SSME FMEA/CIL
REDUNDANCY SCREEN

Component Group:	Ducts and Lines
CIL Item:	K549-01
Part Number:	R0010760
Component:	Offset Mount MCC Pc Transducer Line
FMEA Item:	K547, K549
Failure Mode:	Fails to contain hot gas.

Prepared:	D. Early
Approved:	T. Nguyen
Approval Date:	7/25/00
Change #:	2
Directive #:	CCBD ME3-01-5638
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Phase	Failure / Effect Description	Criticality Hazard Reference
SMC 4.1	Leakage of hot-gas into the aft compartment and overpressurization of the aft compartment. Extensive engine damage. Erosion of Pc port. Loss of vehicle. Redundancy Screens: SINGLE POINT FAILURE: N/A	1 ME-D3S,A,M,C

SSME FMEA/CIL
DESIGN

Component Group:	Ducts and Lines	Prepared:	D. Early
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Design / Document Reference

FAILURE CAUSE: A: Parent material failure or weld failure.

THE MOUNT ASSEMBLY (1) IS MANUFACTURED UTILIZING 321 CRES TUBE AND INCONEL 625. 321 CRES TUBING WAS SELECTED FOR ITS STRENGTH, FABRICABILITY, GENERAL CORROSION RESISTANCE, AND STRESS CORROSION RESISTANCE (2). INCONEL 625 WAS SELECTED FOR ITS WELDABILITY, FORMABILITY, RESISTANCE TO STRESS CORROSION CRACKING, AND CORROSION RESISTANCE (2). INCONEL 625 POSSESSES THE REQUIRED STRENGTH WITHOUT REQUIRING HEAT TREAT. INCONEL 625 IS NOT SIGNIFICANTLY EFFECTED BY HYDROGEN IN THIS ENVIRONMENT (2). PAD AND BASE SECTIONS INCORPORATE RADIUS JOINTS TO REDUCE STRESS CONCENTRATIONS. OFFSET LIMIT REQUIREMENTS ARE ESTABLISHED TO REDUCED STRESS CONCENTRATIONS AND IMPROVE WELD GEOMETRY. TUBING STOCK IS DRAWN TO MAINTAIN SURFACE REGULARITY. INSTALLATION IS CONTROLLED FOR ANGULARITY AND OFFSET PER SPECIFICATION REQUIREMENTS (3). MINIMUM FACTORS OF SAFETY FOR THE MOUNT MEET CEI REQUIREMENTS (4). HIGH AND LOW CYCLE FATIGUE LIFE MEET CEI REQUIREMENTS (5). THE MOUNT ASSEMBLY HAS COMPLETED PRESSURE CYCLING AND ULTIMATE PRESSURE DVS TESTING (6). THE MOUNT ASSEMBLY PARENT MATERIALS WERE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH, SINCE THEY ARE NOT FRACTURE CRITICAL PARTS (7). TABLE K549 LISTS ALL THE FMEA/CIL WELDS AND IDENTIFIES THOSE WELDS IN WHICH THE CRITICAL INITIAL FLAW SIZE IS NOT DETECTABLE, AND THOSE WELDS IN WHICH THE ROOT SIDE IS NOT ACCESSIBLE FOR INSPECTION. THESE WELDS HAVE BEEN ASSESSED AS ACCEPTABLE FOR FLIGHT BY RISK ASSESSMENT (8). THE MOUNT ASSEMBLY HAS UNLIMITED ALLOWABLE LIFE. FLEET LEADER STATUS IS NOT TRACKED (5).

(1) R0010760; (2) RSS-8582; (3) RA1102-006; (4) RSS-8546, CP320R0003B; (5) RL00532, CP320R0003B; (6) RSS-511-31, RSS-511-45; (7) NASA TASK 117; (8) RSS-8756

SSME FMEA/CIL
INSPECTION AND TEST

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Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	MOUNT		R0010760
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING REQUIREMENTS.	R0010760
		DETAILS ARE PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS PRIOR TO WELDING.	RA0115-116
	WELD INTEGRITY	ALL WELDS ARE INSPECTED TO DRAWING AND SPECIFICATION REQUIREMENTS PER WELD CLASS. INSPECTIONS INCLUDE: VISUAL, DIMENSIONAL, PENETRANT, RADIOGRAPHIC, ULTRASONIC, AND FILLER MATERIAL, AS APPLICABLE.	RL10011 RA0607-094 RA0115-116 RA1115-006 RA1115-001 RA0115-127
	BRAZE INTEGRITY	BRAZING IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RA0107-010
	ASSEMBLY INTEGRITY	THE ASSEMBLY IS PROOF PRESSURE TESTED PER DRAWING REQUIREMENTS.	R0010760
		WELDS ARE PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS AFTER PROOF TEST.	RA0115-116
		ASSEMBLY IS FLOW TESTED PER SPECIFICATION REQUIREMENTS.	RL00483
	FLIGHT FLOW TESTING	THE EXTERNAL SURFACE IS VISUALLY INSPECTED PRIOR TO EACH LAUNCH.	OMRSD V41BU0.030
		A HELIUM SIGNATURE LEAK TEST IS PERFORMED PRIOR TO EACH LAUNCH. (LAST TEST)	OMRSD S00000.950

Failure History: Comprehensive failure history data is maintained in the Problem Reporting database (PRAMS/PRACA)
Reference: NASA letter SA21/88/308 and Rocketdyne letter 88RC09761.

Operational Use: Not Applicable.

SSME FMEA/CIL
FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE

Component Group: Ducts and Lines
Item Name: Offset Mount MCC Pc Transducer Line
Item Number: K549
Part Number: R0010760

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Base Line Rationale	Variance	Change Rationale	Variant Dash Number
1. K549-01 MOUNTS ARE REDESIGNED TO ELIMINATE AXIAL DRILLED HOLE IN LINE WITH THE LEE JET	SOME MOUNTS HAVE A PLUG WELDED INTO EXISTING HOLE	DYNAMIC PRESSURE FROM HIGH FLOW LEE JET WAS BEING RECOVERED AND SENSED BY PC TRANSDUCER CAUSING UNACCEPTABLE VARIATIONS BETWEEN A & B PC MEASUREMENTS. USE AS IS RATIONALE: WELDED ASSEMBLIES MEET ALL CEI REQUIREMENTS	R0010760-041

SSME EA/CIL
WELD JOINTS

Component Group: Ducts and Lines
CIL Item: K549
Part Number: R0010760
Component: Offset Mount MCC Pc Transducer Line
FMEA Item: K547, K549

Prepared: D. Early
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Change #: 1
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Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable HCF	Critical Initial Flaw Size Not Detectable LCF	Comments
LINE	R0010760	1,2	GTAW	I	X	X		