

FAILURE MODES EFFECTS ANALYSIS (FMEA) - NON-CIL HARDWARE
NUMBER:M8-1SS-E053 -X

SUBSYSTEM NAME: ECLSS - ISS NITROGEN TRANSFER SYSTEM
REVISION: 0 **04/08/97**

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
LRU :FLOW RESTRICTOR	ME261-0011-0008

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
ISS NITROGEN TRANSFER LINE FLOW RESTRICTOR

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
RESTRICTS NITROGEN FLOW IN THE LINES RUNNING TO THE ISS TO 27.5 +/-2.5
LBM/HR.

REFERENCE DOCUMENTS: **M072-643415**
 VS28-643001

FAILURE MODES EFFECTS ANALYSIS FMEA - NON-CIL FAILURE MODE
NUMBER: M8-1SS-E063-01

REVISION#: 0 04/08/97

SUBSYSTEM NAME: ECLSS - ISS NITROGEN TRANSFER SYSTEM
LRU: ISS NITROGEN TRANSFER LINE FLOW RESTRICTOR **CRITICALITY OF THIS**
ITEM NAME: RESTRICTOR, NITROGEN LINE FLOW **FAILURE MODE: 1R3**

FAILURE MODE:
EXTERNAL LEAKAGE (GROSS)

MISSION PHASE: OO ON-ORBIT
DO DE-ORBIT

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

CAUSE:
CORROSION, MECHANICAL SHOCK, EXCESSIVE VIBRATION, MATERIAL DEFECT

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 PROVIDED BY WORKAROUNDS ARE IN STANDBY UNTIL REQUIRED.

C)

METHOD OF FAULT DETECTION:
INSTRUMENTATION - REDUCED OR LOSS OF ORBITER GN2 SYSTEM PRESSURE
INDICATION.

CORRECTING ACTION: MANUAL

CORRECTING ACTION DESCRIPTION:

CREW CAN ISOLATE LEAKAGE BY CLOSING THE SYS 1 ISO ON THE PAYLOAD BAY MMU INTERFACE PANEL. IN THE EVENT EXTERNAL LEAKAGE CANNOT BE ISOLATED, THE

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CREW CABIN AREA CONTAINS SUFFICIENT NITROGEN FOR CREW SURVIVAL DURING ABORTED MISSION DE-ORBIT AND LANDING PHASES.

REMARKS/RECOMMENDATIONS:

FLOW RESTRICTOR IS MOUNTED EXTERNALLY ON A RIGID NITROGEN LINE NEAR THE PAYLOAD BAY INTERFACE TO THE MMU INTERFACE PANEL. ALL EXTERNAL LEAKAGE OF NITROGEN WOULD BE OUTSIDE THE HABITABLE VOLUME. ISS GN2 TRANSFER CAN OCCUR DURING EVA OPERATIONS.

- FAILURE EFFECTS -

(A) SUBSYSTEM:

NITROGEN SUPPLY IS DIVERTED INTO THE PAYLOAD BAY BEFORE IT REACHES THE SPACE STATION.

(B) INTERFACING SUBSYSTEM(S):

GROSS EXTERNAL LEAKAGE COULD RESULT IN INADEQUATE N2 SUPPLY FOR CREW CABIN AIR MAKEUP, WATER TANKS, AND EXTERNAL AIRLOCK REPRESSURIZATION.

(C) MISSION:

LOSS OF MISSION OBJECTIVES ASSOCIATED WITH TRANSFERRING GN2 TO SPACE STATION. INCREASED USE OF ORBITER NITROGEN SUPPLY WOULD RESULT IN EARLY MISSION TERMINATION.

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

FAILURE TO ISOLATE EXTERNAL LEAKAGE OF N2 COULD JEOPARDIZE SAFETY OF CREW AND VEHICLE IF NITROGEN MAKEUP CAPABILITIES ARE REQUIRED DURING CREW'S RETURN TO EARTH. LOSS OF N2 SUPPLY TO ISS COULD IMPACT SPACE STATION OPERATIONS.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FIRST FAILURE (EXTERNAL LEAKAGE OF FLOW RESTRICTOR) - GN2 IS DIVERTED AWAY FROM THE SPACE STATION RESULTING IN POTENTIAL IMPACT TO SPACE STATION OPERATIONS. INCREASED USE OF ORBITER NITROGEN SUPPLY.
SECOND FAILURE (FAILURE TO CLOSE MMU SYS 1 ISO VALVE) - INABILITY TO ISOLATE A DOWNSTREAM N2 LEAK USING THIS VALVE. INCREASE USE OF CONSUMABLES WOULD RESULT IN PREMATURE DEPLETION OF GN2 TANKS. LOSS OF EVA CAPABILITIES DUE TO INABILITY TO REPRESSURIZE EXTERNAL AIRLOCK RESULTING FROM LACK OF CONSUMABLES. CREW WOULD HAVE TO RELY ON CONSUMABLES REMAINING IN CREW CABIN DURING ORBITER'S RETURN TO EARTH. AN UNCONTROLLED EXTERNAL LEAKAGE OF NITROGEN WOULD RESULT IN EARLY MISSION TERMINATION. - CRITICALITY 2RS CONDITION.

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(F) RATIONALE FOR CRITICALITY DOWNGRADE:
THIRD FAILURE (EXTERNAL LEAKAGE OF CABIN PRESSURE) - LOSS OF CABIN PRESSURE WITH NO N2 MAKEUP CAPABILITY WOULD RESULT IN LOSS OF CREW AND VEHICLE. - CRITICALITY 1R3 CONDITION.

- TIME FRAME -

TIME FROM FAILURE TO CRITICAL EFFECT: DAYS

TIME FROM FAILURE OCCURRENCE TO DETECTION: SECONDS

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 WOULD HAVE AMPLE TIME TO CLOSE GN2 ISOLATION VALVE TO STOP EXTERNAL LEAKAGE BEFORE PROBLEM BECAME CATASTROPHIC.

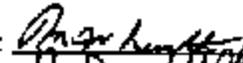
HAZARD REPORT NUMBER(S): ORBI 071

HAZARD(S) DESCRIPTION:
INADEQUATE NITROGEN SUPPLY TO MAINTAIN CABIN PRESSURE.

- APPROVALS -

SS & PAE
DESIGN ENGINEER

: M. W. GUENTHER
: K. J. KELLY

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