 PRINT DATE: 10/10/95

FAILURE MODES EFFECTS ANALYSIS (FMEA) – NON-CIL HARDWARE
NUMBER: M8-1MR-E005-X

SUBSYSTEM NAME: ECLSS - EXTERNAL AIRLOCK
REVISION: 2 9/15/95

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	VALVE, NEGATIVE PRESS RELIEF CARELTON TECHNOLOGIES	MC250-0002-0075 2725-0001-3

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
EXTERNAL AIRLOCK NEGATIVE PRESSURE RELIEF VALVE

REFERENCE DESIGNATORS:

QUANTITY OF LIKE ITEMS: 2
TWO

FUNCTION:
TWO VALVES MOUNTED FOR PARALLEL FLOW, EACH OF WHICH ALLOWS SUFFICIENT FLOW INTO THE INTERNAL AIRLOCK, TUNNEL ADAPTER, AND EXTERNAL AIRLOCK TO MAINTAIN THE TUNNEL/AIRLOCK STRUCTURAL CRUSHING PRESSURE AT LESS THAN 0.5 PSID DURING DESCENT. EACH RELIEF VALVE CONTAINS A SEALING CAP INTEGRAL TO ITS ASSEMBLY. VALVES ARE MOUNTED ON THE EXTERNAL AIRLOCK BULKHEAD WITH A SINGLE O-RING SEAL PER VALVE.

REFERENCE DOCUMENTS: V628-341015

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- NON-CIL FAILURE MODE
NUMBER: M8-1MR-E005- 03

REVISION# 2 9/15/95

SUBSYSTEM NAME: ECLSS - EXTERNAL AIRLOCK
LRU: VALVE, NEGATIVE PRESSURE RELIEF
ITEM NAME: VALVE, NEGATIVE PRESSURE RELIEF

CRITICALITY OF THIS FAILURE MODE: 1R3

FAILURE MODE:
INTERNAL LEAKAGE

MISSION PHASE:
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY: 104 ATLANTIS

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION, CONTAMINATION, PHYSICAL BINDING/JAMMING, SEAL MATERIAL DEGRADATION

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

CRITICALITY 1R2 DURING INTACT ABORT ONLY (AVIONICS ONLY)? N/A

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

PASS/FAIL RATIONALE:
A)

B)
N/A - NEGATIVE PRESSURE RELIEF VALVE AND CAP ARE IN STANDBY UNTIL REQUIRED.

C)

METHOD OF FAULT DETECTION:
NONE FIRST FAILURE. LOSS OF PRESSURE FOLLOWING SECOND FAILURE.

CORRECTING ACTION: CREW COULD CLOSE APPROPRIATE HATCH(S) TO ISOLATE LEAKAGE.

REMARKS/RECOMMENDATIONS:
VALVE CAP PROVIDES A REDUNDANT SEAL AGAINST INTERNAL LEAKAGE.

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OF REDUNDANCY - RELIEF VALVE CAP REMAINS TO SEAL AGAINST LOSS OF EXTERNAL AIRLOCK ATMOSPHERE.

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(B) INTERFACING SUBSYSTEM(S):
NO EFFECT FIRST FAILURE. RELIEF VALVE CAP WILL PROVIDE ADEQUATE PROTECTION AGAINST LOSS OF PRESSURIZATION.

(C) MISSION:
NO EFFECT FIRST FAILURE. POSSIBLE LOSS OF MISSION OBJECTIVES IF SECOND ASSOCIATE FAILURE (RELIEF VALVE CAP LEAKAGE) OCCURS PRIOR TO DOCKING OR PRIOR TO COMPLETION OF IVA.

(D) CREW, VEHICLE, AND ELEMENT(S):
NO EFFECT FIRST FAILURE. SECOND FAILURE COULD JEOPARDIZE CREW SAFETY.

(E) FUNCTIONAL CRITICALITY EFFECTS:
FIRST FAILURE - NO EFFECT.
SECOND ASSOCIATED FAILURE (RELIEF CAP LEAKAGE) COULD RESULT IN EXCESSIVE LOSS OF HABITABLE PRESSURE WITH ALL HATCHES OPEN. SAFETY OF ORBITER AND MIR CREW AND VEHICLE JEOPARDIZED UPON LOSS OF CONSUMABLES. POSSIBLE LOSS OF PRESSURE IN MIR IF SECOND FAILURE OCCURS WHILE EXTERNAL AIRLOCK UPPER HATCH IS OPEN.

DESIGN CRITICALITY (PRIOR TO DOWNGRADE, DESCRIBED IN (F)): 1R2

(F) RATIONALE FOR CRITICALITY DOWNGRADE:
THIRD & FOURTH FAILURES (INABILITY TO CLOSE CREW CABIN HATCH & FIFTH HATCH) - LOSS OF CAPABILITY TO ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE FROM CREW CABIN COULD RESULT IN LOSS OF CREW AND VEHICLE.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: HOURS TO DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS TO MINUTES

TIME FROM DETECTION TO COMPLETED CORRECTIVE ACTION: SECONDS

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

RATIONALE FOR TIME TO CORRECTING ACTION VS TIME TO EFFECT:
CREW WOULD HAVE ENOUGH TIME TO ISOLATE EXTERNAL LEAKAGE OF HABITABLE PRESSURE BY CLOSING THE APPROPRIATE HATCHES BEFORE THE PROBLEM BECAME CATASTROPHIC.

HAZARDS REPORT NUMBER(S): ORBI 511

HAZARD(S) DESCRIPTION:
LOSS OF HABITABLE PRESSURE.

- APPROVALS -

PRODUCT ASSURANCE ENGR. : M. W. GUENTHER : M. W. Guenther
DESIGN ENGINEER : K. J. KELLY : K. J. Kelly