FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M8-1SS-E036 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 0 04/08/97

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:VALVE, PURGE CARLETON TECHNOLOGIES	MC250-0004-0015 B40583-1

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CREW CABIN PURGE VALVE

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
ATTACHED TO THE INLET OF THE CREW CABIN PURGE ISO VALVE, THE PURGE VALVE PROVIDES CAPABILITY FOR PURGING CREW CABIN PRESSURE OVERBOARD AT CONTROLLED RATES DEPENDENT ON THE CREW SIZE. THE VALVE IS A BUTTERFLY VALVE THAT HAS EIGHT FLOW POSITIONS FIXED BY DETENTS IN THE ACTUATION MECHANISM. THIS VALVE IS MANUALLY OPERATED WITHIN THE CREW CABIN.

REFERENCE DOCUMENTS: VS28-643001
V828-643222
M072-643401

FAILURE MODES EFFECTS ANALYSIS FMEA – NON-CIL FAILURE MODE
NUMBER: M8-1SS-E036-02

REVISION#: 0 04/08/97

SUBSYSTEM NAME: ECLSS - ARPCS
LRU: VALVE, CREW CABIN PURGE
ITEM NAME: VALVE, CREW CABIN PURGE

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
FAILS TO CLOSE, INTERNAL LEAKAGE

MISSION PHASE: OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:
103 DISCOVERY
104 ATLANTIS
105 ENDEAVOUR

CAUSE:
CORROSION, CONTAMINATION, PHYSICAL BINDING/JAMMING, EXCESSIVE VIBRATION, MECHANICAL SHOCK, MATERIAL DEFECT, FATIGUE, POROSITY

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) N/A
C) PASS

PASS/FAIL RATIONALE:
A)

B)
N/A - ALL REDUNDANCY IS IN STANDBY UNTIL REQUIRED.

C)

METHOD OF FAULT DETECTION:
PHYSICAL OBSERVATION - VALVE DOES NOT CLOSE WHEN MANUALLY OPERATED.
INSTRUMENTATION - LOSS OF PRESSURE WITHIN CREW CABIN WHEN BOTH CREW CABIN PURGE ISO VALVE AND ECLSS BAY VACUUM VENT ISO VALVE ARE OPEN.

CORRECTING ACTION: MANUAL

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CORRECTING ACTION DESCRIPTION:
CREW COULD UTILIZE CREW CABIN PURGE ISO VALVE OR ECLSS BAY VACUUM VENT ISO VALVE TO CONTROL CREW CABIN PRESSURE VENTING. EXTERNAL LEAKAGE OF PRESSURE FOLLOWING THIRD FAILURE CAN BE ISOLATED FROM CREW CABIN BY PERFORMING AN IN-FLIGHT MAINTENANCE TO SEAL LEAK USING DUCT TAPE OR ANY OTHER AVAILABLE MATERIAL.

REMARKS/RECOMMENDATIONS:
CREW CABIN PURGE VALVE, CREW CABIN PURGE ISO VALVE, AND ECLSS BAY VACUUM VENT ISO VALVE ARE ALL IN SERIES. ALL THREE MUST BE OPENED BEFORE THERE CAN BE A LOSS OF CREW CABIN PRESSURE TO THE OUTSIDE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF CAPABILITY TO REGULATE CREW CABIN PRESSURE VENTING BASED ON THE NUMBER OF CREW.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT FIRST FAILURE. INTERNAL LEAKAGE OF BOTH THE CREW CABIN PURGE ISO VALVE AND ECLSS BAY VACUUM VENT ISO VALVE WILL RESULT IN EXCESS LOSS OF CONSUMABLES WITHIN CREW CABIN.

(C) MISSION:
NO EFFECT FIRST FAILURE. LOSS OF MISSION IF SECOND SERIES VALVE (CREW CABIN PURGE ISO VALVE) AND THIRD SERIES VALVE (ECLSS BAY VACUUM VENT ISO VALVE) INTERNALLY LEAK OR FAIL TO CLOSE.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT FIRST FAILURE. LOSS OF CREW/VEHICLE IF AN INTERNAL LEAKAGE CONDITION ON BOTH THE CREW CABIN PRESSURE BLEED VALVE AND ECLSS BAY ISOLATION VALVE OCCURS AND CREW CABIN PRESSURE CANNOT BE MAINTAINED.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE (CREW CABIN PURGE VALVE INTERNALLY LEAKS OR FAILS TO CLOSE) - NO EFFECT.
SECOND FAILURE (CREW CABIN PURGE ISO VALVE INTERNALLY LEAKS OR FAILS TO CLOSE) - NO EFFECT; LOSS OF SERIES REDUNDANCY.
THIRD FAILURE (ECLSS BAY VACUUM VENT ISO VALVE INTERNALLY LEAKS OR FAILS TO CLOSE) - LOSS OF PRESSURE WITHIN CREW CABIN. SAFETY OF CREW AND VEHICLE JEOPARDIZED UPON LOSS OF CONSUMABLES. - CRITICALITY 1R3 CONDITION.
POSSIBLE LOSS OF PRESSURE IN SPACE STATION IF THIRD FAILURE OCCURS WHILE 576 BULKHEAD HATCH AND EXTERNAL AIRLOCK UPPER HATCH ARE OPEN.

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DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R3

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
PERFORMING A WORKAROUND TO SEAL EXTERNAL LEAKAGE OF PRESSURE WHEN ALL THREE SERIES VALVES FAIL IN THE OPEN POSITION DOES NOT IMPACT THE 1R3 CRITICALITY OF THIS FAILURE MODE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: SECONDS

IS TIME REQUIRED TO IMPLEMENT CORRECTING ACTION LESS THAN TIME TO EFFECT?
YES

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW HAS ENOUGH TIME TO UTILIZE CREW CABIN PURGE ISO VALVE OR ECLSS BAY VACUUM VENT ISO VALVE TO CONTROL DEPRESSURIZATION OR SEAL LEAK TO PREVENT EXTERNAL LEAKAGE OF CREW CABIN PRESSURE BEFORE PROBLEM BECOMES CATASTROPHIC.

HAZARD REPORT NUMBER(S): ORBI 511

HAZARD(S) DESCRIPTION:
LOSS OF HABITABLE PRESSURE IN CREW CABIN HABITABLE VOLUME

- APPROVALS -

SS & PAE	:	M. W. GUENTHER	:
DESIGN ENGINEER	:	K. J. KELLY	: