FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER:M8-1SS-E035 -X

SUBSYSTEM NAME: ECLSS - ARPCS

REVISION: 1 10/22/97

PART DATA

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:VALVE, PURGE ISO CARLETON TECHNOLOGIES	MC250-0004-0011 2765-0001-5

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
CREW CABIN PURGE ISO VALVE

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
PROVIDES CAPABILITY FOR VENTING CREW CABIN PRESSURE OVERBOARD VIA A VACUUM VENT LINE. THE VALVE IS A BUTTERFLY VALVE THAT HAS TWO 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-E035-01

REVISION#: 0 04/08/97

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

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
FAILS TO OPEN, RESTRICTED FLOW

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

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN
A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:
A)

B)

C)

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

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:
WITH 576 BULKHEAD HATCH OPEN CREW COULD UTILIZE THE EXTERNAL AIRLOCK DEPRESS VALVE OR ONE OR BOTH EQUALIZATION VALVES ON THE EXTERNAL

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AIRLOCK AFT HATCH (WHEN NO PRESSURIZED PAYLOAD IS INSTALLED) OR ONE OR BOTH EQUALIZATION VALVES ON THE TUNNEL ADAPTER "C" HATCH (WHEN PRESSURIZED PAYLOAD IS INSTALLED) TO VENT PRESSURE (FROM CREW CABIN AND ODS) OVERBOARD. ADDITIONAL CAPABILITY TO VENT PRESSURE IS AVAILABLE WHEN ORBITER AND SPACE STATION ARE NOT DOCKED BY THE USE OF ONE OR BOTH EQUALIZATION VALVES ON EXTERNAL AIRLOCK UPPER HATCH.

REMARKS/RECOMMENDATIONS:
VALVE IS ONLY UTILIZED TO VENT PRESSURE TO THE OUTSIDE IN THE EVENT SMOKE, EXCESSIVE OXYGEN, OR OTHER TOXIC FUMES ARE PRESENT IN THE CREW CABIN. FILTER PROVIDED WITHIN SERIES PURGE VALVE WILL HELP SCREEN OUT CONTAMINATES. PURGE ISO VALVE DOES NOT CONTAIN A FILTER.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF FUNCTION - VALVE CANNOT BE USED TO VENT CREW CABIN PRESSURE OVERBOARD.

(B) INTERFACING SUBSYSTEM(S):
NO EFFECT UNTIL CREW CABIN VENTING IS REQUIRED. THEN USE OF CONTINGENCY ACTION TO PERFORM VENTING WOULD RESULT IN AN INCREASED USE OF CONSUMABLES.

(C) MISSION:
NO IMMEDIATE EFFECT. FAILURE TO REMOVE CONTAMINANTS FROM CREW CABIN AIR COULD RESULT IN EARLY MISSION TERMINATION.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT UNTIL SMOKE, EXCESSIVE OXYGEN, OR OTHER TOXIC FUMES ARE PRESENT IN THE CREW CABIN. THEN LOSS OF ALL CREW CABIN VENTING CAPABILITIES COULD JEOPARDIZE THE SAFETY OF THE CREW.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE (CREW CABIN PURGE ISO VALVE FAILS TO OPEN OR CLOGGED) - INABILITY TO VENT CREW CABIN PRESSURE OVERBOARD USING THIS VALVE.
SECOND FAILURE (EXTERNAL AIRLOCK DEPRESS VALVE FAILS TO OPEN) - INABILITY TO DEPRESSURIZE EXTERNAL AIRLOCK FOR VENTING OF CREW CABIN AND ODS PRESSURE OVERBOARD WITH 576 BULKHEAD HATCH OPEN.
THIRD FAILURE (FIRST EQUALIZATION VALVE ON AN OUTSIDE HATCH FAILS TO OPEN) - NO EFFECT OTHER THAN VENTING TIME INCREASED WHEN USING A SINGLE EQUALIZATION VALVE TO VENT PRESSURE OVERBOARD.

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FOURTH FAILURE (SECOND EQUALIZATION VALVE ON AN OUTSIDE HATCH FAILS TO OPEN) - LOSS OF ALL CREW CABIN AND ODS PRESSURE VENTING CAPABILITIES. NO EFFECT UNTIL A HAZARDOUS CONTAMINATION EXISTS.
FIFTH FAILURE (FAILURE RESULTING IN THE PRESENSE OF A TOXIC/HAZARDOUS MATERIAL WITHIN THE CREW CABIN) - THEN INABILITY TO REMOVE THIS HAZARDOUS/TOXIC CONTAMINATION FROM THE CREW CABIN COULD POTENTIALLY RESULT IN LOSS OF CREW. - CRITICALITY 1R3 CONDITION.

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

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
NONE. ALL WORKAROUNDS HAVE ALREADY BEEN CONSIDERED IN DETERMINING THE CRITICALITY OF THIS FAILURE MODE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

TIME FROM DETECTION TO COMPLETED CORRECTING ACTION: MINUTES

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 OTHER DEPRESS/EQUALIZATION VALVES TO DEPRESSURIZE CREW CABIN BEFORE PROBLEM BECOMES CATASTROPHIC.

HAZARD REPORT NUMBER(S): ORBI 044

HAZARD(S) DESCRIPTION:
UNKNOWN GASEOUS CONTAMINATION LEVELS IN CREW CABIN.

- APPROVALS -

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