1) CIL ITEM : 9400-06
2) PHEA CODE : 9400
3) COMPONENT : HPOTP
4) PART NUMBER : RS007701
5) SYSTEM/SUBSYSTEM : PUMPS/9XXX
6) FAILURE MODE : TURBINE DISCHARGE FLOW BLOCKAGE

7) PREPARED : SSME RELIABILITY
8) APPROVED :
9) DATE : 06-01-95
10) REVISION/CHANGE : -002/0
11) EFFECTIVITY : -761
12) HAZARD REFERENCE : SEE LISTINGS BELOW
13) CCBD # : ME3-01-3275

PHASE	FAILURE DESCRIPTION/EFFECT	CRITICALITY
S	DECREASE IN TURBINE PRESSURE RATIO REDUCES TURBINE POWER OUTPUT, RESULTING IN REDUCED PUMP SPEED, FLOW, AND DISCHARGE PRESSURE. REDUCED TURBOPUMP OUTPUT RESULTS IN REDUCED ENGINE THRUST. THIS IS SENSED BY THE CONTROLLER, WHICH INCREASES OXIDIZER PREBURNER FLOW. EXCESS TURBINE DISCHARGE TEMPERATURE WILL CAUSE REDLINE SHUTDOWN. MISSION SCRUB IF DETECTED BY REDLINE. LOSS OF VEHICLE DUE TO HPOTP TURBINE OR HEAT EXCHANGER FAILURE MAY RESULT IF NOT DETECTED. REDUNDANCY SCREENS: TURBOPUMP 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 ITEM IS DETECTABLE DURING FLIGHT. C: PASS. LOSS OF REDUNDANT HARDWARE ITEMS COULD NOT RESULT FROM A SINGLE CREDIBLE EVENT.	1R HAZARD REF: ME-C1S,M.
M	DECREASE IN TURBINE PRESSURE RATIO REDUCES TURBINE POWER OUTPUT, RESULTING IN REDUCED PUMP SPEED, FLOW, AND DISCHARGE PRESSURE. REDUCED TURBOPUMP OUTPUT RESULTS IN REDUCED ENGINE THRUST. THIS IS SENSED BY THE CONTROLLER, WHICH INCREASES OXIDIZER PREBURNER FLOW. EXCESS TURBINE DISCHARGE TEMPERATURE WILL CAUSE REDLINE SHUTDOWN. MISSION ABORT IF DETECTED BY REDLINE. LOSS OF VEHICLE DUE TO HPOTP TURBINE OR HEAT EXCHANGER FAILURE MAY RESULT IF NOT DETECTED. REDUNDANCY SCREENS: TURBOPUMP 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 ITEM IS DETECTABLE DURING FLIGHT. C: PASS. LOSS OF REDUNDANT HARDWARE ITEMS COULD NOT RESULT FROM A SINGLE CREDIBLE EVENT.	1R HAZARD REF: ME-C1S,M.

CIL ITEM: B400-06	DESIGN	DOCUMENT REF.
	FAILURE CAUSE A: COLLAPSE, DISTORTION OF TURBINE DISCHARGE DUCTING FAILURE CAUSE B: BENDING, CRACKING OF TURNING VANES THE TURBINE DISCHARGE STRUT ASSEMBLY (1) PROVIDES FLOW GUIDANCE TO THE EXHAUST GASES, SUPPORT FOR THE TURBINE HOUSING, AND COOLANT DISTRIBUTION TO THE MAIN HOUSING, THE SECOND-STAGE DISC AND TURBINE BLADES, AND THE TURBINE SEAL ASSEMBLY. THE -029 FLANGE IS THE STRUCTURAL MEMBER OF THE STRUT AND IS MANUFACTURED UTILIZING FORGED INCOLOY 903. INCOLOY 903 IS AN IRON BASE ALLOY WHICH WAS SELECTED FOR ITS TENSILE STRENGTH, AND RESISTANCE TO HYDROGEN ENVIRONMENT EMBRITTLEMENT, CORROSION, AND STRESS CORROSION CRACKING (2). THE ALLOY IS THERMO-MECHANICALLY PROCESSED FOR IMPROVED HIGH TEMPERATURE STRESS RUPTURE DUCTILITY, SOLUTION HEAT TREATED, AND AGE-HARDENED (1). THE STRUT IS PILOTED BY THE MAIN HOUSING (3) AND IS SECURED BY 15 BOLTS (4) AND LOCKWASHERS (5). SHEET METAL IS FORMED AND WELDED OVER THE FLANGE BODY TO PROVIDE AERODYNAMIC FLOW GUIDANCE OF THE TURBINE EXHAUST GAS. THE SHEET METAL DETAILS INCLUDES THE -035, -035, -037 VANES, THE -025 SHIELDS, THE -039 PLATES, THE -043 REFLECTOR, THE -053 RING, AND THE -019 SLEEVES. ANNEALED HAYNES 188 WAS SELECTED AS THE SHEET METAL MATERIAL FOR ITS TENSILE STRENGTH AT ELEVATED TEMPERATURES AND RESISTANCE TO DEGRADATION IN HIGH PRESSURE GASEOUS HYDROGEN (2). THE ALLOY HAS WELDABILITY TO ITSELF AND IS CORROSION RESISTANT (2). COOLANT IS ACQUIRED FROM THE TURBINE HOUSING (6) TO THERMALLY STABILIZE THE SHEET METAL STRUCTURE. A MIXED COOLANT OF HYDROGEN AND HOT-GAS IS USED TO COOL THE UPSTREAM PORTION OF THE FLANGE AND THE -033 VANE AND THE -025 SHIELDS. THE VANE IS SLOTTED, WHILE THE SHIELDS ARE SEGMENTED TO ALLOW FOR THERMAL EXPANSION AND CONTRACTION (1). THE VANE IS WELDED TO THE -019 SLEEVES AND IS CRIMPED AT THE UPSTREAM LOCATION TO THE FLANGE LIP. THE CRIMP IS RESTRAINED FROM MOVEMENT BY THE SECOND-STAGE TIP SEAL (7) AND NOZZLE FLANGE (8) DURING OPERATION. THE SHIELDS ARE BUTT-WELDED TO THE FLANGE AND ARE ENCLOSED BY THE VANE. THE MIXED COOLANT IS SUBSEQUENTLY DISCHARGED INTO THE HOT-GAS EXHAUST STREAM VIA VENT HOLES ON THE VANE (1). THE COOLANT IS METERED BY THE FLOW PASSAGES IN THE STRUT FLANGE WHICH MINIMIZES THE RESULTANT PRESSURE DIFFERENTIAL ACROSS THE VANE AND SHIELDS. THE -019 SLEEVES COVER THE 22 STRUTS TO FORM A PROTECTIVE COOLANT JACKET BETWEEN THE STRUTS AND THE EXHAUST GAS. THE SLEEVES ARE CRIMPED CIRCUMFERENTIALLY TO THE STRUTS IN THE ENCLOSED CAVITY OF THE VANE AND SHIELDS. HYDROGEN COOLANT IS METERED BY INDIVIDUAL LEE JET PLUGS (9) TO COOL THE STRUT AND SLEEVE, AND IS DISCHARGED AT THE MAIN HOUSING INTERFACE. THE SEGMENTED -035 VANES, THE -043 REFLECTOR, AND THE -053 RING ARE WELDED TO THE SLEEVE FOR RETENTION. THE REFLECTOR AND RING FORM A SHIELD FOR THE MAIN HOUSING AGAINST THE EXHAUST GAS AND UTILIZES THE COOLANT FROM THE SLEEVE DISCHARGE. THE REMAINING -037 VANE IS SECURED AT THE UPSTREAM LOCATION TO THE MAIN HOUSING BY RETAINER SEGMENTS (10), BOLTS (11), AND LOCKWASHERS (12). THIS AREA IS COOLED BY THE REFLECTOR DISCHARGE. ASSEMBLY PROCEDURES FOR LOCKING DEVICES ENSURE DEFECT-FREE INSTALLATION OF THE LOCKWASHERS (13). THE DOWNSTREAM SECTION OF THE VANE IS POSITIONED BY THE -039 PLATES WHICH ARE WELDED TO THE SLEEVES. THE PLATES PROVIDE REACTION SUPPORT FOR THE VANE AGAINST MOMENTUM AND PRESSURE LOADING, WHILE ALLOWING FREE THERMAL MOVEMENT OF THE VANE.	(1) RS007779 (2) RSS-8578-11 (3) RS007729 (4) RS007795 (5) RS007873 (6) RS007746 (7) RS007915 (8) RS007910 (9) JEPA1253022A (10) RS007875 (11) RS007792 (12) RS007894 (13) RL00814

C1L ITEM: B400-06	DESIGN	DOCUMENT REF.
	FAILURE CAUSE C: LOSS OF COOLANT TO TURBINE DISCHARGE STRUT	
	THE TURBINE DISCHARGE STRUT (1) UTILIZES COOLANT FROM THE TURBINE HOUSING (2) FOR THERMAL STABILIZATION OF THE STRUT ASSEMBLY. THE -029 FLANGE IS THE STRUCTURAL MEMBER OF THE STRUT AND IS MANUFACTURED UTILIZING FORGED INCOLOY 903. SHEET METAL IS FORMED AND WELDED OVER THE FLANGE BODY TO PROVIDE AERODYNAMIC FLOW GUIDANCE OF THE TURBINE EXHAUST GAS, AND IS MANUFACTURED UTILIZING ANNEALED HAYNES 188. A MIXED COOLANT OF HYDROGEN AND HOT-GAS IS INTRODUCED TO THE FLANGE AT THE SECOND-STAGE NOZZLE FLANGE (3) INTERFACE. THE COMPRESSION SUPPLIED BY THE TURBINE HOUSING AND ATTACHMENT BOLTS PRELOAD (4), TOGETHER WITH THE FLANGE SURFACE FINISH REQUIREMENTS, MINIMIZES LEAKAGE POTENTIALS AT THE INTERFACE. FOUR PARALLEL PASSAGES SUPPLY COOLANT TO THE OUTER DIAMETER COOLANT MANIFOLD OF THE FLANGE AND IS DISCHARGED TO A MANIFOLD FORMED BY THE -033 VANE AND -025 SHIELDS BY FOUR ADDITIONAL PARALLEL PASSAGES (1). A SIMILAR DESIGN IS USED FOR THE INNER DIAMETER COOLANT MANIFOLD OF THE FLANGE (1). THE VANE IS SLOTTED, WHILE THE SHIELDS ARE SEGMENTED, TO ALLOW FOR THERMAL EXPANSION AND CONTRACTION (1). THE MIXED COOLANT IS SUBSEQUENTLY VENTED INTO THE HOT-GAS EXHAUST STREAM VIA HOLES ON THE VANE (1). COOLANT IS METERED BY THE FLOW PASSAGES IN THE STRUT FLANGE WHICH MINIMIZES THE RESULTANT PRESSURE DIFFERENTIAL ACROSS THE VANE AND SHIELDS. HYDROGEN COOLANT IS METERED AT EACH STRUT BY A LEE JET PLUG (5), WHICH USES TWO PARALLEL PASSAGES TO COOL THE STRUT AND SLEEVE. THE FLOW IS DISCHARGED AT THE MAIN HOUSING INTERFACE, WHERE THE -043 REFLECTOR AND THE -053 RING FORM A MANIFOLD SHIELD FOR THE MAIN HOUSING AGAINST THE EXHAUST GAS. A PRESSURE-ASSISTED SEAL (6) IS EMPLOYED AT THE INTERFACE TO PREVENT COOLANT LEAKAGE. THE SEAL IS MANUFACTURED UTILIZING A-286 CRES, WHICH WAS SELECTED FOR ITS DUCTILITY, ELASTIC MODULUS, AND RESISTANCE TO HYDROGEN ENVIRONMENT, CORROSION, AND STRESS CORROSION CRACKING (7). THE ALLOY IS SOLUTION HEAT TREATED AND AGE-HARDENED (8). THE SEALING SURFACES ARE SILVER PLATED FOR ENHANCED SEALING FUNCTION (8). CLEANLINESS REQUIREMENTS DURING HANDLING AND ASSEMBLY (8), AND AT THE VEHICLE PROPELLANT CLEANLINESS LEVEL (9), MINIMIZES THE POTENTIAL OF BLOCKAGE FROM FOREIGN CONTAMINATION. ENGINE DRYING AND PURGING PRECLUDES THE FORMATION OF ICE CONTAMINATION. THE PRESSURE-ASSISTED SEAL IS ASSESSED TO HAVE INFINITE LIFE (10) AND IS NOT TRACKED BY SERIALIZATION.	(1) RS007779 (2) RS007746 (3) RS007910 (4) RS007892 (5) JEPA1253022A (6) RES1263 (7) RSS-8578-11 (8) RL10001 (9) ICD 13M15000 (10) RL00532, CP320R00038
	ALL CAUSES:	
	THE HIGH CYCLE AND LOW CYCLE FATIGUE LIFE OF THE TURBINE DISCHARGE STRUT, RETAINER SEGMENTS, RETAINER BOLTS, MAIN PUMP HOUSING, SECOND-STAGE NOZZLE FLANGE, AND THE PRESSURE-ASSISTED SEAL MEET CEI REQUIREMENTS (1). THE TURBINE HOUSING HIGH CYCLE FATIGUE LIFE MEETS CEI REQUIREMENTS (1), BUT IS LOW CYCLE FATIGUE LIFE LIMITED BY MAJOR WAIVER (7). THE MINIMUM FACTORS OF SAFETY FOR THESE PARTS MEET CEI REQUIREMENTS (2). THE HARDWARE PARENT MATERIALS WERE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH SINCE THEY ARE NOT FRACTURE CRITICAL PARTS, EXCEPT FOR THE TURBINE DISCHARGE STRUT WHICH WAS CLEARED BY CRITICAL INITIAL FLAW SIZE DETECTABILITY, THE MAIN PUMP HOUSING, TURBINE HOUSING, AND SECOND-STAGE NOZZLE WHICH WERE CLEARED BY RISK ASSESSMENT (3). THE FMEA/CIL WELDS ARE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH BY THE WELD ASSESSMENT (4). TABLE B400 LISTS ALL 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. THOSE WELDS IN WHICH THE CRITICAL INITIAL FLAW SIZE IS NOT DETECTABLE ARE ACCEPTABLE FOR FLIGHT BY RISK ASSESSMENT (4). THE CONTROLLER SOFTWARE IS CONFIGURED TO DETECT AND RESPOND TO THE FAILURES IDENTIFIED AND COMMAND A SAFE ENGINE STATE (5). REUSE OF PARTS DURING OVERHAUL ARE CONTROLLED BY THE REQUIREMENTS OF THE OVERHAUL SPECIFICATION (6).	(1) RL00532, CP320R00038 (2) RSS-8546-16, CP320R0003B (3) NASA FASK 117 (4) RSS-8756 (5) CP406R0008 3.2.3:5.2 (6) RL00874 (7) DAR 2141

CIL ITEM: B4DD-06		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
FAILURE CAUSE A, B:	RS007779 - STRUT		RS007779
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER DRAWING AND SPECIFICATION REQUIREMENTS.	RS007779 RB0170-196 RB0170-197
		STRUT IS PENETRANT AND MAGNETIC PARTICLE INSPECTED PER SPECIFICATION REQUIREMENTS.	RA0115-116 RA0115-115
	HEAT TREAT	HEAT TREAT IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RA0611-020
		ANNEALING IS VERIFIED PER DRAWING REQUIREMENTS.	RS007779
	ASSEMBLY INTEGRITY	THE STRUT SHEET METAL IS INSPECTED WITH A GO, NO-GO GAUGE FOR CLEARANCE INTO THE POWERHEAD PER SPECIFICATION REQUIREMENTS.	RL00814 RL00874
		UPSTREAM COMPONENTS ARE BORESCOPE INSPECTED AFTER EACH ENGINE HOT FIRE AND AFTER EACH TURBOPUMP REMOVAL.	RF0001-053 RL00461 OMMSD V41B00.065
	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 RA0507-094 RA0115-116 RA0115-006 RA1115-001 RA0115-127
		WELDS 67-70, 95, 96, 142 AND ADJACENT PARENT MATERIAL WALL THICKNESSES ARE INSPECTED FOR THINNING AND STEPS AFTER FLUSHING OPERATIONS PER DRAWING REQUIREMENTS.	RS007779
FAILURE CAUSE C:	RS007746 - TURBINE SUPPORT RS007779 - STRUT		RS007746 RS007779
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RB0170-197

CIL ITEM: B400-06		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
	ASSEMBLY SUTEGRITY	THE FLOW PASSAGES, COOLANT JETS AND BLEED PASSAGES ARE INSPECTED AND FLOW TESTED PER SPECIFICATION REQUIREMENTS DURING PUMP ASSEMBLY.	RL00814
		TURBINE HOUSING FREE HEIGHT IS INSPECTED PER DRAWING REQUIREMENTS.	RS007746
		THE OXIDIZER SYSTEM IS PURGED PER SPECIFICATION REQUIREMENTS.	OMRSD S00FB0.300 OMRSD S00FA0.210 OMRSD S00FN0.250 OMRSD V41C80.080 OMRSD V41C40.061
ALL CAUSES:	RS007701 - HPOTP		RS007701
	CLEANLINESS OF COMPONENTS	SSME SYSTEM CLEANLINESS IS VERIFIED THROUGHOUT ASSEMBLY PER SPECIFICATION REQUIREMENTS.	RL10001
	ASSEMBLY INTEGRITY	THE PUMP SUBASSEMBLIES ARE INSPECTED DURING OVERHAUL PER SPECIFICATION REQUIREMENTS. INSPECTIONS INCLUDE: VISUAL, DIMENSIONAL, PENETRANT, AND REPLACEMENT OF USAGE ITEMS AS APPLICABLE, PER OVERHAUL CLASSIFICATION.	RL00874 AA0115-116
		BOLT INSTALLATION AND TORQUE ARE VERIFIED PER DRAWING AND SPECIFICATION REQUIREMENTS.	RS007701 RL00814
		LOCKWASHER DEFORMATION IS VERIFIED PER DRAWING AND SPECIFICATION REQUIREMENTS.	RS007701 RL00814
		OPERATION/PERFORMANCE IS VERIFIED BY ENGINE HOT FIRE TESTING AND 2ND E & M INSPECTIONS.	RL00050-04 RL00056-06 RL00056-07 RL00461

CIL ITEM: B400-06		INSPECTION AND TEST	
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
		DATA FROM PREVIOUS FLIGHT OR HOT FIRE IS REVIEWED FOR PROPER TURBOPUMP OPERATION/PERFORMANCE. (LAST TEST)	MSFC PLN 1228
FAILURE HISTORY: COMPREHENSIVE FAILURE HISTORY DATA IS MAINTAINED IN THE PROBLEM REPORTING DATABASE (PRAMS/PRACA). REFERENCE: NASA LETTER SA21/68/308 AND ROCKETDYNE LETTER 88RC09761.			

OPERATIONAL USE: NOT APPLICABLE

TABLE B400. HIGH PRESSURE OXIDIZER TURBOPUMP
FMEA/CIL WELD JOINTS

COMPONENT	BASIC PART NO.	WELD NO.	WELD TYPE	CLASS	ROOT SIDE NOT ACCESS	CRITICAL INITIAL FLAW SIZE NOT DETECTABLE HCF	LCF	COMMENTS
MAIN HOUSING	RS007729	1,2	EBW	1	X	X		
MAIN HOUSING	RS007729	3	EBW	1		X		
MAIN HOUSING	RS007729	9,10	GTAW	II	X	X	X	
MAIN HOUSING	RS007729	11,12	GTAW	I		X		
MAIN HOUSING	RS007729	13	EBW	1	X	X		
MAIN HOUSING	RS007729	14-17,46	GTAW	II	X			
MAIN HOUSING	RS007729	18,19	GTAW	II	X	X	X	
MAIN HOUSING	RS007729	21,23	GTAW	II	X			
MAIN HOUSING	RS007729	22,24	GTAW	II	X			
MAIN HOUSING	RS007729	44,55-59	GTAW	I	X			
MAIN HOUSING	RS007729	45	GTAW	I	X			
MAIN HOUSING	RS007729	48	GTAW	I	X	X	X	
MAIN HOUSING	RS007729	49	GTAW	I	X			
MAIN HOUSING	RS007729	50	GTAW	I				
MAIN HOUSING	RS007729	51,52	GTAW	I	X			
MAIN HOUSING	RS007729	54	GTAW	I	X			
MAIN HOUSING	RS007729	55,56	GTAW	I	X			
MAIN HOUSING	RS007729	61	GTAW	I				
MAIN HOUSING	RS007729	62	GTAW	I	X			
MAIN HOUSING	RS007729	63	GTAW	I				
MAIN HOUSING	RS007729	64	GTAW	I	X	X		
MAIN HOUSING	RS007729	65	GTAW	1	X			
MAIN HOUSING	RS007729	66-70	GTAW	II	X			
INLET HOUSING	RS007732	4	GTAW	I		X		
INLET HOUSING	RS007732	8,9	GTAW	I		X		
VOLUTE	RS007732	10,15	GTAW	I	X	X		
VOLUTE	RS007732	20,21	GTAW	I				
VOLUTE	RS007732	22,23	GTAW	1				
VOLUTE	RS007732	24,27	GTAW	I		X	X	
VOLUTE	RS007732	25,26	GTAW	I				
FLANGE	RS007736	1,2	GTAW	II	X			
FLANGE	RS007736	3,26	GTAW	II	X			

TABLE B400. HIGH PRESSURE OXIDIZER TURBOPUMP
FMEA/CIL WELD JOINTS

COMPONENT	BASIC PART NO.	WELD NO.	WELD TYPE	CLASS	ROOT SIDE NOT ACCESS	CRITICAL INITIAL FLAW SIZE NOT DETECTABLE HCF	LCF	COMMENTS
FLANGE	R0007736	6,7	GTAW	II	X			
FLANGE	R0007736	9-12,17	GTAW	II	X			
FLANGE	R0007736	13-16	GTAW	II	X			
FLANGE	R0007736	18,20	GTAW	I	X			
FLANGE	R0007736	19,21	GTAW	II	X			
FLANGE	R0007736	22	EBW	I	X			
FLANGE	R0007736	23	GTAW	II				
FLANGE	R0007736	24	GTAW	II	X			
FLANGE	R0007736	26	GTAW	II	X			
BELLOWS	R0007740	1,2,5,9	GTAW	I		X		
BELLOWS	R0007740	3,4	EBW	I				
HOUSING	R0007746	1,2	GTAW	I	X	X	X	
HOUSING	R0007746	3	GTAW	I	X			
HOUSING	R0007746	4	GTAW	II	X			
HOUSING	R0007746	5	GTAW	II	X	X		
HOUSING	R0007746	6-17	GTAW	II	X	X		
HOUSING	R0007746	18-29	GTAW	II	X	X	X	
HOUSING	R0007746	30-41	GTAW	II		X	X	
BELLOWS	R0007748	1	EBW	I				
BELLOWS	R0007749	2	GTAW	I	X			
BELLOWS	R0007749	1-4	GTAW	I				
BELLOWS	R0007749	5,6	EBW	I				
BELLOWS	R0007749	11	EBW	I				
BELLOWS	R0007749	12	EBW	I				
BELLOWS	R0007751	3	EBW	I	X			
BELLOWS	R0007751	4	EBW	I	X	X	X	
BELLOWS	R0007751	8	GTAW	I	X	X		
SECOND STAGE NOZZLE	R0007752	1,2	EBW	I	X			
SECOND STAGE NOZZLE	R0007752	1	GTAW	I	X	X	X	
JET RING	R0007757	1	GTAW	I	X	X	X	
FAIRING	R0007774	1-12	GTAW	I		X		
FAIRING	R0007774	13-24	GTAW	I		X		

TABLE B400. HIGH PRESSURE OXIDIZER TURBOPUMP
PREA/CIL WELD JOINTS

COMPONENT	BASIC PART NO.	WELD NO.	WELD TYPE	CLASS	ROOT SIDE NOT ACCESS	CRITICAL INITIAL FLAW SIZE NOT DETECTABLE REF	LCF	COMMENTS
FAIRING	RS007774	25-36	BTAW	I		X		
FAIRING	RS007774	74	BTAW	I				
FAIRING	RS007774	75,76	BTAW	II	X			
STRUT	RS007779	23-44, 143-164	BTAW	II	X			
STRUT	RS007779	45-66, 165-186	BTAW	II	X			
STRUT	RS007779	67	BTAW	II	X			
STRUT	RS007779	69,70	EBW	II	X			
STRUT	RS007779	71	EBW	II				
STRUT	RS007779	72	EBW	II				
STRUT	RS007779	73-94	EBW	II				
STRUT	RS007779	95,96	EBW	II	X			
SHIELD	RS007781	1,11	BTAW	II				
SHIELD	RS007781	2,3,4	BTAW	II				
SEAL	RS008848	1 PLC	BTAW	I				
SEAL	RS008857	1 PLC	BTAW	I		X	X	

FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE

CIL ITEMS: B400-XX		HPOTP	P/N RS007791
BASE LINE RATIONALE	VARIANCE	CHANGE RATIONALE	VARIANT DASH NUMBER
1. B400-02, B400-03 SECOND STAGE NOZZLE CASTING IS HOT ISOSTATIC PRESSED PER DRAWING REQUIREMENTS. (ECP 1A-2949)	SECOND STAGE NOZZLE CASTINGS HAVE NOT BEEN HOT ISOSTATIC PRESSED	HOT ISOSTATIC PRESS INCREASES STRUCTURAL INTEGRITY BY REDUCING CASTING MICROPOROSITY. USE AS IS RATIONALE: 1. LIFE LIMIT ON NON HOT ISOSTATIC PRESSED 2ND STAGE NOZZLES REDUCES PROBABILITY OF LOW CYCLE FATIGUE CRACKING RESULTING FROM EXCESSIVE MICROPOROSITY. (DAR 2147) 2. A PENETRANT INSPECTION INTERVAL HAS BEEN IMPOSED ON NON HOT ISOSTATIC PRESSED 2ND STAGE NOZZLES TO VERIFY NO CRACKING IN EXCESS OF ALLOWABLE LIMITS. (DAR 2147)	-121, -131, -141, -151, -161, -171, -181, -191, -201, -211, -221, -231, -241, -251, -261, -271, -291, -301, -311, -331, -351, -371, -401
2. B400-13, B400-22 PROCESSED AND INSPECTED PER SPECIFICATION REQUIREMENTS (RL00916). (ECP 909)	BEARINGS ARE PROCESSED AND INSPECTED PER SPECIFICATION REQUIREMENTS (RL00558).	LONG TERM FATIGUE LIFE OF BEARING IS ENHANCED BY REDUCING THE ALLOWABLE SIZE AND QUANTITY OF ALLOWABLE DEFECTS. USE AS IS RATIONALE: 1. WEAR LIFE LIMIT ON BEARINGS PREVENTS WEAR FROM EXCEEDING ALLOWABLE LIMITS. (DAR 2054, DAR 2082) 2. CONTINUED USE WITH ALLOWABLE DISCREPANCIES IS CONTROLLED PER THE MAINTENANCE CONTROL DOCUMENT REQUIREMENTS (RSS-8795).	-121, -131, -141, -151, -161, -171, -181, -191, -201, -211, -221, -231, -241, -251, -261, -271, -291, -301, -311, -331, -351, -371, -401, -411 -421, -431, -441, -451, -461

FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE

CIL ITEMS: 8400-RK		HPOTP	P/N RS007701
BASE LINE RATIONALE	VARIANCE	CHANGE RATIONALE	VARIANT DASH NUMBER
3. 8400-21 HOUSING DETAILS ARE ULTRASONIC INSPECTED PER DRAWING AND SPECIFICATION REQUIREMENTS. (ECP 680)	HOUSING DETAILS HAVE NOT BEEN ULTRASONIC INSPECTED PER DRAWING AND SPECIFICATION REQUIREMENTS.	THE ADDED NDI PROVIDES ADDED CONFIDENCE THAT THE CRITICAL FLAW SIZE IS DETECTED IN THE PARENT MATERIAL OF THE HOUSING DETAILS. USE AS IS RATIONALE: 1. HOUSING DETAILS ARE ACCEPTABLE WITHOUT ULTRASONIC INSPECTION DUE TO A PENETRANT INSPECTION OF THE HOUSING DETAILS. THE PENETRANT INSPECTION IS ADEQUATE TO DETECT CRITICAL INITIAL FLAWS WHICH ARE THROUGH CRACKS.	-121, -131, -141, -151, -161, -171, -181, -191, -201, -211, -221, -231, -241, -251, -261, -271, -291, -301, -311, -331, -351, -371, -401, -411 -421, -431, -441, -451, -461, -471, -481, -491, -501
4. 8400-21 FITTING MATERIAL INTEGRITY IS VERIFIED PER SPECIFICATION REQUIREMENTS (INCONEL 718, #80170-153).	RS007729-059 TEE-FITTING IS MANUFACTURED FROM AIR MELT 321 CRES BAR (QQ-S-763 CL321 COND A).	INCONEL 718 MATERIAL DOES NOT EXHIBIT INCLUSION STRINGERS WHICH ARE SUSCEPTABLE TO CHEMICAL ATTACK AND MAY RESULT IN LEAKAGE. USE AS IS RATIONALE: 1. FITTINGS ARE LEAK CHECKED FOLLOWING PROOF PRESSURE TEST PER RL00587. 2. LOADS INDUCED BY FABRICATION (WELDING AND PROOF PRESSURE TESTING) ARE HIGHER THAN OPERATIONAL LOADS AND SUFFICIENT TO SCREEN -059 FITTINGS FOR LEAKAGE.	-171, -181