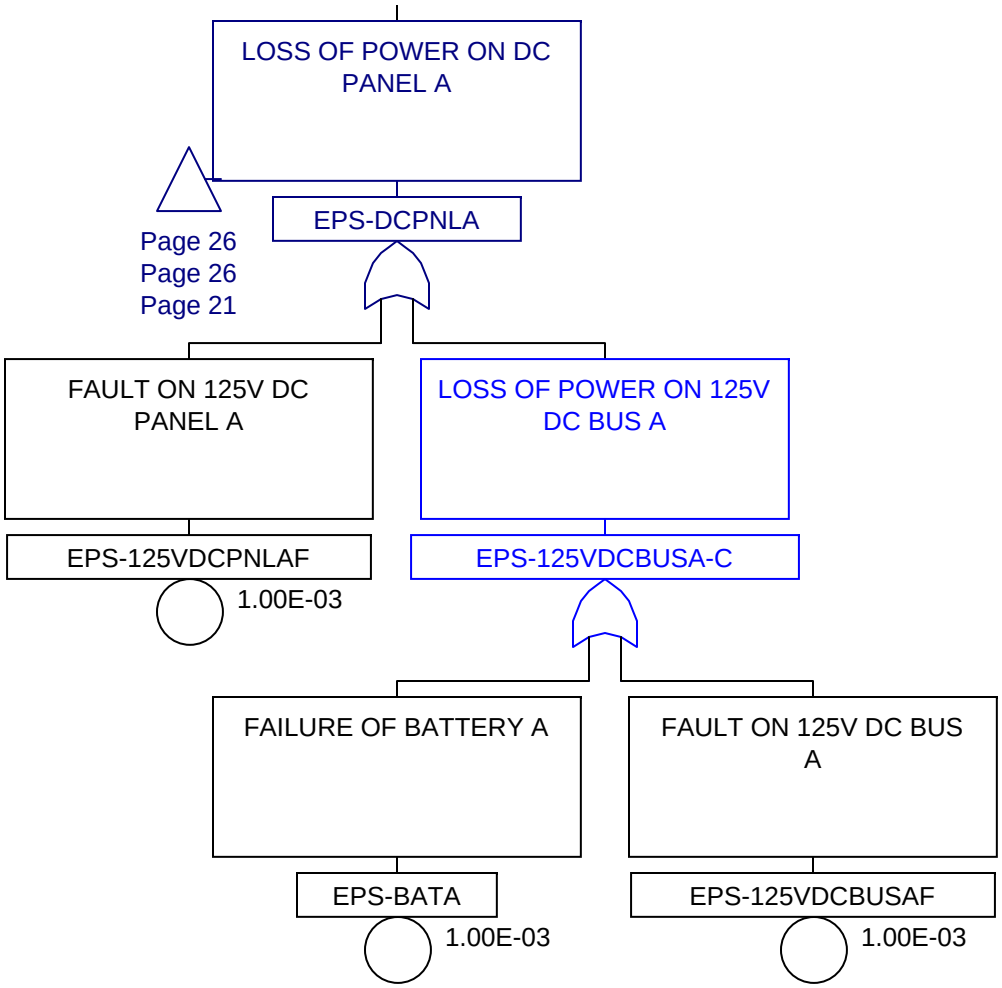

LOSS OF POWER ON 4KV BUS A
EPS-4KVBUSA
Page 19
Page 28
Page 10
... see x-ref
LOSS OF POWER TO 4KV BUS A
4KV BUS A FAULT
LOSS OF POWER ON DC PANEL A
EPS-4KFBUSA-OSP
EPS-4VBUSAF
1.00E-03
EPS-DCPNLA
Page 31
LOSS OF OFFSITE POWER TO 4KV BUS A
FAILURE OF DIESEL GENERATOR A
EPS-OSP-A
EPS-DGA
FAILURE OF START-UP TRANSFORMER (SUT)
LOSS OF OFFSITE POWER INITIATING EVENTS
FAILURE OF DIESEL GENERATOR A
LOSS OF POWER ON DC PANEL A
SUTF
1.00E-03
LOSP-INIT
Page 30
EPS-DGAF
1.00E-03
EPS-DCPNLA
Page 31

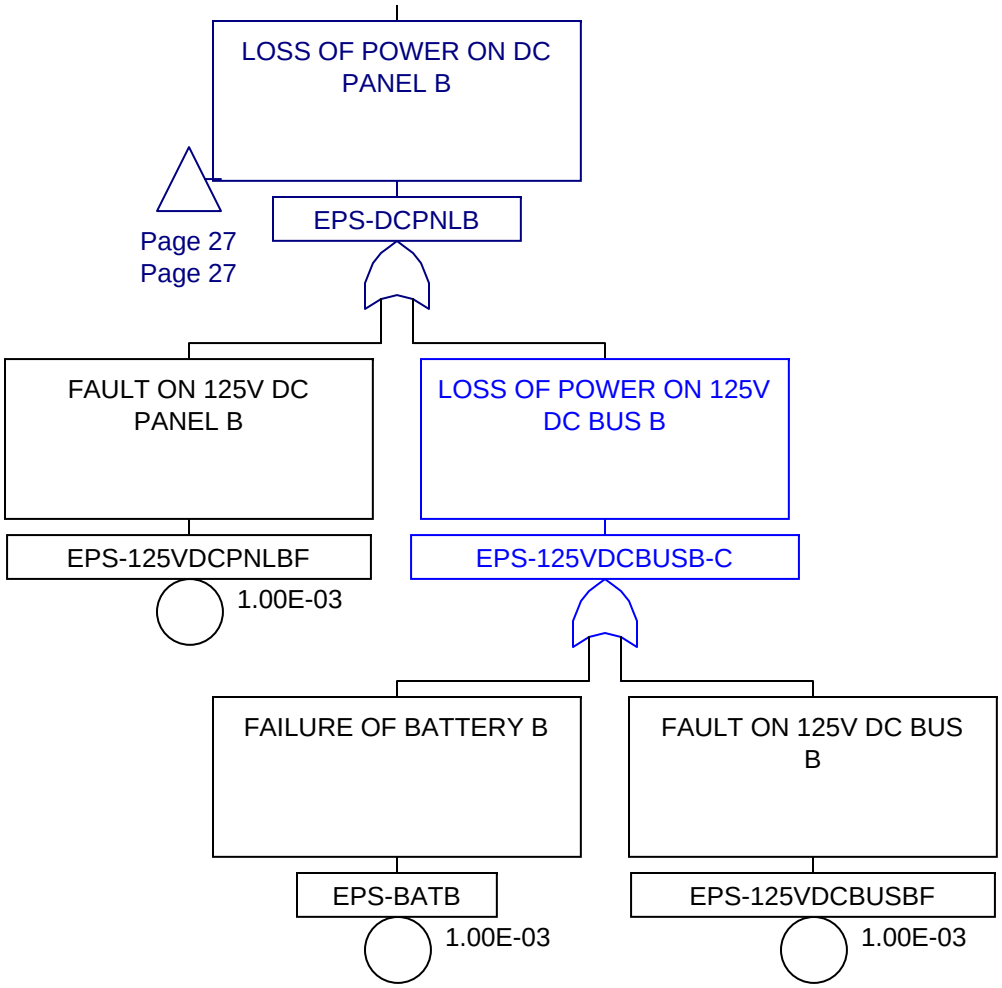

LOSS OF POWER ON 4KV BUS B
EPS-4KVBUSB
Page 29
Page 20
Page 23
... see x-ref
LOSS OF POWER TO 4KV BUS B
4KV BUS B FAULT
LOSS OF POWER ON DC PANEL B
EPS-4KFBUSB-OSP
EPS-4VBUSBF
1.00E-03
EPS-DCPNLB
Page 32
LOSS OF OFFSITE POWER TO 4KV BUS B
FAILURE OF DIESEL GENERATOR B
EPS-OSP-B
EPS-DGB
FAILURE OF START-UP TRANSFORMER (SUT)
LOSS OF OFFSITE POWER INITIATING EVENTS
FAILURE OF DIESEL GENERATOR B
LOSS OF POWER ON DC PANEL B
SUTF
1.00E-03
LOSP-INIT
Page 30
EPS-DGBF
1.00E-03
EPS-DCPNLB
Page 32

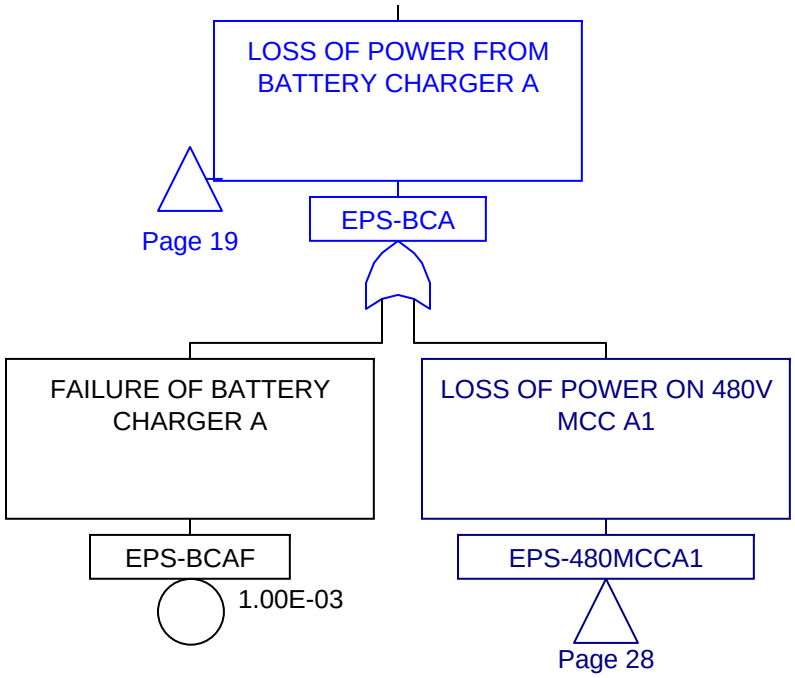

LOSS OF POWER ON 480V MCC A1
EPS-480MCCA1
Page 33
Page 24
Page 22
... see x-ref
LOSS OF POWER ON 480V LOAD CENTER A
480V MCC A1 FAULT
EPS-480VLCA
EPS-480VMCCA1F
1.00E-03
LOSS OF POWER ON 4KV BUS A
480V LOAD CENTER A TRANSFORMER FAILS
EPS-4KVBUSA
EPS-480VLCAXTF
1.00E-03
Page 26
480V LOAD CENTER A FAULT
EPS-480VLCAF
1.00E-03

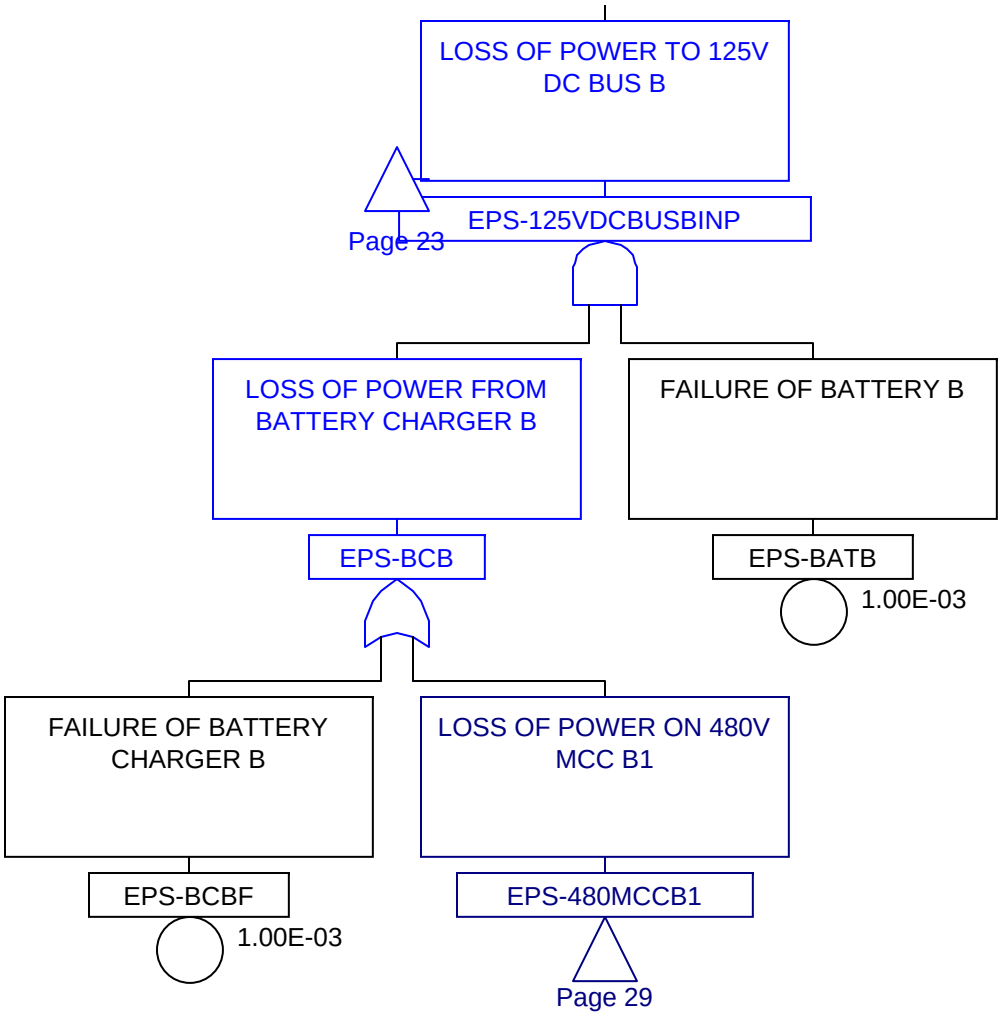

LOSS OF POWER ON 480V MCC B1
EPS-480MCCB1
Page 14
Page 25
Page 22
... see x-ref
LOSS OF POWER ON 480V LOAD CENTER B
480V MCC B1 FAULT
EPS-480VLCB
EPS-480VMCCB1F
1.00E-03
480V LOAD CENTER B FAULT
480V LOAD CENTER B TRANSFORMER FAILS
EPS-480VLCBF
1.00E-03
EPS-480VLCBXTF
1.00E-03
LOSS OF POWER ON 4KV BUS B
EPS-4KVBUSB
Page 27


LOSS OF POWER ON 480V LOAD CENTER 1
Page 15
EPS-480VLC1
LOSS OF POWER ON 4KV BUS 1
480V LOAD CENTER 1 FAULT
480V LOAD CENTER 1 TRANSFORMER FAILS
EPS-4KVBUS1
EPS-480VLC1F
1.00E-03
EPS-480VLC1XTF
1.00E-03
FAILURE OF UNIT AUXILIARY TRANSFORMER (UAT)
4KV BUS 1 FAULT
LOSS OF OFFSITE POWER INITIATING EVENTS
UATF
1.00E-03
EPS-4VBUS1F
1.00E-03
Page 26
Page 27
LOSP-INIT
PLANT-CENTERD LOSS OF OFFSITE POWE INITIATING EVENT
WEATHER-CENTERD LOSS OF OFFSITE POWE INITIATING EVENT
%T5P
1.00E-02
%T5D
1.00E-04
GRID-CENTERD LOSS OF OFFSITE POWE INITIATING EVENT
%T5C
1.00E-03


LOSS OF POWER ON DC PANEL A
EPS-DCPNLA
Page 26
Page 26
Page 21
FAULT ON 125V DC PANEL A
LOSS OF POWER ON 125V DC BUS A
EPS-125VDCPNLAF
1.00E-03
EPS-125VDCBUSA-C
FAILURE OF BATTERY A
FAULT ON 125V DC BUS A
EPS-BATA
1.00E-03
EPS-125VDCBUSAF
1.00E-03


LOSS OF POWER ON DC PANEL B
EPS-DCPNLB
Page 27
Page 27
FAULT ON 125V DC PANEL B
LOSS OF POWER ON 125V DC BUS B
EPS-125VDCPNLBF
1.00E-03
EPS-125VDCBUSB-C
FAILURE OF BATTERY B
FAULT ON 125V DC BUS B
EPS-BATB
1.00E-03
EPS-125VDCBUSBF
1.00E-03


LOSS OF POWER FROM BATTERY CHARGER A
Page 19
EPS-BCA
FAILURE OF BATTERY CHARGER A
LOSS OF POWER ON 480V MCC A1
EPS-BCAF
1.00E-03
EPS-480MCCA1
Page 28


LOSS OF POWER TO 125V DC BUS B
EPS-125VDCBUSBINP
Page 23
LOSS OF POWER FROM BATTERY CHARGER B
FAILURE OF BATTERY B
EPS-BCB
EPS-BATB
1.00E-03
FAILURE OF BATTERY CHARGER B
LOSS OF POWER ON 480V MCC B1
EPS-BCBF
1.00E-03
EPS-480MCCB1
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