

**FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE  
NUMBER:MB-1SS-E043 -X****SUBSYSTEM NAME: ECLSS - EMU POTABLE & WASTE WATER SYSTEM  
REVISION: 0 04/08/97**

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**PART DATA**

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	<b>PART NAME</b>	<b>PART NUMBER</b>
	<b>VENDOR NAME</b>	<b>VENDOR NUMBER</b>
LRU	:VALVE, SOLENOID LATCHING VALCOR ENGINEERING CORP	ME284-0518-1023 V70500-59-1

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**EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:  
ECLSS PANEL EMU POTABLE WATER SUPPLY SOLENOID LATCHING (CONTROL) VALVE****QUANTITY OF LIKE ITEMS: 2  
TWO****FUNCTION:  
ALLOWS FLOW OF POTABLE WATER TO AFFECTED EMU WHEN VALVE IS LATCHED IN  
THE OPEN POSITION. WHEN VALVE IS LATCHED CLOSED, IT PROVIDES EMU  
ISOLATION AGAINST A 40 PSIA MAXIMUM WATER SUPPLY PRESSURE.****REFERENCE DOCUMENTS: VS28-643001**

**FAILURE MODES EFFECTS ANALYSIS FMEA -- NON-CIL FAILURE MODE**

NUMBER: M8-1SS-E043-02

REVISION#: 0 04/17/98

SUBSYSTEM NAME: ECLSS - EMU POTABLE &amp; WASTE WATER SYSTEM

LRU: ECLSS PANEL EMU POTABLE WATER CONTROL VALVE CRITICALITY OF THIS

ITEM NAME: VALVE, EMU POTABLE WATER CONTROL 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:**

CHEMICAL REACTION, CONTAMINATION, MECHANICAL SHOCK, EXCESSIVE VIBRATION, MISHANDLING OR ABUSE, INTERNAL COMPONENT FAILURE

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

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

**PASS/FAIL RATIONALE:**

A)

B)

N/A - REDUNDANCY IS IN STANDBY UNTIL REQUIRED.

C)

**METHOD OF FAULT DETECTION:**

VISUAL/PHYSICAL OBSERVATION - EMU TANKS START FILLING UP WITH WATER WHEN EMU'S ARE FIRST CONNECTED.

INSTRUMENTATION - (1) SHUTOFF VALVE POSITION INDICATION ON M013Q PANEL AND IN TELEMETRY DATA; (2) EMU POTABLE WATER SUPPLY PRESSURE INDICATION ON THE AW82D PANEL PRESSURE GAUGE; OR (3) WATER PRESSURE TO EMU'S CAN ALSO BE OBTAINED FROM THE ISSA POTABLE WATER SUPPLY PRESSURE TRANSDUCER.

MASTER MEAS. LIST NUMBERS:	V64X0515E
	V64X0535E

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**CORRECTING ACTION: MANUAL**

**CORRECTING ACTION DESCRIPTION:**

POTABLE WATER TO EMU'S CAN BE SHUTOFF BY DISCONNECTING THE QD LOCATED AT THE MICROBIAL CHECK VALVE OR BY CLOSING THE MID DECK POTABLE WATER SHUTOFF VALVE.

**REMARKS/RECOMMENDATIONS:**

WITHIN THE ECLSS PANEL DUAL POTABLE WATER SUPPLY PATHS ARE PROVIDED TO SERVICE THE EMU'S. EACH PATH CONTAINS ONE LATCHING VALVE TO CONTROL FLOW OF POTABLE WATER. POTABLE WATER SHUTOFF TO ALL EMU'S IS PROVIDED BY A SOLENOID OPERATED LATCHING VALVE LOCATED IN THE MID DECK AREA.

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**- FAILURE EFFECTS -**

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**(A) SUBSYSTEM:**

INABILITY TO CONTROL POTABLE WATER FLOW TO AFFECTED EMU.

**(B) INTERFACING SUBSYSTEM(S):**

NO EFFECT FIRST FAILURE. INCREASED USE OF POTABLE WATER FOLLOWING FIFTH FAILURE COULD POTENTIALLY DRAIN ORBITER FLASH EVAP SYSTEM. POTENTIAL FOR WATER BUILDUP IN EXTERNAL AIRLOCK, CREW CABIN MID DECK, OR PAYLOAD BAY DEPENDING ON WHERE LEAKAGE OCCURRED.

**(C) MISSION:**

NO EFFECT ON MISSION SINCE FAILURE DOES NOT AFFECT SERVICING OF EMU'S WITH POTABLE WATER.

**(D) CREW, VEHICLE, AND ELEMENT(S):**

NO EFFECT FIRST FAILURE. INADVERTENT DRAINING OF ORBITER FLASH EVAP SYSTEM FOLLOWING FIFTH FAILURE COULD RESULT IN LOSS OF CREW AND VEHICLE.

**(E) FUNCTIONAL CRITICALITY EFFECTS:**

FIRST FAILURE (EMU WATER CONTROL VALVE FAILS TO CLOSE OR INTERNALLY LEAKS)  
- NO EFFECT UNTIL AN EXTERNAL LEAKAGE OF POTABLE WATER OCCURS DOWNSTREAM OF THIS VALVE.

SECOND FAILURE (EXTERNAL LEAKAGE OF POTABLE WATER DOWNSTREAM OF SHUTOFF VALVE) - UNABLE TO STOP EXTERNAL LEAKAGE OF POTABLE WATER USING THIS VALVE.

THIRD FAILURE (MID DECK POTABLE WATER SHUTOFF VALVE FAILS TO CLOSE OR INTERNALLY LEAKS) - UNABLE TO NOMINALLY SHUT OFF WATER FLOW TO THE EMU'S. POSSIBLE INADVERTENT DRAINING OF WATER FROM ORBITER FLASH EVAP SYSTEM WITHOUT PERFORMING A WORKAROUND. - CRITICALITY 1R3 CONDITION.

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

**(F) RATIONALE FOR CRITICALITY DOWNGRADE:**

**FOURTH FAILURE (UNABLE TO PERFORM WORKAROUND TO DISCONNECT QD) -  
UNABLE TO STOP INADVERTENT DRAINING OF ORBITER FLASH EVAP SYSTEM USING  
THIS QD.**

**FIFTH FAILURE (UNABLE TO STOP FLOW OF WATER TO AIRLOCK BY CLOSING  
APPROPRIATE ORBITER POTABLE & SUPPLY WATER SYSTEM VALVES) - UNABLE TO  
PERFORM WORKAROUND TO ISOLATE EXTERNAL LEAKAGE OF WATER FROM ORBITER  
POTABLE & SUPPLY WATER SYSTEM. CONTINUOUS DRAINING OF ORBITER FLASH  
EVAP SYSTEM COULD RESULT IN POTENTIAL LOSS OF CREW AND VEHICLE. -  
CRITICALITY 1R3 CONDITION.**

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**- TIME FRAME -**

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**TIME FROM FAILURE TO CRITICAL EFFECT: DAYS**

**TIME FROM FAILURE OCCURRENCE TO DETECTION: HOURS**

**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 WOULD HAVE SUFFICIENT TIME TO STOP EXTERNAL LEAKAGE OF POTABLE  
WATER BEFORE LOSS OF WATER FROM ORBITER FLASH EVAP SYSTEM BECOMES  
CATASTROPHIC.**

**HAZARD REPORT NUMBER(S): ORBI 276**

**HAZARD(S) DESCRIPTION:**

**LOSS OF FLASH EVAPORATION FUNCTION**

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**- APPROVALS -**

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**SS & PAE  
DESIGN ENGINEER**

**: M. W. GUENTHER  
: S. CASTILLO**

*M. W. Guenther*  
*S. Castillo*

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