SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :AUXILIARY POWER (APUS) FMEA NO 04-2 -11A -11 REV:02/26/93

ASSEMBLY :FUEL SUPPLY
P/N RI :ME271-0079-58XX
P/N VENDOR:TITEFLEX P/N 106056-58XX
QUANTITY :3
:1 PER FUEL FEEDLINE
:

CRIT. FUNC: 1
CRIT. HDW: 1

VEHICLE EFFECTIVITY:	102	103	104
	X	X	X

PHASE(S): PL X LO X OO X DO X LS X

REDUNDANCY SCREEN: A- B- C-

PREPARED BY:		APPROVED BY:	APPROVED BY (NASA):
DES	M HAMMEL	DES	SSM
REL	T R BOLTZ	REL	REL
QE	W J SMITH	QE	QE

ITEM:
FLEX HOSE, FUEL FEED LINE.

FUNCTION:
TO PROVIDE FOR DEFLECTION AT THE APU INTERFACE CAUSED BY BULKHEAD VIBRATION AND APU OVERHANG.

FAILURE MODE:
EXTERNAL LEAKAGE

CAUSE(S):
RUPTURE, CRACKS, FITTING FAILURES, APU DETONATION.

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

(A) POSSIBLE LOSS OF ONE APU SYSTEM BEFORE MISSION COMPLETION.

(B) POSSIBLE LOSS OF SHAFT POWER TO ONE HYDRAULIC PUMP. RAW FUEL IN AFT COMPARTMENT AND POSSIBLE DAMAGE TO ADJACENT HARDWARE.

(C) ABORT DECISION IS REQUIRED, IF FAILURE OCCURS PRIOR TO ENTRY COMMITMENT.

(D) NO EFFECT UNLESS FUEL IS IGNITED OR UNTIL SECOND SYSTEM LOST.

(E) FUNCTIONAL CRITICAL EFFECT - POSSIBLE LOSS OF CREW/VEHICLE IF EXPOSED FUEL IS IGNITED, CAUSING LOSS OF ADJACENT AND REDUNDANT HARDWARE.

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

(A) DESIGN
MATURE HARDWARE USED ON MILITARY AIRCRAFT AND SPACE PROGRAMS.

HOSE INNER CORE IS EXTRUDED TFE. REINFORCEMENT IS 304 SS WIRE BRAID. HOSE IS SINGLE BRAID, QUALIFIED TO MIL-H-25579.

HOSE-END FITTINGS ARE SS PROGRESSIVE-SWAGED WITH POSITIVE BRAID LOCK AND CONFORM TO MIL-H-25579. ONE HOSE END IS 304L STRAIGHT TUBE AND THE OTHER END IS 6AL-4V TITANIUM DUAL-SEAL FITTING WITH 8 RMS FINISH.

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(B) TEST

HOSE ASSEMBLY QUALIFICATION IMPULSE ENDURANCE CYCLING - 100,000 CYCLES, 0-1875-0 PSI AT 400 DEG F IN ACCORDANCE WITH FIG 3 MIL-H-25579. RATE 1 CYCLES/MIN. BURST PRESSURE - -8 SIZE, 8,000 PSI AT 70F, 6,000 PSI AT 4 DEG F.

SUPPLIER ACCEPTANCE - PROOF PRESSURE 3000. INTEGRATED SUBSYSTEM TEST WA USED FOR CERTIFICATION.

OMRSD: TOXIC VAPOR CHECKS AND POSTFLIGHT SYSTEM INSPECTIONS ARE PERFORMED EVERY FLOW.

(C) INSPECTION

RECEIVING INSPECTION

RECEIVING INSPECTION AND CHEMICAL ANALYSIS PERFORMED ON ALL RAW MATERIALS. RECEIVING INSPECTION VERIFIES INCOMING RAW STOCK IS NOT RELEASED TO THE SHOP FOR USE UNTIL A SAMPLE OF THE MATERIAL HAS BEEN CERTIFIED AS ACCEPTABLE BY THE COMPANY METALLURGIST.

CONTAMINATION CONTROL

CLEANLINESS TO LEVEL 100 IS VERIFIED BY INSPECTION. CORROSION PROTECTION REQUIREMENTS ARE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

MANUFACTURING, ASSEMBLY AND INSTALLATION REQUIREMENTS ARE VERIFIED BY INSPECTION. DIMENSIONS AND SURFACE FINISHES ARE VERIFIED BY INSPECTION. HOSE END FITTINGS ARE VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION

RADIOGRAPHIC INSPECTION OF SWAGED FITTINGS TO ASSURE THE HOSE AND BRAID ARE PROPERLY BOTTOMED IN THE END FITTING IS VERIFIED. RADIOGRAPHIC INSPECTION OF BUTT WELDED TUBING IS VERIFIED. EACH WELD RADIOGRAPH IS INSPECTED UNDER MAGNIFICATION TO ASSURE THE WELDS ARE FREE OF CRACKS, POROSITY, INCLUSIONS OR VOIDS.

CRITICAL PROCESSES

BUTT WELDING AND SWAGING ARE VERIFIED BY INSPECTION.

TESTING

TEST EQUIPMENT AND TOOL CALIBRATION ARE VERIFIED BY INSPECTION. PROOF PRESSURE AND LEAK TEST OF EACH HOSE ASSEMBLY IS PERFORMED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE, AND SHIPPING PROCEDURES ARE VERIFIED.

(D) FAILURE HISTORY

CAR AB5521, NOVEMBER 1979: AFTER FIRST INSTALLATION IN OV-102, FLEX HOSE DYNATUBE FITTING HAD HYDRAZINE LEAKAGE AFTER PASSING GAS LEAK TEST. SEALING SURFACE WAS REPOLISHED AND FITTING WAS RETORQUED. CAUSE OF LEAKAGE COULD NOT BE DETERMINED.

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IT WAS CONCLUDED THAT, INITIALLY WHEN THE DYNATUBE FITTING HAD EXPERIENCED ABOVE-SPEC GAS LEAKAGE, IT SHOULD HAVE BEEN REMOVED AND REINSTALLED PER DRAWING REQUIREMENTS. CORRECTIVE ACTION WAS TO INCORPORATE THIS REMOVAL AND REINSTALLATION PROCEDURE WHEN A DYNATUBE FITTING SHOWS SIGNS OF EXCESSIVE GAS LEAKAGE.

(E) OPERATIONAL USE

MANUALLY CLOSE FUEL TANK ISOLATION VALVES.