CRITICAL ITEMS LIST (CIL)

SYSTEM:	Propulsion/Mechanical	FUNCTIONAL CRIT:	1
SUBSYSTEM:	LO2 Penetrations	PHASE(S):	a, b
REV & DATE:	J, 12-19-97	HAZARD REF:	P.10, S.07
DCN & DATE:			
ANALYSTS:	J. Attar/H. Claybrook		

FAILURE MODE: Leakage

FAILURE EFFECT:
a) Loss of mission and vehicle/crew due to fire/explosion.
b) Loss of mission and vehicle/crew due to fire/explosion.

TIME TO EFFECT: Seconds

FAILURE CAUSE(S):
A: Scratched/Nicked/Misaligned
B: Deterioration
C: Flange Mating Surface Defects

REDUNDANCY SCREENS: Not Applicable

FUNCTIONAL DESCRIPTION: Prevents leakage of LO2/GO2 between adapter and the aft manhole cover at the pressure monitor test port.

FMEA ITEM CODE(S)	PART NO.	PART NAME	QTY	EFFECTIVITY
2.9.3.1	55L5-4R	K-Seal	1	LWT-54 & Up

REMARKS:

SYSTEM:	Propulsion/Mechanical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	LO2 Penetrations	DCN & DATE:	004, 6-30-99
FMEA ITEM CODE(S):	2.9.3.1		

RATIONALE FOR RETENTION

DESIGN:

A-C: The K-seal is located between the LO2 tank aft manhole cover pressure monitor test port and adapter. These Harrison K-seals have been used on various space vehicles where cryogenic propellant sealing was required. Design features that aid in sealing are: dual sealing surfaces, heel seal (provides mechanical stop and carries hoop tension), soft coating on the seals (seals surface finish imperfections) and flexible tapered lips (maintains uniform stress levels). Seals are manufactured from A-286 CRES and coated with Dupont TFE primer followed by Dupont Black TFE Enamel.

A: Improper handling and installation leads to leakage which is detected by test. If the joint is disassembled, seal reuse/replacement is specified and controlled by STP2012.

B: Procurement of seals is governed by material, fabrication, processing and inspection specifications per MMC Standard 55L5. Coating material compatibility testing is specified for oxygen service (NHB 8060.1).

C: Mating surface finish is specified on engineering drawings to assure performance within the capability of the seal. Fitting torque requirement is specified on the Engineering installation drawing and is lockwired to preclude disengagement.

TEST:

The K-Seal is certified. Reference HCS MMC-ET-TM08-L-P008.

Qualification: MMA conducted a study that compared the K-seal performance at ET environments with past usage environments experienced by the seal. The study concluded that the seal design is qualified by similarity for all ET environments.

Acceptance:

MAF:

A-C: Perform seal leakage test (MMC-ET-TM04k).

Launch Site:

A-C: Perform seal leakage test (OMSRD File IV for LWT-54 thru 84, 89 thru 93).

SYSTEM:	Propulsion/Mechanical	REV & DATE:	J, 12-19-97
SUBSYSTEM:	LO2 Penetrations	DCN & DATE:	004, 6-30-99
FMEA ITEM CODE(S):	2.9.3.1		

RATIONALE FOR RETENTION

INSPECTION:

Vendor Inspections - Lockheed Martin Surveillance:

B: Verify materials selection and verification controls (MMC-ET-SE16 and Standard drawings 55L5).

MAF Quality Inspection:

A: Inspect (visually) seal surfaces for freedom of nicks, radial scratches or other imperfections during installation (drawing 80911001205).

A, C: Verify installation and witness torque (drawing 80911001205).

C: Inspect surface finish (drawing 80911001205).

C: Inspect sealing surfaces for freedom of nicks, radial scratches or other imperfections during installation (acceptance drawing 82620000001).

A-C: Witness seal leakage test (MMC-ET-TM04k).

B: Verify oxygen compatibility test report (NHB8060.1).

Launch Site:

A-C: Witness seal leakage test (OMRSD File IV for LWT-54 thru 84, 89 thru 93).

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.