SSME FMEA/CIL
REDUNDANCY SCREEN

Component Group:	Orifices
CIL Item:	N720-01
Part Number:	RS009038
Component:	MCC ASI Oxidizer Upstream Orifice
FMEA Item:	N720, N721
Failure Mode:	Orifice restricted or blocked.

Prepared:	D. Early
Approved:	T. Nguyen
Approval Date:	7/25/00
Change #:	2
Directive #:	CCBD ME3-01-5638
Page:	1 of 1

Phase	Failure / Effect Description	Criticality Hazard Reference
S 4.1	The main chamber gases do not ignite. Low Pc results in failure to satisfy ignition confirmed limits and controller initiated shutdown. Mission scrub. Loss of vehicle due to LOX duct rupture may result if failure to establish MCC ignition is not detected. Redundancy Screens: ORIFICE SYSTEM, SENSOR SYSTEM: UNLIKE REDUNDANCY A: Pass - Redundant hardware items are capable of checkout during normal ground turnaround. B: Pass - Loss of a redundant hardware items is detectable during flight. C: Pass - Loss of redundant hardware items could not result from a single credible event.	1R ME-C3S

SSME FMEA/CIL DESIGN

Component Group:	Orifices
CIL Item:	N720-01
Part Number:	RS009038
Component:	MCC ASI Oxidizer Upstream Orifice
FMEA Item:	N720, N721
Failure Mode:	Orifice restricted or blocked.

Prepared:	D. Early
Approved:	T. Nguyen
Approval Date:	7/25/00
Change #:	2
Directive #:	CCBD ME3-01-5638
Page:	1 of 1

Design / Document Reference

FAILURE CAUSE: A: Contamination.

A GASEOUS NITROGEN (GN2) PURGE IS USED DURING PROPELLANT CONDITIONING TO REMOVE MOISTURE AND TO DILUTE PROPELLANT LEAKAGE. GASEOUS NITROGEN PARTICULATES ARE CONTROLLED BY THE INTERFACE CONTROL DOCUMENT (1). CLEANLINESS REQUIREMENTS ARE ESTABLISHED TO REDUCE THE POSSIBILITY OF ORIFICE BLOCKAGE (2). ENGINE SYSTEMS ARE CLEANED TO APPLICABLE MEDIA CLEANLINESS REQUIREMENTS (2). GN2 PURGE IS FILTERED BY THE PNEUMATIC CONTROL ASSEMBLY (PCA). THE GN2 INLET FILTER REMOVES PARTICULATES LARGER THAN 15-MICRON (3). THE PCA AND HELIUM PRECHARGE VALVE (HPV) DETAIL PARTS AND TEST FIXTURES ARE CLEANED (2) PRIOR TO ASSEMBLY (4). ASSEMBLY AND TEST ARE PERFORMED IN A CLEAN ROOM (5). LUBRICANTS ARE NOT ALLOWED FOR ASSEMBLY OR TEST (4). COMPONENT LEVEL TEST FLUIDS ARE NITROGEN AND HELIUM WHICH MEET THE HARDWARE CLEANLINESS REQUIREMENTS (2). THE COMPONENT PARTS AND SUBASSEMBLY ARE FREE OF VISIBLE FOREIGN PARTICLES AT THE TIME OF ASSEMBLY (4). THE ORIFICE SIZE IS LARGER THAN ACCEPTABLE PARTICULATES.

THE OXIDIZER SUPPLY IS FILTERED TO 800-MICRONS AT THE EXTERNAL TANK (1). THE ASI SYSTEM HAS BEEN DESIGN VERIFICATION TESTED FOR LOW PRESSURE IGNITION AND LOW MIXTURE RATIOS (6). THE CONTROLLER SOFTWARE IS CONFIGURED TO DETECT AND RESPOND PROPERLY TO FAILURE IDENTIFIED AND COMMAND A SAFE ENGINE STATE (7).

(1) ICD13M15000; (2) RL10001; (3) R0019450; (4) RL00226, RL00347; (5) RQ0711-600; (6) RSS-305-19; (7) CP406R0001 PT1, 3.2.3.3

SSME FMEA/CIL
INSPECTION AND TEST

Component Group: Orifices
CIL Item: N720-01
Part Number: RS009038
Component: MCC ASI Oxidizer Upstream Orifice
FMEA Item: N720, N721
Failure Mode: Orifice restricted or blocked.

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 7/25/00
Change #: 2
Directive #: CCBD ME3-01-5638

Failure Causes	Significant Characteristics	Inspection(s) / Test(s)	Document Reference
A	ORIFICE PCA GN2 INLET FILTER		RS009038 RES1090
	CLEANLINESS OF COMPONENTS	THE ASSEMBLY AND UPSTREAM COMPONENTS ARE CLEANED PER SPECIFICATION REQUIREMENTS.	RL10001
		AFTER WELDING, THE PASSAGE PORTS AND ORIFICES ARE INSPECTED FOR BLOCKAGE DUE TO WELD MATERIAL.	RL10011
		DURING PROPELLANT CONDITIONING, THE OXIDIZER SYSTEM PURGE IS VERIFIED PER SPECIFICATION REQUIREMENTS.	OMRSD S00FB0.300
		THE SSME PROPELLANT SYSTEM IS DRIED AND VERIFIED DRY PRIOR TO EACH FLIGHT.	OMRSD V41CB0.080 OMRSD V41CB0.081
	PCA GN2 FILTER INTEGRITY	FILTERS ARE INSPECTED TO MEET FLOW AND FILTRATION REQUIREMENTS PER SPECIFICATION REQUIREMENTS.	RC1090
	ASSEMBLY INTEGRITY	THE HOT FIRE TESTING AND 2ND E & M INSPECTIONS VERIFY CORRECT OPERATION.	RL00050-04 RL00056-06 RL00056-07
	PRE-FLIGHT CHECKOUT	THE ASI CHAMBERS ARE INSPECTED FOR DAMAGE PRIOR TO EACH LAUNCH. (LAST TEST)	OMRSD V41BU0.029

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.