FAILURE MODES EFFECTS ANALYSIS (FMEA) – CRITICAL HARDWARE
NUMBER: 06-3B-0401-X

SUBSYSTEM NAME: ATCS - AMMONIA BOILER SYSTEM
REVISION: 1 08/25/93 W

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	AMMONIA BOILER SUB-SYSTEM	MC250-0005-0007 74716050
SRU	:	BOILER, AMMONIA	74716050

PART DATA

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
BOILER, AMMONIA

QUANTITY OF LIKE ITEMS: 1
ONE

FUNCTION:
PROVIDES COOLING FOR FREON COOLANT LOOPS WITH VAPORIZATION OF AMMONIA AS THE COOLING SOURCE. THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDING OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP DURING NORMAL DEORBITS.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3B -0401 -2 REV:03/09/8

ASSEMBLY :AMMONIA BOILER SUBSYSTEM
P/N RI :MC250-0005-0007
P/N VENDOR:74716050
QUANTITY :1
:ONE
:

ABORT
AOA, RTLS, TAL

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL LO GO DO X LS

CRIT. FUNC:
CRIT. HDW:

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:		APPROVED BY:		APPROVED BY (NASA):	
DES	J. MORGAN	DES		SSM	
REL	D. RISING	REL		REL	
QE	W. SMITH	QE		QE	

ITEM:
BOILER, AMMONIA.

FUNCTION:
PROVIDES COOLING FOR FREON COOLANT LOOPS WITH VAPORIZATION OF AMMONIA A THE COOLING SOURCE. THE AMMONIA BOILER SYSTEM IS USED DURING POSTLANDI OPERATIONS, LAUNCH ABORTS, AND AS A BACKUP SYSTEM DURING NORMAL DEORBIT

FAILURE MODE:
RESTRICTED FLOW, AMMONIA LOOP.

CAUSE(S):
CORROSION, VIBRATION, STRUCTURAL DAMAGE, CONTAMINATION.

EFFECT(S) ON:
(A)SUBSYSTEM (B)INTERFACES (C)MISSION (D)CREW/VEHICLE

(A) RESTRICTION OF SINGLE AMMONIA FLOW PATH WILL CAUSE LOSS OF BOTH AMMONIA TANKS AND CONTROLLERS.

(B) LOSS OF FREON COOLANT LOOP HEAT REJECTION BY THE AMMONIA BOILER.

(C) LOSS OF AMMONIA BOILER DURING POSTLANDING MAY CAUSE LOSS OF PAYLOAD COOLING.

(D) LOSS OF AMMONIA BOILER WHEN REQUIRED DURING DEORBIT WILL RESULT IN LOSS OF VEHICLE COOLING WHICH MAY CAUSE LOSS OF CREW/VEHICLE.

DISPOSITION & RATIONALE:
(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A) DESIGN
STANDARD BRAZED TUBE-SHELL CONSTRUCTION WITH 154 AMMONIA PASSAGES (0.0 INCH INNER DIAMETER) AND A ONE INCH EXHAUST VENT LINE. TOTAL RESTRICT OF PASSAGES IS REMOTE. CONTROL VALVES UPSTREAM HAVE A 100 MICRON FILT AT INLET. PARTIAL RESTRICTION RESULTS IN PERFORMANCE DEGRADATION. MATERIALS ARE CRES STAINLESS STEEL, WHICH IS CORROSION RESISTANT AND COMPATIBLE WITH AMMONIA AND FREON 21.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :ACTIVE THERMAL CONTROL FMEA NO 06-3B -0401 -2 REV:03/09/88

(B) TEST
QUALIFICATION TEST - QUALIFICATION TESTED FOR 100 MISSION LIFE. VIBRATION TESTED AT 0.01 G^2/HZ FOR 48 MIN/AXIS AND SHOCK TESTED AT +/- 2 G/AXIS.

ACCEPTANCE TEST - ATP INCLUDES FLOW TEST.

OMRSD - AMMONIA SAMPLE VERIFIED TO MEET SE-S-0073 REQUIREMENTS PRIOR TO LOADING. VEHICLE IS SERVICED THROUGH A GSE 15 MICRON (ABSOLUTE) FILTER. FUNCTIONAL TEST IS MONITORED TO VERIFY FLOWRATE IS WITHIN SPECIFIED LIMITS EVERY TURNAROUND.

(C) INSPECTION

RECEIVING INSPECTION
RAW MATERIAL CERTIFICATION VERIFIED BY INSPECTION. PARTS PROTECTION VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CONTAMINATION CONTROL PROCESSES, CONTAMINATION CONTROL PLAN, AND CORROSION PROTECTION PROVISIONS ARE VERIFIED BY INSPECTION. SYSTEM FLUI SAMPLES FOR CONTAMINATION VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
MANUFACTURING, INSTALLATION, AND ASSEMBLY OPERATIONS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
PENETRANT INSPECTION OF TIG WELDS IS VERIFIED.

CRITICAL PROCESSES
TUBE BRAZING AND TUBE WELDING VERIFIED BY INSPECTION. PASSIVATION OF CRES MATERIALS IS VERIFIED BY INSPECTION.

TESTING
FLOWRATES ARE VERIFIED TO SPECIFIED LIMITS BY INSPECTION.

HANDLING/PACKAGING
HANDLING AND STORAGE ENVIRONMENTS ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY
NO APPLICABLE FAILURE HISTORY.

(E)OPERATIONAL USE
IF FAILURE OCCURS DURING DEORBIT, PERFORM VEHICLE PRIORITY POWERDOWN. IF FAILURE OCCURS DURING POSTLANDING ACTIVITIES, PERFORM VEHICLE POWERDOWN.