CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1R
SUBSYSTEM:	Helium Inject	PHASE(S):	a
REV & DATE:	J, 12-19-97	HAZARD REF:	P.02, P.06
DCN & DATE:			
ANALYSTS:	J. Delmonte/H. Claybrook		

FAILURE MODE: Leakage

FAILURE EFFECT: a) Loss of mission and vehicle/crew due to geysering followed by water hammer effect results in leakage of LO2 feedline and loss due to fire/explosion.

TIME TO EFFECT: Minutes

FAILURE CAUSE(S): Structural Failure of Manifold

REDUNDANCY SCREENS: Screen A: PASS
Screen B: N/A - Item nonfunctional in flight.
Screen C: PASS

FUNCTIONAL DESCRIPTION: Provides flow path to redundant filter/check valve branches for injecting helium into the LO2 feedline.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
2.4.13.1	80921011939-009	Manifold Assy (Upstream)	1	LWT-54 & Up

REMARKS:

SYSTEM:	Propulsion/Mechanical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	Helium Inject	DCN & DATE:	
FMEA ITEM CODE(S):	2.4.13.1		

RATIONALE FOR RETENTION

DESIGN:

The manifold provides structural provisions to install each filter/check valve assembly and provides a helium flow path to the LO2 propellant feed system. The manifold is machined from 2219-T87 aluminum plate and has been designed to meet the required yield (1.25) and ultimate (4.0) safety factors (ET Stress Report 826-2188). Material selected in accordance with MMC-ET-SE16 and controlled per MMHA Approved Vendor Product Assurance Plan, assures conformance of composition, material compatibility, and properties.

Redundancy Description:

The helium inject system on the ET and Orbiter SSME bleed provide LO2 conditioning that will prevent geysering. The systems are considered to be redundant and loss of helium injection is assessed criticality 1R.

Effect of First Redundancy Loss:

(Helium Injection) - Flow of LO2 from the tank to the SSME's by the active engine bleed system provides a cooling effect within the feedline and geysering will not occur. Manifold leakage resulting in loss of helium injection will be detected by the facility flowmeter and the action taken is LO2 stop flow.

Effect of Second Redundancy Loss:

(SSME Bleed) - For worst case (no helium injection, stop flow, and engine bleeds closed) geysering will occur in approximately 100 minutes. Action is taken to safe (off load) the ET.

TEST:

The Manifold Assy is certified. Reference HCS MMC-ET-TM08-L-P002.

Acceptance:

Perform leakage test (MMC-ET-TM04k).

INSPECTION:

Vendor Inspection - Lockheed Martin Surveillance:

Verify materials selection and verification controls (MMC-ET-SE16 and drawing 80921011939).

Penetrant inspect after machining (STP2501, Type 1, Method A).

MAF Quality Inspection:

Witness leakage test (MMC-ET-TM04k).

FAILURE HISTORY:

Current data on test failures, unexplained anomalies and other failures experienced during ground processing activity can be found in the PRACA data base.