Exhibit G-2

4.6.4 Bore Pressure Test

Part Condition: Good

Part Description:

Using Nitrogen, the Bore was pressurized at 60 psi for 2 hours. Pressure remained the same throughout the test, indicating that the Chevron seals are in good working order.

Bore Pressure Test

5 Quality Checkpoint (QCP)

5.1 Attachments

See content below.

Comanche 3 QCP - Major Outage

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Xcel Energy

Customer: Xcel Energy
Site: Comanche Unit #3
Turbine Type: Steam
Turbine Serial Number: ~~N-1478~~ DV 04465 50
GE Site Lead:
QCP Revision: Rev 4 3/17/2020

Note 1: Field Engineer or Craft Supervisor can sign off a control point as pre-determined during outage planning
Note 2: Click here to add/customize verification methods and set definitions

Quality Control Point		GE Field Engineer or Superintendent		XCEL WITNESS (if applicable)		Reference Documents	Comments	Hold point/ witness point
Task	Verification Method	Initial	Date	Initial	Date			
Mitsubishi Turbine								
Mobilization								
All parts / materials on site	Document Review						Open packings, check quantities, and paperwork	H
Tool container on site	Visual Inspection							W
All special tools on site	Visual Inspection							W
Verify setup of laydown area	Visual Inspection					Laydown Plan	Team review by all parties	W
Verify agreement on FME plan	Document Review					FME plan	Presentation by FE to all parties (GE, subcontractors and customer) - establish a list of authorized persons	H
Walkdown and verify LOTO (Verify application of Safety grounds on Generator line side.)	Document Review					OneGE Safety Plan	GS	H
Procure all applicable Field Procedures & adapt / markup for unit and outage scope specifics	Document Review							H
Permit released - Customer handover	Document Review							H
Establish clean conditions (FME) - Zone 2	Visual Inspection					FME plan	FE to perform training / induction to authorized persons	H
Demobilization/ Move off site								
All site personel sign off LOTO	Visual Inspection					OneGE Safety Plan		H
Check packing of Tool container	Visual Inspection							W
All Rented Material returned	Visual Inspection							W
All Customer Material returned	Visual Inspection							W
Verify Site & Equipment Are Orderly	Visual Inspection							H
HP Turbine Checks								
HIP Disassembly								
Tight- Joint gap readings prior to HP outer cylinder removal	Review/Validate data sheets	2/1/20	JV			TC4F-36-001		
Loose- Joint gap readings prior to HP outer cylinder removal	Review/Validate data sheets	2/1/20	JV			TC4F-36-001		
Tight- Joint gap readings prior to HP inner cylinder cover removal	Review/Validate data sheets	3/4/20	JV			TC4F-36-002		
Loose- Joint gap readings prior to HP inner cylinder cover removal	Review/Validate data sheets	3/4/20	JV			TC4F-36-002		
Tight- Joint gap readings prior to IP inner cylinder cover removal	Review/Validate data sheets	3/5/20	JV			TC4F-36-003		
Loose- Joint gap readings prior to IP inner cylinder cover removal	Review/Validate data sheets	3/5/20	JV			TC4F-36-003		
Tight- Joint gap readings prior to N2 Packing Casing cover removal	Review/Validate data sheets	3/5/20	JV			TC4F-36-004		
Loose- Joint gap readings prior to HP inner cylinder cover removal	Review/Validate data sheets	3/5/20	JV			TC4F-36-004		
Opening HP axial rotor reference readings prior to thrust bearing/ coupling disassembly	Review/Validate data sheets	2/13/20	JV			TC4F-36-005		
As Found differential runout of the HIP turbine to LPA coupling halves	Review/Validate data sheets	1/28/20	JV			D306307		
Opening HP/LP Coupling Alignment	Review/Validate data sheets	1/30/20	JV			D306301		W
Opening HP Turbine Oil and Gland Bores	Review/Validate data sheets	2/13/20	JV			D306105		
Opening HP rotor "Thrust Bump" - SEM, L & k	Review/Validate data sheets	2/13/20	JV			TC4F-36-005		W
Measure thrust bearing locating mechanism position and screw heights	Review/Validate data sheets	2/14/20	JV			IR2WH2030		
Check thrust bearing squarness	Review/Validate data sheets	Not Done @ Disassembly				IR2WH2032		
Opening HP blade path clearances	Review/Validate data sheets	2/13/20	JV			IR2WH3000, 3001, 3004		W
As found blade ring drop checks	Review/Validate data sheets	2/18/20	JV			D307202		
Install Lower Half Turbine Casing FME Bladders	Witness Completion of Task	2/1/20	JV					
Evaluate conditions of existing diaphragm centering pins and correct as necessary.	Review/Validate data sheets	2/25/20	JV			D307210		
Coupling bolt holes and bolts shall be dimensionally analyzed	Review/Validate data sheets	2/11/20	JV			D306305		
The T-1 and T-2 journal bearings will be ultrasonic checked for babbit bond.	Review/Validate data sheets		JV					
The T-1 and T-2 journal bearings clearances will be recorded.	Review/Validate data sheets	2/13/20	JV			IR2WH2033		
Inspect and determine the condition and clearances of T1 and T2 oil deflectors. The oil deflector should be retoothed if the measured clearance exceeds 1-1/2 times the design clearance.	Review/Validate data sheets	2/18/20	JV			D309301		
Record HPIP rotor journal dimensions.	Review/Validate data sheets	2/14/20	JV			D306103		
Measure thrust bearing stack and compare to bump check clearance	Review/Validate data sheets	DV	4/22/20			D309202		
Inspect stage and shaft packing to determine physical condition and clearances.	Visual Verification	JV	2/14/20			D305343		
Perform tops on/tops off diaphragm alignment. Final desired settings to be provided by laser alignment specialist.	Review/Validate data sheets	3/11/20	JV					
Measure internal component drops and radial positions prior to moving components.	Review/Validate data sheets	3/17/20	JV			D307202R		

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Comanche 3 QCP - Major Outage

Task	Quality Control Point	Verification Method	GE Field Engineer or Supervisor Initial	GE Field Engineer or Supervisor Date	XCEL WITNESS (if applicable) Initial	XCEL WITNESS (if applicable) Date	Reference Documents	Comments	Hold point/ witness point
HP Reassembly		Review/Validate data sheets							
FME/ Cleanliness Verification	Prior to HP Inner Cylinder Base Installation	Visual Verification		5/12/20	5/13/20				XCEL WITNESS
FME/ Cleanliness Verification	Prior to Upper Half IP Inlet Casing Installation	Visual Verification		5/12/20	5/13/20				XCEL WITNESS
FME/ Cleanliness Verification	Prior to U/H HP N2 Packing Casing Installation	Visual Verification		5/12/20	5/13/20				XCEL WITNESS
FME/ Cleanliness Verification	Prior to Lower Half Blade Ring, Dummy Ring, and Gland Install	Visual Verification		5/12/20	5/13/20				XCEL WITNESS
Verify Packing Orientation	Prior to Final HP Rotor Installation	Visual Verification		N/A	N/A				
FME/ Cleanliness Verification	Prior to Rotor Installation	Visual Verification		5/14/20	5/13				XCEL WITNESS
Spray color with developer	In seal areas and rotate to check for contact	Visual Verification		5/14/20					
Closing HP Blade Path Clearances		Review/Validate data sheets		5/21/20			IR2WH3000, 3001,3004		
As Left diaphragm drop checks		Review/Validate data sheets		5/13/20			D307202		
Verify Support Key Clearance	Data Sheet is Complete Prior to U/H Installation	Review/Validate data sheets		5/16/20			IR2WH-0525, 0526		
Closing HP rotor float check	determine limiting component forward and aft			5/21/20			IR2WH-1528		
Thrust bearing Clearance check		Review/Validate data sheets		5/22/20			IR2WH-2031		
FME/ Cleanliness Verification	Prior to Upper Half Inner Blade Ring, Dummy Ring, and Gland Installation	Visual Verification		5/23/20	5/23				XCEL WITNESS
HP Inner Cylinder horizontal joint	bolting tightened per OEM instruction	Ring check		5/25/20	5/25		Dwg IWE-N26-10M-7762		XCEL WITNESS
N2 Packing Casing horizontal joint	bolting tightened per OEM instruction	Ring check		5/24/20	5/24		Dwg IWE-N26-10M-7762		XCEL WITNESS
IP Inner Cylinder Horizontal Joint	Bolting Tightened per OEM instruction	Ring check		5/23/20	5/22		Dwg IWE-N26-10M-7762		XCEL WITNESS
Tight bolt horizontal joint gap	checkof inner cylinders and N2 Packing casing	Review/Validate data sheets		5/23/20			TC4F-36-002 thru 004		
FME/ Cleanliness Verification	Prior to Upper Half Outer Cylinder Cover Installation			5/28/20	5/28				XCEL WITNESS
FME/ Cleanliness Verification of Steam Inlet Piping	Prior to HP Outer Cylinder Cover Installation	Visual Verification		5/12/20					
Outer Cylinder horizontal joint	bolting tightened per OEM instruction	Ring check		5/19/20	5/21		Dwg IWE-N26-10M-7762		XCEL WITNESS
Main Steam Inlet Piping flange	bolting tightened per OEM instruction	Ring check		5/30/20	5/30		Dwg 05310-1001		XCEL WITNESS
Reheat Inlet Piping flange	bolting tightened per OEM instruction	Ring check		5/30/20	5/30		Dwg 05320-1001		XCEL WITNESS
Tight bolt, cap check of Steam Inlet Flanges - Gasket Compression		Review/Validate data sheets		5/20/20			IR2WH5008		
Tight bolt horizontal joint gap check of outer cylinders		Review/Validate data sheets		5/23/20			TC4F-36-001	Double Tilt Rod -	
Perform twist/tilt check of bearings to journals		Review/Validate data sheets		5/23/20			D309102	not necessary	
Closing HP/LP Coupling Alignment		Review/Validate data sheets		5/22/20			D306301		XCEL WITNESS
Closing HP Turbine Oil & Gland Bores		Review/Validate data sheets		5/24/20			D306105		
Tighten coupling bolts per OEM instruction		Ring Check		5/28/20			SKF Dwg 13112		
As Left differential runout of the HP turbine to LPA coupling halves		Review/Validate data sheets		5/28/20			D306307		
Closing Axial Reference Readings Obtained Once Couplings are Assembled		Review/Validate data sheets		5/28/20			TC4F-36-005		
Perform pinch check on T1 & T2 bearings		Review/Validate data sheets		5/28/20			D309101		
LP Turbine Checks									
LP Disassembly									
Inner Casing Tight - Joint gap readings		Review/Validate data sheets		1/30/20			TC4F-36-006		
Inner Casing Loose- Joint gap readings		Review/Validate data sheets		1/30/20			TC4F-36-006		
Dual Flow Blade Ring Tight- Joint gap readings				2/1/20			TC4F-36-007		
Dual Flow Blade Ring Loose- Joint gap readings				2/3/20			TC4F-36-007		
Opening LP axial rotor reference readings prior to thrust bearing/ coupling disassembly		Review/Validate data sheets		2/3/20					
As Found differential runout of the coupling halves		Review/Validate data sheets		1/28/20			D306307	"L" Reference Dimension	
Opening LPA/LPB Coupling Alignment		Review/Validate data sheets		1/30/20			D306301	Not measured	
Opening LPB/Generator Coupling Alignment				1/30/20					
Opening LP Turbine Oil & Gland Bores		Review/Validate data sheets		1/30/20			D306105		
Opening LP blade path clearances		Review/Validate data sheets		1/24&13			IR2WH3000, 3001& 3012		
Install Lower Half Turbine Casing FME Planking/ Bladders		Witness complete task		1/30/20					Xcel Witness
Upper inner casing shall be blast cleaned in the areas of the horizontal joints, inner shell fits, and diaphragm fits, and a visual inspection completed. Evidence of steam cutting, erosion, pitting, metal displacement, distortion, etc. shall be noted and repairs completed as required.		Witness complete task		2/5/20					
As Found inner component drop checks		Review/Validate data sheets		2/11/20			D307202		
Evaluate conditions of existing diaphragm centering pins and correct as necessary.		Review/Validate data sheets		2/12/20			D307210		
Coupling bolt holes and bolts shall be dimensionally analyzed		Review/Validate data sheets		2/11/20			D306305		
Coupling bolt holes and bolts shall be ultrasonic checked for bobbit bond.		Visual Verification							
T3,T4,T5,T6 journal bearings will be ultrasonic checked for babbit bond.		Review/Validate data sheets		4/11/20			D309101		
T3,T4,T5,T6 journal bearings clearances will be recorded.		Review/Validate data sheets		2/18/20			D309301		
Inspect and determine the condition and clearances of T3-6 & TG oil deflectors. The oil deflector should be retoothed if the measured clearance exceeds 1-1/2 times the design clearance.									
Measure clearances and NDE oil seal rings		Review/Validate data sheets		2/12/20			D309104		
Record TE and GE rotor journal dimensions		Review/Validate data sheets		2/14/20			D306103		
Inspect diaphragm and shaft packing to determine physical condition and clearances.		Visual Verification		2/15/20			D305343		
Perform tops on/tops off diaphragm alignment. Final desired settings to be provided by laser alignment specialist.		Review/Validate data sheets		3/11/20					
Measure internal component drops and radial positions prior to moving components		Review/Validate data sheets		3/17/20			D307202R		

Quality Control Point		GE Field Engineer or Superintendent		XCEL WITNESS (if applicable)		Reference Documents	Comments	Hold point/ witness point
Task	Verification Method	Initial	Date	Initial	Date			
LP Reassembly								
As Built inner component drop checks	Review/Validate data sheets	DV	4/28/20	[redacted]		D307202		
Visually Inspect New L-1's and Lashing Lugs	Visual Verification	NA	NA		NA			
Verify Packing Orientation Prior to LP Rotor Installation	Visual Verification	DV	5/8/20				Packings can only be installed one way	
Spray rotors with developer in seal areas and rotate to check for contact	Visual Verification	DV	5/7/20					
FME/ Cleanliness Verification- LPA Lower Half Prior to LP Rotor Installation	Visual Verification	DV	5/13/20		5/15			XCEL WITNESS
FME/ Cleanliness Verification- LPB Lower Half Prior to LP Rotor Installation	Visual Verification	DV	5/14/20		5/16			XCEL WITNESS
Closing LP Blade Path Clearances	Review/Validate data sheets	DV	5/6/20			IR2WH3000, 3001 & 3012		
As Left inner component drop checks	Review/Validate data sheets	DV	5/6/20			D307202		
As left elevation support block clearances	Review/Validate data sheets	DV	5/9/20					
Closing LP rotor float check - note component limiting travel in either direction	Review/Validate data sheets	DV	5/7/20			IR2WH1526		
Closing LPA/LPB & LPB/Generator Coupling Alignment	Review/Validate data sheets	DV	5/16/20			D306301		
Closing LP Turbine Oil Bores	Review/Validate data sheets	DV	5/6/20					
Closing Axial Reference Readings Obtained Once Couplings are Assembled	Review/Validate data sheets	DV	5/28/20					
As Left differential runout of the HIP/LPA, LPA/LPB & LPB/Generator coupling halves.	Review/Validate data sheets	DV	5/26/20				LPA/LPB not measured - could not turn	
LPA FME/ Cleanliness Verification- Prior to Upper Half Components Installation	Visual Verification	DV	5/16/20		5/16	LPA		XCEL WITNESS
LPB FME/ Cleanliness Verification- Prior to Upper Half Components Installation	Visual Verification	DV	5/13/20		5/13/20	LPB		XCEL WITNESS
LPA FME/ Cleanliness Verification- Prior to Bolting Access Cover Installation	Visual Verification	DV	5/20/20		5/20/20	LPA		XCEL WITNESS
LPB FME/ Cleanliness Verification- Prior to Bolting Access Cover Installation	Visual Verification	DV	5/13/20		5/13/20	LPB		XCEL WITNESS
LPA FME/ Cleanliness Verification- Condenser- Prior to LP Outer Cylinder Cover Installation	Visual Verification	NA	NA			LPA	Checked by customer	XCEL WITNESS
LPB FME/ Cleanliness Verification- Condenser- Prior to LP Outer Cylinder Cover Installation	Visual Verification	NA	NA			LPB	Checked by customer	XCEL WITNESS
LP-A Blade checks								
L-1TE								
Visual Inspection Completed	Visual Inspection	DV	5/5/20					
L-1GE								
Visual Inspection Completed	Visual Inspection	DV	5/5/20					
LP-B Blade checks								
L-1TE								
Visual Inspection Completed	Visual Inspection	DV	5/4/20					
L-1 & L-0GE								
Visual Inspection Completed	Visual Inspection	DV	5/6/20					
Front Standard Checks								
Front Standard								
Install FME Bladder in open holes	Visual Inspection	1/30/20	DV					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	DV	5/28/20		5/28			XCEL WITNESS
Measure #1 bearing pinch to strongback	Review/Validate data sheets	DV	5/28/20			D309101		
Remove FME Bladders from open holes	Visual Inspection	CM	5/29/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	CM	5/29/20		5/29/20			XCEL WITNESS
Bearing Standards and Pedestals								
#2 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	1/28/20	DV					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	CM	5/26/20		5/26			XCEL WITNESS
Measure #2 bearing pinch/clearance to pedestal cover	Review/Validate data sheets	DV	5/28/20			D309101		
Remove FME Bladder from open holes	Visual Inspection	CM	5/29/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	DV	5/		5/29			XCEL WITNESS
#3 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	1/28/20	DV					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	5/26/20	[illegible]		5/26			XCEL WITNESS
Measure #3 bearing clearance to pedestal cover	Review/Validate data sheets	DV	5/28/20			D309101		
Remove FME Bladder from open holes	Visual Inspection	CM	5/29/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	DV			5/25			XCEL WITNESS
#4 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	1/27/20	DV					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	5/26/20	[illegible]		5/26			XCEL WITNESS
Measure #4 bearing clearance to pedestal cover	Review/Validate data sheets	DV	5/28/20			D309101		
Remove FME Bladder from open holes	Visual Inspection	DV	5/25/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	DV	5/25/20		5/25			XCEL WITNESS

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Quality Control Point		GE Field Engineer or Superintendent		XCEL WITNESS (if applicable)		Reference Documents	Comments	Hold point/ witness point
Task	Verification Method	Initial	Date	Initial	Date			
#5 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	1/22/20	[illegible]	[redacted]				
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	CM	8/26/20		3/27/20			XCEL WITNESS
Measure #5 bearing clearance to pedestal cover	Review/Validate data sheets	[illegible]	5/24/20			D309101		
Remove FME Bladder from open holes	Visual Inspection	[illegible]	5/24/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	[illegible]	5/24/20				…e as #4 - Additional Sign-off NA	XCEL WITNESS
#6 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	1/22/20	[illegible]					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	CM	8/25/20		3/27/20			XCEL WITNESS
Measure #6 bearing clearance to pedestal cover	Review/Validate data sheets	[illegible]	5/28/20			D309101		
Remove FME Bladder from open holes	Visual Inspection	[illegible]	5/28/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	[illegible]	5/28/20					XCEL WITNESS
EHC tank cleanliness		[illegible]	5/6/20		5/6/20			
Lube Oil Tank Cleanliness		[illegible]	5/11/20		5/11/20			

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Quality Control Point		GE Field Engineer		XCEL WITNESS (if applicable)		Reference Documents	Comments	Hold point/ witness point
Task	Verification Method	Initial	Date	Initial	Date			
Generator								
Disassembly- Exciter								
Remove protection covers, Install FME and DOCUMENT (FME Log)	Visual Inspection	1/28/20	DV					
Take clearances and remove air deflectors	Review/Validate data sheets	1/28/20	DV			AL93815		
Take clearances and remove brush rigging	Visual Inspection	1/31/20	DV			AL93815		
Measure steady rest bearing preload	Review/Validate data sheets	1/31/20	DV			D306107	Inboard/outboard Bearing in/out	
Disassembly- CE & TE								
Disconnect bearing instrumentation	Visual Inspection	1/30/20	DV					
Record opening oil deflectors alignment	Review/Validate data sheets	1/30/20	DV			D309302		
Record Rotor Position (Oil Bore) As Found	Review/Validate data sheets	1/31/20	DV			D306105		
Measure bearing bracket vertical step at outer oil deflector face	Review/Validate data sheets	2/12/20	DV			TC4F-36-022		
Measure top bearing shell clearance (to top post)	Review/Validate data sheets	2/12/20	DV			D309101		
Verify H2 seal ring freedom of movement	Witness complete task	2/8/20	DV					
Check top bearing clearances to rotor journal with lead wire	Review/Validate data sheets					D309101		
Establish clean conditions (install FME & record) - Zone 1	Visual Inspection	2/14/20	DV					
Remove U/H bearing bracket and associated hardware (Install FME & DOCUMENT)	Visual Inspection	2/14/20	DV					
Measure H2 seal bracket alignment to rotor (inner oil deflector)	Review/Validate data sheets	2/15/20	DV			D309302		
Remove upper hydrogen seal brackets and measure hydrogen seal squareness to rotor	Review/Validate data sheets	2/15/20	DV			TC4F-36-007		
Remove hydrogen seals.	Visual Inspection	2/15/20	DV					
Measure gas gap baffle clearances and remove gas gap baffles - CE only	Review/Validate data sheets	2/17/20	DV			TC4F-36-010	CE only	
Measure blade tip clearances - TE only	Review/Validate data sheets	2/18/20	DV			TC4F-36-009	TE only	
Remove blower shroud segments and rotating blower blades.	Visual - Confirm part marking or tagging	2/18/20	DV					
Clean and Inspect- CE & TE								
Clean & Visually inspect bearing brackets	Visual Inspection	DV	3/13/20					
Clean & Visually inspect fan blades and bolts - NDE	Visual Inspection	DV	3/11/20				TE only	
Check gland seal ring flatness, thickness, diameter, hydrogen seal bracket groove parallelism	Visual Inspection	3/11/20	DV			TC4F-36-008		
Clean, measure & visually inspect outer oil deflectors.	Visual Inspection	2/28/20	DV			D309301		
Measure H2 seal bracket inner oil deflector clearances	Review/Validate data sheets	2/28/20	DV			D309301		
Clean & visually inspect retaining rings - NDE	Visual Inspection	4/1/20	DV				3-Angle Phased Array Shear Wave	
Reassembly- CE & TE								
Verify cleanliness of generator installing Field	Visual Inspection	DV	3/13/20		3/13/20			XCEL WITNESS
Install and measure gas gap baffle clearances.	Review/Validate data sheets	DV	4/2/20			TC4F-36-010		
Install rotating blower blades and blower shroud segments. Measure clearances.	Review/Validate data sheets	DV	4/2/20			TC4F-36-009		
Verify that all blower blade locks are secured	Visual Verification	DV	4/9/20					XCEL WITNESS
Record H2 Seal bracket inner oil deflector clearances (Alignment to rotor)	Review/Validate data sheets	DV	4/14/20			D309302		
Re-install U/H Bearing & Record Clearances	Review/Validate data sheets	DV	5/21/20				Lead wire to Journal	
Install lower half hydrogen seal brackets and verify that gasket is not damaged	Visual Verification	DV	4/14/20					
Install hydrogen seal rings and measure squareness to the rotor	Visual Verification	DV	4/13/20					
Install upper half hydrogen seal bracket and verify that gasket is not damaged	Visual Verification	DV	4/13/20					
Perform closeout inspection of stator frame prior to installation of TE upper bearing bracket	Visual Verification	DCV	4/23/20		4/24			XCEL WITNESS
Perform closeout inspection of stator frame prior to installation of CE upper bearing bracket	Visual Verification	DV	4/23/20		4/23			XCEL WITNESS
Record Rotor Positions (Oil Bore) As Left	Visual Inspection	DV	4/14/20			D306105		
Record closing endshield vertical offset at outer oil deflector face	Review/Validate data sheets	DV	4/24/20			TC4F-36-022		
Perform a 500-volt one minute insulation test on the hydrogen seal casing	Megger check	DV	4/13/20					XCEL APPROVAL
Perform a 500 volt one minute insulation test on T-7 Bearing periodically during assembly	Megger check	DV	4/13/20					XCEL APPROVAL
Perform a 500 volt one minute insulation test on T-8 Bearing periodically during assembly	Megger check	DV	4/13/20					XCEL APPROVAL
Perform a 500 volt one minute insulation test on T-9 Bearing periodically during assembly	Megger check	DV	5/25/20		5/25			XCEL APPROVAL
Record closing oil deflectors alignment	Review/Validate data sheets	DV	5/25/20			D309302		
Reconnect bearing instrumentation	Visual Inspection	DV	5/29/20					
Pump sealant (end-shield U/H)	Visual Inspection	DV	5/9/20					
Reassembly- Exciter								
Install exciter	Visual Inspection	DV	5/25/20					
Install and validate clearances for air deflectors	Review/Validate data sheets	DV	5/30/20			AL93815		
Measure steady rest bearing preload	Review/Validate data sheets	DV	5/24/20			D306107	Inboard/outboard Bearing in/out	
Install and adjust brush rigging and Record	Visual Inspection	NA	NA		NA	AL93815	Installed by customer	
Reassembly- General								
Remove oil supply blanks (FME Covers and Barriers DOCUMENT)	Visual Inspection	DV	5/29/20					
Perform Generator Air Test (24H)	Review/Validate data sheets	DV	5/31/20			TC4F-36-011	Did not meet GE spec	XCEL APPROVAL
Verify electrical re-connections (flexible links, etc)	Visual Inspection	NA	NA		NA		Performed by customer	
Verify that skid pan softener is intact	Visual	DV	3/14/20					
Check collector ring OD's & Flatness	Datasheet	3/12/20	DV					

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Comanche 3 QCP - Major Outage

Quality Control Point		GE Field Engineer or Superintendent		XCEL WITNESS (if applicable)		Reference Documents	Comments	Hold point/ witness point
Task	Verification Method	Initial	Date	Initial	Date			
Throttle Valve checks				[redacted]				
Throttle Valve - Left Side				[redacted]				
Measure and record bonnet gaps	Review/Validate data sheets	[illegible]	2/27/20	[redacted]		TC4F-36-014		
Install FME line Bladder	Visual Inspection	[illegible]	2/14/20	[redacted]				XCEL WITNESS
Valve Stem Inspection- TIR diameters	Review/Validate data sheets	[illegible]	2/26/20	[redacted]		TC4F-36-013		
Measure and record valve travels and pilot valve lift	Review/Validate data sheets	[illegible]	2/6/20	[redacted]		TC4F-36-012		
Measure and record valve stem bushing clearance	Review/Validate data sheets	[illegible]	2/26/20	[redacted]		IR2WH3527	Replaced stem	
Pilot Valve to Disk Contact Checks (100%)	Photographs	[illegible]	3/5/20	[redacted]	3/5			XCEL WITNESS
Stem to Main Valve Nut Backseat Contact (100%)	Photographs	[illegible]	3/5/20	[redacted]	3/5			XCEL WITNESS
Main Plug Nut to Bushing Back Seat Contact Check (100%)	Photographs	[illegible]	3/11/20	[redacted]	3/11			XCEL WITNESS
Crosshead to Upper Bushing Seat Contact Check (100%)	Photographs	[illegible]	3/9/20	[redacted]	3/9			XCEL WITNESS
Main Disk to Seat Contact Check	Photographs	[illegible]	4/23/20	[redacted]	4/23			XCEL WITNESS
NDE inspection per ~~F1.1 Completed~~ Xcel NDE Matrix	Complete Inspection/checklist form	[illegible]	4/23/20	[redacted]				XCEL WITNESS
Remove FME line Bladder	Visual Inspection	[illegible]	5/1/20	[redacted]				
FME / Cleanliness - Just prior to valve installation	Witness completion of task	[illegible]	5/1/20	[redacted]	5/1			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	[illegible]	5/2/20	[redacted]		TC4F-36-014		
Verify that leakoff line flanges are square	Review/Validate data sheets	[illegible]	5/17/20	[redacted]		TC4F-36-021		
Throttle Valve - Right Side				[redacted]				
Measure and record bonnet gaps	Review/Validate data sheets	[illegible]	2/3/20	[redacted]		TC4F-36-014		
Install FME line Bladder	Visual Inspection	[illegible]	2/8/20	[redacted]				XCEL WITNESS
Valve Stem Inspection- TIR diameters	Review/Validate data sheets	[illegible]	2/26/20	[redacted]		TC4F-36-013		
Measure and record valve travels and pilot valve lift	Review/Validate data sheets	[illegible]	2/8/20	[redacted]		TC4F-36-012		
Measure and record valve stem bushing clearance	Review/Validate data sheets	[illegible]	2/26/20	[redacted]		IR2WH3527	Replaced stem & spring guide	
Pilot Valve to Disk Contact Checks (100%)	Photographs	[illegible]	3/6/20	[redacted]	3/6			XCEL WITNESS
Stem to Main Valve Nut Backseat Contact (100%)	Photographs	[illegible]	3/11/20	[redacted]	3/11			XCEL WITNESS
Main Plug Nut to Bushing Back Seat Contact Check (100%)	Photographs	[illegible]	3/11/20	[redacted]	3/11			XCEL WITNESS
Crosshead to Upper Bushing Seat Contact Check (100%)	Photographs	[illegible]	3/12/20	[redacted]	3/12			XCEL WITNESS
Main Disk to Seat Contact Check	Photographs	[illegible]	4/27/20	[redacted]	4/27			XCEL WITNESS
NDE inspection per ~~F1.1 Completed~~ Xcel NDE Matrix	Complete Inspection/checklist form	[illegible]	3/7/20	[redacted]				XCEL WITNESS
Remove FME line Bladder	Visual Inspection	[illegible]	5/1/20	[redacted]				
FME / Cleanliness - Just prior to valve installation	Witness completion of task	[illegible]	5/1/20	[redacted]	5/1			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	[illegible]	5/2/20	[redacted]		TC4F-36-014		
Verify that leakoff line flanges are square	Review/Validate data sheets	[illegible]	5/17/20	[redacted]		TC4F-36-021		
Governor Valves (GV) checks				[redacted]				
Governor Valve #1				[redacted]				
Measure and record bonnet gaps	Review/Validate data sheets	[illegible]	2/3/20	[redacted]		TC4F-36-014		
Install FME line Bladder	Visual Inspection	[illegible]	2/14/20	[redacted]				XCEL WITNESS
Valve Stem Inspection- TIR, diameters	Review/Validate data sheets	[illegible]	3/7/20	[redacted]		TC4F-36-015		
Measure and record pilot valve lift	Review/Validate data sheets	[illegible]	2/18/20	[redacted]		IR2WH3540		
Measure and record valve stem bushing clearance	Review/Validate data sheets	[illegible]	2/18/20	[redacted]		IR2WH3540		
NDE inspection per ~~F1.1 Completed~~ Xcel NDE Matrix	Complete Inspection/checklist form	[illegible]	3/8/20	[redacted]				XCEL WITNESS
Blue Check Bonnet to Steam Chest (100%)	Photographs	NA	NA	[redacted]	NA		Joint is gasketed	XCEL WITNESS
Stem Nut to Bushing back Seat Contact Check (100%)	Photographs	CM	3/20/20	[redacted]	3/20/20			XCEL WITNESS
Main Disk to Seat Check (100%)	Photographs	CM	3/24/20	[redacted]	3/24			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation	Witness completion of task	[illegible]	5/2/20	[redacted]	5/2/20			XCEL WITNESS
Remove FME line Bladder	Visual Inspection	[illegible]	5/2/20	[redacted]				
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	[illegible]	5/5/20	[redacted]		TC4F-36-014		
Verify that leakoff line flanges are square	Review/Validate data sheets	[illegible]	5/17/20	[redacted]		TC4F-36-021		
Governor Valve #2				[redacted]				
Measure and record bonnet gaps	Review/Validate data sheets	[illegible]	2/3/20	[redacted]		TC4F-36-014		
Install FME line Bladder	Visual Inspection	[illegible]	2/19/20	[redacted]	NA			XCEL WITNESS
Valve Stem Inspection- TIR, diameters	Review/Validate data sheets	[illegible]	3/7/20	[redacted]		TC4F-36-015		
Measure and record pilot valve lift	Review/Validate data sheets	[illegible]	2/18/20	[redacted]		IR2WH3540		
Measure and record valve stem bushing clearance	Review/Validate data sheets	[illegible]	2/18/20	[redacted]		IR2WH3540		
NDE inspection per ~~F1.1 Completed~~ Xcel NDE Matrix	Complete Inspection/checklist form	[illegible]	3/5/20	[redacted]				XCEL WITNESS
Blue Check Bonnet to Steam Chest (100%)	Photographs	NA	NA	[redacted]	NA		Joint is gasketed	XCEL WITNESS
Stem Nut to Bushing back Seat Contact Check (100%)	Photographs	CM	3/20/20	[redacted]	3/20/20			XCEL WITNESS
Main Disk to Seat Check (100%)	Photographs	CM	3/24/20	[redacted]	3/24			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation	Witness completion of task	[illegible]	5/2/20	[redacted]	5/2/20			XCEL WITNESS
Remove FME line Bladder	Visual Inspection	[illegible]	5/2/20	[redacted]				
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	[illegible]	5/5/20	[redacted]		TC4F-36-014		
Verify that leakoff line flanges are square	Review/Validate data sheets	[illegible]	5/17/20	[redacted]		TC4F-36-021		

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Task	Quality Control Point	Verification Method	GE Field Engineer or Supervisor Initial	GE Field Engineer or Supervisor Date	XCEL WITNESS (if applicable) Initial	XCEL WITNESS (if applicable) Date	Reference Documents	Comments	Hold point/ witness point
Governor Valve #3									
Measure and record bonnet gaps		Review/Validate data sheets	[redacted]	3/4/20			TC4F-36-014		
Install FME line Bladder		Visual Inspection	[redacted]	3/4/20					
Valve Stem Inspection- TIR, diameters		Review/Validate data sheets	[redacted]	3/4/20			TC4F-36-015		
Measure and record pilot valve lift		Review/Validate data sheets	[redacted]	3/6/20			IR2WH3540		
Measure and record valve stem bushing clearance		Review/Validate data sheets	[redacted]	3/6/20			IR2WH3540		
NDE inspection per ~~PI completed~~ Xcel NDE Matrix		Complete inspection/checklist form	[redacted]	3/5/20					
Blue Check Bonnet to Steam Chest (100%)		Photographs	NA	NA				Joint is gasketed	XCEL WITNESS
Stem Nut to Bushing back Seat Contact Check (100%)		Photographs	[redacted]	3/20/20					XCEL WITNESS
Main Disk to Seat Check (100%)		Photographs	[redacted]	3/20/20					XCEL WITNESS
FME / Cleanliness - Just prior to valve installation *Need to clean before HPTC install		Witness completion of task	[redacted]	3/24/20			TC4F-36-015		XCEL WITNESS
Remove FME line Bladder		Visual Inspection	[redacted]	5/12/20			IR2WH3540		
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	[redacted]	5/12/20			TC4F-36-014		
Verify that leakoff line flanges are square		Review/Validate data sheets	[redacted]	5/12/20			TC4F-36-021		
Governor Valve #4									
Measure and record bonnet gaps		Review/Validate data sheets	[redacted]	2/20/20			TC4F-36-014		
Install FME line Bladder		Visual Inspection	[redacted]	2/14/20					
Valve Stem Inspection- TIR, diameters		Review/Validate data sheets	[redacted]	3/4/20			TC4F-36-015		
Measure and record pilot valve lift		Review/Validate data sheets	[redacted]	2/18/20			IR2WH3540		
Measure and record valve stem bushing clearance		Review/Validate data sheets	[redacted]	2/18/20			IR2WH3540		
NDE inspection per ~~PI completed~~ Xcel NDE Matrix		Complete inspection/checklist form	[redacted]	3/5/20					
Blue Check Bonnet to Steam Chest (100%)		Photographs	NA	NA				Joint is gasketed	XCEL WITNESS
Stem Nut to Bushing back Seat Contact Check (100%)		Photographs	[redacted]	3/20/20					XCEL WITNESS
Main Disk to Seat Check (100%)		Photographs	[redacted]	3/20/20					XCEL WITNESS
FME / Cleanliness - Just prior to valve installation *Need to clean before HPTC install		Witness completion of task	[redacted]	3/24/20			TC4F-36-015		XCEL WITNESS
Remove FME line Bladder		Visual Inspection	[redacted]	5/12/20			IR2WH3540		
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	[redacted]	5/12/20			TC4F-36-014		XCEL WITNESS
Verify that leakoff line flanges are square		Review/Validate data sheets	[redacted]	5/12/20			TC4F-36-021		XCEL WITNESS
Reheat Stop Valve Checks									
RHSV - Left Side									
Measure and record cover gaps		Review/Validate data sheets	[redacted]	2/13/20			TC4F-36-014		
Measure axial clearance between the yoke and shoulder ring		Review/Validate data sheets	[redacted]	2/13/20			TC4F-36-016		
Valve Shaft Inspection- TIR, diameters		Review/Validate data sheets	[redacted]	2/15/20			TC4F-36-017		
Seal Ring to Stem and Housing Contact Check (100%)		Photographs	[redacted]	5/13/20					XCEL WITNESS
Main Disk to Seat Contact Check (100%) Not 100%		Photographs	[redacted]	5/14/20					XCEL WITNESS
Dimensionally inspect the stem/shaft to include its TIR, bushing, seal rings and all associated components.		Review/Validate data sheets	[redacted]	2/15/20			IR2WH3514		XCEL WITNESS
NDE inspection per ~~PI completed~~ Xcel NDE Matrix		Complete inspection/checklist form	[redacted]	2/15/20					XCEL WITNESS
Measure axial clearance between the yoke and shoulder ring		Review/Validate data sheets	[redacted]	2/13/20			TC4F-36-016		XCEL WITNESS
FME / Cleanliness - Just prior to valve installation components.		Witness completion of task	[redacted]	5/18/20					
Measure and record cover gaps-Gasket compression		Review/Validate data sheets	[redacted]	5/13/20			TC4F-36-014		XCEL WITNESS
RHSV - Right Side									
Measure and record bonnet gaps		Review/Validate data sheets	[redacted]	2/3/20			TC4F-36-014		
Measure axial clearance between the yoke and shoulder ring		Review/Validate data sheets	[redacted]	2/11/20			TC4F-36-016		
Valve Shaft Inspection- TIR, diameters		Review/Validate data sheets	[redacted]	2/15/20			TC4F-36-017		
Seal Ring to Stem and Housing Contact Check (100%)		Photographs	[redacted]	4/24/20					XCEL WITNESS
Main Disk to Seat Contact Check (100%) Not 100%		Photographs	[redacted]	5/14/20					XCEL WITNESS
Dimensionally inspect the stem/shaft to include its TIR, bushing, seal rings and all associated components.		Review/Validate data sheets	[redacted]	4/4/20			IR2WH3514		XCEL WITNESS
NDE inspection per ~~PI completed~~ Xcel NDE Matrix		Complete Inspection/Checklist form	[redacted]	3/3/20					XCEL WITNESS
Measure axial clearance between the yoke and shoulder ring		Review/Validate data sheets	[redacted]	5/15/20			TC4F-36-016		
FME / Cleanliness - Just prior to valve installation components.		Witness completion of task	[redacted]	5/16/20		5/16			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	[redacted]	5/17/20			TC4F-36-014		

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Task	Quality Control Point	Verification Method	GE Field Engineer or Supervisor Review Initial	GE Field Engineer or Supervisor Review Date	XCEL WITNESS (if applicable) Initial	XCEL WITNESS (if applicable) Date	Reference Documents	Comments	Hold point/ witness point
Intercept Valve Checks									
IV - Left Side Outboard									
Measure and record bonnet gaps		Review/Validate data sheets	RP	2/3/20			TC4F-36-014		
Measure and record pilot valve lift and balance chamber clearances		Review/Validate data sheets	RP				TC4F-36-018		
Measure and record valve stem bushing clearance		Review/Validate data sheets	RP	4/4/20			TC4F-36-019		
Dimensionally inspect stem-runout		Complete Inspection/Checklist form	RP				TC4F-36-020	Replaced stem	
NDE inspection per ~~FTI completed~~ ☞ Xcel NDE Matrix		Visual Inspection	RP	3/12/20					XCEL WITNESS
Install FME line Bladder		Visual Inspection	RP	2/24/20					
Remove FME line Bladder		Visual Inspection	RP						
Stem Backseat to Nut Contact Check (100%)		Photographs	RP	4/10/20		4/10			XCEL WITNESS
Disk to Seat Contact Check (100%) – Not 100%		Photographs	RP	5/13/20		5/13			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task	RP	5/15/20		5/14/20			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	RP	5/16/20			TC4F-36-014		
Verify that leakoff line flanges are square		Review/Validate data sheets	RP	5/17/20			TC4F-36-021		
IV - Left Side Inboard									
Measure and record bonnet gaps		Review/Validate data sheets	RP	2/3/20			TC4F-36-014		XCEL WITNESS
Measure and record pilot valve lift and balance chamber clearances		Review/Validate data sheets	RP	2/24/20			TC4F-36-018		XCEL WITNESS
Measure and record valve stem bushing clearance		Review/Validate data sheets	RP	2/24/20			TC4F-36-019		XCEL WITNESS
Dimensionally inspect stem-runout		Complete Inspection/Checklist form	RP	3/2/20			TC4F-36-020		
NDE inspection per ~~FTI completed~~ ☞ Xcel NDE Matrix		Visual Inspection	RP	3/12/20					XCEL WITNESS
Install FME line Bladder		Visual Inspection	RP	2/24/20					
Remove FME line Bladder		Visual Inspection	RP	5/11/20		3/28			XCEL WITNESS
Stem Backseat to Nut Contact Check (100%) – Seat points - Not 100%		Photographs	RP	5/11/20		5/11			XCEL WITNESS
Disk to Seat Contact Check (100%)		Witness completion of task	RP	5/13/20		5/14/20	TC4F-36-014		XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Review/Validate data sheets	RP	5/16/20			TC4F-36-021		
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	RP	5/17/20					
Verify that leakoff line flanges are square		Review/Validate data sheets	RP						
IV - Right Side Outboard									
Measure and record bonnet gaps		Review/Validate data sheets	RP	2/3/20			TC4F-36-014		XCEL WITNESS
Measure and record pilot valve lift and balance chamber clearances		Review/Validate data sheets	RP	2/24/20			TC4F-36-018		XCEL WITNESS
Measure and record valve stem bushing clearance		Review/Validate data sheets	RP	2/24/20			TC4F-36-019		XCEL WITNESS
Dimensionally inspect stem-runout		Complete Inspection/Checklist form	RP	3/2/20			TC4F-36-020		
NDE inspection per ~~FTI completed~~ ☞ Xcel NDE Matrix		Visual Inspection	RP	3/12/20					XCEL WITNESS
Install FME line Bladder		Visual Inspection	RP	2/24/20					
Remove FME line Bladder		Visual Inspection	RP	5/13/20		3/28			XCEL WITNESS
Stem Backseat to Nut Contact Check (100%)		Photographs	RP	5/13/20		5/11			XCEL WITNESS
Disk to Seat Contact Check (100%) – Seat points - Not 100%		Photographs	RP	5/11/20		5/11			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task	RP	5/13/20		5/14/20	TC4F-36-014		XCEL WITNESS
Measure and record bonnet gaps-Gasket compression		Review/Validate data sheets	RP	5/16/20			TC4F-36-021		
Verify that leakoff line flanges are square		Review/Validate data sheets	RP	5/17/20					

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Task	Quality Control Point	Verification Method	GE Field Engineer Initial	GE Field Engineer Date	XCEL WITNESS (if applicable) Initial	XCEL WITNESS (if applicable) Date	Reference Documents	Comments	Hold point/ witness point
Non Return Valve Inspections									
FWET-FV-3011-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3098-02	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3094-02	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3110-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3122-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3107-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3129-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
MPCR-FV-3023-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
MPCR-FV-3024-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3116-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3118-01	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							
FWET-FV-3102-02	Dimension Inspections	Review/Validate data sheets							XCEL WITNESS
	Contact check	Paper Check							XCEL WITNESS
Operates Freely disconnected from the actuator		Visual Verification							XCEL WITNESS
FME / Cleanliness - Just prior to valve installation		Witness completion of task							

6 Unit

6.1 Unit Description

Mitsubishi TC4F-36 Turbine
Serial Number: N-61-04465
HP Inlet Pressure: 3600 psia
HP Inlet Temperature: 1050 degrees F
IP Inlet Pressure: 720 psia
IP Inlet Temperature: 1100 degrees F
Exhaust Pressure: 4.00 inches HgA
Net Power Output: 878700 kW

MELCO Generator
Hydrogen Cooled with Stator Cooling Water
Serial Number: 05HBSE01
Hydrogen Pressure: 72.5 psi
Rated Output: 856800 kW

7 Appendix

7.1 Attachments

See content below.

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COMANCHE UNIT 3
LP STEAM TURBINE NDE REQUIREMENTS
ALL MT IS WFMT EXCEPT WHERE DRY IS SPECIFICALLY ALLOWED

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
A-LP Turbine Rotor	Perform Rotor Head Shot	✓		✓			Done
	Measure & record any blade movement fore or aft			N/A			
	Polish upstream and downstream blade root and wheel faces and perform WFMT with an AC Yoke on the Turbine end per ASTMI-16001-C	✓		✓			Done
	Inspect Turbine End Blading L-5T to L-0T	✓		✓			Done
	Inspect Turbine End Shrouds using an AC Yoke (Covers or Tenons)	✓		✓			Done
	Inspect Turbine end stellite strips on L-0 per ASTMI-16001-C and inspect stellite strips and ISB for erosion per MSTB-009		✓	✓			Done
	Evaluate Turbine end blade leading edge and ISB erosion per SIP-CCL0-1 and MSTB-009			✓			Done
	Polish upstream and downstream blade root and wheel faces and perform WFMT with an AC Yoke on the Generator end per ASTMI-16001-C	✓		✓			Done
	Inspect LP Generator End Blading L-5G to L-0G	✓		✓			Done
	Inspect Generator End Shrouds using an AC Yoke	✓		✓			Done
	Inspect Generator end stellite strips on L-0 per ASTMI-16001-C and inspect stellite strips and ISB for erosion per MSTB-009		✓	✓			Done

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Evaluate Generator end blade leading edge and ISB erosion per SIP-CCL0-1. and MSTB-009			✓			Done
	Inspect Journal between L-5's						Done
	Inspect Turbine End Journal						done
	Inspect Generator End Journal						done
	Inspect Turbine End Coupling						done
	Inspect Generator End Coupling						Done
A-LP Stationary Blades	Inspect A-LP no. 1 lower blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP no. 1 upper blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done
	Inspect A-LP nos. 2, 3, 4 lower stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints	✓		✓			done *Both MT and UT on studs*
	Inspect A-LP nos. 2, 3, 4 upper stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints	✓		✓			done
	Inspect A-LP generator end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP generator end no. 5 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
	Inspect A-LP turbine end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP turbine end no. 5 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			done

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
6	Inspect A-LP generator end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP generator end no. 6 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
O	Inspect A-LP turbine end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP turbine end no. 6 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
B-LP Turbine Rotor	Perform Rotor Head Shot	✓		✓			Done
	Measure & record any blade movement fore or aft					N/A	✓
	Polish upstream and downstream blade root and wheel faces and perform WFMT with an AC Yoke on the Turbine end per ASTMI-16001-C	✓		✓			Done
	Inspect Turbine End Blading L-5T to L-0T	✓		✓			Done
	Inspect Turbine End Shrouds using an AC Yoke	✓		✓			Done
	Inspect Turbine end stellite strips on L-0 per ASTMI-16001-C and inspect stellite strips and ISB for erosion per MSTB-009		✓	✓			Done
	Evaluate Turbine end blade leading edge and ISB erosion per SIP-CCL0-1 and MSTB-009						Done
	Polish upstream and downstream blade root and wheel faces and perform WFMT with an AC Yoke on the Generator end per ASTMI-16001-C	✓		✓			Done
	Inspect LP Generator End Blading L-5G to L-0G	✓		✓			Done
	Inspect Generator End Shrouds using an AC Yoke	✓		✓			Done
	Inspect Generator end stellite strips on L-0 per ASTMI-16001-C and inspect stellite strips and ISB for erosion per MSTB-009		✓	✓			Done
	Evaluate Generator end blade leading edge and ISB erosion per SIP-CCL0-1. and MSTB-009			✓			Done
	Inspect Journal between L-5's		✓	✓			Done
	Inspect Turbine End Journal		✓	✓			Done

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Inspect Generator End Journal	✓		✓			Done
	Inspect Turbine End Coupling	✓		✓			Done
	Inspect Generator End Coupling	✓		✓			Done
B-LP Stationary Blades	Inspect A-LP no. 1 lower blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP no. 1 upper blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done
	Inspect A-LP nos. 2, 3, 4 lower stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP nos. 2, 3, 4 upper stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done
	Inspect A-LP generator end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP generator end no. 5 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
	Inspect A-LP turbine end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP turbine end no. 5 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
	Inspect A-LP generator end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Inspect A-LP generator end no. 6 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
0	Inspect A-LP turbine end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints	✓		✓			Done *Both MT and UT on studs*
	Inspect A-LP turbine end no. 6 upper stationary Blades, Shrouds and Hor. Joints	✓		✓			Done
Cylinders, Cases & Misc.	LP-A Lower Inner Cylinder fits, seal faces and horizontal joints	✓		✓			*Dry MT is approved*
	LP-A Upper Inner Cylinder fits, seal faces and horizontal joints	✓		✓			*Dry MT is approved*
	LP-B Lower Inner Cylinder fits, seal faces and horizontal joints	✓		✓			*Dry MT is approved*
	LP-B Upper Inner Cylinder fits, seal faces and horizontal joints	✓		✓			*Dry MT is approved*
✓	LP-A Turbine End Exhaust Flow Guide piping, nozzles, struts, bolting, bolt holes, dowels and horizontal joints.						*UT bolting, dry MT is approved.*
✓	LP-A Generator End Exhaust Flow Guide piping, nozzles, struts, bolting, bolt holes, dowels and horizontal. joints.						*UT bolting, dry MT is approved.*
✓	LP-B Turbine End Exhaust Flow Guide piping, nozzles, struts, bolting, bolt holes, dowels and horizontal joints.						*UT bolting, dry MT is approved.*
✓	LP-B Generator End Exhaust Flow Guide piping, nozzles, struts, bolting, bolt holes, dowels and horizontal joints.						*UT bolting, dry MT is approved.*
✓	Inspect LP-A desuperheater and gland steam piping						*Check for OD erosion and wall thickness*

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NDE Matrix Comanche Unit 3

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Inspect LP-B desuperheater and gland steam piping					N/A	*Check for OD erosion and wall thickness*
	Crossover pipe gasket surfaces						
	Crossover pipe flange gasket surface					N/A	
	HP to LP-A Coupling Bolts			✓	✓		
	LP-A to LP-B Coupling Bolts			✓	✓		
	LP-B to Generator Coupling Bolts			✓	✓		
	LP-A Crossover Pipe Bolting						
	LP-B Crossover Pipe Bolting						
	LP-A Outer Case Bolting						
	LP-A Inner Case Bolting						
	LP-B Outer Case Bolting						
	LP-B Inner Case Bolting						
	LP-A Crossover Expansion Bellows					N/A	*PT if removed, VT if accessible*
	LP-B Crossover Expansion Bellows					N/A	*PT if removed, VT if accessible*
	LP-A Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers	✓					*UT bolting, dry MT is approved.*
	LP-A Turbine End Steam Gland upper half case	✓					*dry MT is approved*
	LP-A Generator End Steam Gland lower half case, studs, nuts, sleeves and washers	✓					*UT bolting, dry MT is approved.*
	LP-A Generator End Steam Gland upper half case	✓					*dry MT is approved*
	LP-B Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers	✓					*UT bolting, dry MT is approved.*
	LP-B Turbine End Steam Gland upper half case	✓					*dry MT is approved*
	LP-B Generator End Steam Gland lower half case, studs, nuts, sleeves and washers	✓					*UT bolting, dry MT is approved.*

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NDE Matrix Comanche Unit 3

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	LP-B Generator End Steam Gland upper half case	✓		✓			*dry MT is approved*
	LP-A Rotor Shaft Expansion Bellows						RED DYE, UW
	LP-B Rotor Shaft Expansion Bellows						RED DYE, UW
Bearings	No. 3 Bearing		✓	✓	✓		
	No. 4 Bearing		✓	✓	✓		
	No. 5 Bearing		✓	✓	✓		
	No. 6 Bearing		✓	✓	✓		

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SIEMENS WESTINGHOUSE AND MITSUBISHI STEAM TURBINE GENERATORS
NDE REQUIREMENTS
ALL MT SHALL BE WET FLUORESCENT MT (WFMT) UNLESS DRY (DMT) IS ALLOWED IN THE COMMENTS SECTION
ALL PT SHALL BE FLUORESCENT PT (FPT) UNLESS VISIBLE (VPT) IS ALLOWED IN THE COMMENTS SECTION
ECT = EDDY CURRENT TESTING, UT = ULTRASONIC TESTING

COMPONENT	ITEM	METHOD				Comments
		MT	PT	VT	UT	
Turbine Rotors						Head shot and coil MT
	Blades	X	X	X		MT or PT depending on material properties
	Shrouds	X		X		Perform separate AC Yoke inspection
	Tenons	X		X		Perform separate AC Yoke inspection
	Stellite Strips		X	X		ECT may be substituted for PT. VPT is OK.
	Lashing Lugs	X	X	X		MT or PT depending on material properties
	Journals	X		X		
	Body	X		X		Pay special attention to all circumferential grooves and diameter fillets per PB2-12-0046-ST-EN-01 or PB2-12-0047-ST-EN-01 as applicable.
	Dummy Ring areas	X		X		
	Couplings	X		X		
	First 2 rows of HP & IP blade tenons			X		Per OMM-161
	Measure gaps between shrouds and blades			X		
	Measure shroud offset			X		
	HP Rotor center region grooves		X			Per PB12-0046-ST-EN-01
	Side entry blade roots		X	X		FPT after grinding and polishing per AIB 7703
	Polish upstream and downstream blade root and wheel faces on LP Rotor rows L-0, L-1 and L-2	X		X		Use an AC Yoke for this inspection. Eddy current may be substituted for MT.
	Inspect titanium blade interlocks		X	X		Per SB-2004-019, Rev. 4
	Pins on any pinned rows				X	
	Compensator (bellows)		X	X		
	Evaluate LP Rotor L-0 Row trailing edge erosion on titanium blades			X		Per SB2-09-0010-ST-EN-01, Rev. 1
	Evaluate LP Rotor leading edge erosion			X		Per Westinghouse Service Position Paper on LP Blade Erosion dated July, 1975
	Evaluate shroud and leading edge erosion			X		Per Mitsubishi Technical Bulletin MSTB-008

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COMPONENT	ITEM	METHOD				Comments
		MT	PT	VT	UT	
Blade Rings and Diaphragms	Airfoils	X	X	X		The last LP blade ring may be non-magnetic and if so, will require FPT in lieu of MT. All magnetic blade rings require MT. These inspections are in addition to VT.
	Studs, screws and pins	X		X	X	
	Nozzle Block screws	X		X		Per SB4-11-0042-ST-EN-01
	Nozzle Block vanes		X	X		Per SB4-12-0017-ST-EN-01
	Horizontal Joints	X		X		
	Seal Faces	X		X		
	Outer rings and inner webs	X		X		
Dummy Rings	Rings	X		X		
	Studs	X		X	X	
Inner Cylinder	Horizontal joint studs	X		X	X	
	Nuts, sleeves and washers	X		X		
	Fits and seal faces	X		X		WFMT or DMT is OK
	Horizontal joints including bolt holes	X		X		
	Exhaust Hood spray piping, nozzles and supports			X		
	Exhaust Flow Guides			X		
	Flow Guide bolting	X		X	X	
	Flow Guide bolt holes	X		X		
	Flow Guide dowels	X		X		
	Flow Guide horizontal joints	X		X		
	Gasket surfaces and handhole covers			X		
Outer Case	Horizontal joint studs	X		X	X	
	Nuts, sleeves and washers	X		X		
	Fits and seal faces	X		X		WFMT or DMT is OK
	Horizontal joints	X		X		WFMT or DMT is OK
	Exhaust strut/bracing welds	X		X		WFMT or DMT is OK
Steam Glands	Gland Cases vetical and horizontal joints and packing seal faces	X		X		WFMT or DMT is OK
	Desuperheater and gland steam piping			X	X	Per SB 53009ST
	Studs, nuts, sleeves and washers	X		X	X	
Generator Rotor	Exposed shaft	X		X		

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COMPONENT	ITEM	METHOD				Comments
		MT	PT	VT	UT	
	Coupling	X		X		
	Retaining rings	X	X	X		MT or FPT, depending on material properties
	Fan blades	X	X	X		MT or FPT, depending on material properties
Generator	Stationary Blower blade rings		X	X		Per PB2-10-0012-GN-EN-01
	Rotating Blower blades	X		X		
	Blower, Diffuser and Shroud	X	X	X		Per SB2-13-0023-GN-EN-01. MT or FPT, depending on material properties
	Blower blade locking inserts		X	X		Per OMM-071
Exciter Rotor	Exposed shaft	X		X		
	Coupling	X		X		
	Retaining rings	X	X	X		MT or FPT, depending on material properties
Bearings & Seals	Thrust Bearings		X	X	X	VPT is OK
	Journal Bearings		X	X	X	VPT is OK
	Hydrogen Seals		X	X	X	
	Bearing rings and bolting	X		X		
Throttle Valves X	Studs	X		X	X	MT per SB 54010ST
	Valve seat, seat seal weld & pilot valve seat		X	X		VPT is OK
	Pilot valve seat		X	X		VPT is OK
X	Strainer groove		X	X		Per TA2003-001
	Valve body (Steam Chest)		X	X		VPT is OK
X	Anti-swirl dam	X	X	X		MT or PT is OK. VPT is OK
	Disc/Plug	X		X		
	Disc/Plug Seat		X	X		VPT is OK
	Stem	X	X	X		Depending on material
	Strainer	X		X		
	Nuts and washers	X		X		Hardness test studs per Service Bulletin 54010
	Springs	X		X		
	Crossheads	X	X	X		Depending on material (VPT is OK)
Governor Valves X	Studs	X		X	X	MT per SB 54010ST
X	Valve seat		X	X		VPT is OK
	Valve body Bonnet		X	X		Per SB4-14-0011-ST-EN-01 (VPT is OK)
	Disc/Plug	X		X		
	Disc/Plug Seat		X	X		VPT is OK
	Stem	X		X		

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COMPONENT	ITEM	METHOD				Comments
		MT	PT	VT	UT	
	Crossheads	X	X	X		Depending on material (VPT is OK)
	Nuts and washers	X		X		
	Springs	X		X		
Intercept Valves	Studs	X		X	X	MT per SB 54010ST
Including Pilot Valves	Disc Seat		X	X		VPT is OK
	Disc	X		X		
	Valve Seat		X	X		VPT is OK
	Strainer groove		X	X		Per TA98-004 (VPT is OK)
	Anti-swirl dam		X	X		MT or PT is OK. VPT is OK
	Stem	X		X		
	Strainer	X		X		
	Valve body (Steam Chest)		X	X		VPT is OK
	Nuts and washers	X		X		
	Springs	X		X		
Reheat Stop Valves	Studs	X		X	X	MT per SB 54010ST
	Flapper Seat		X	X		VPT is OK
	Flapper swing arms seat	X		X		
	Valve body seating area		X	X		VPT is OK
	Nuts and washers	X		X		
Blowdown Valve	Studs	X		X	X	
	Valve seat		X			VPT is OK
	Disc Seat		X			VPT is OK
	Stem	X		X		
	Nuts and Washers	X		X		
	Springs	X		X		
Miscellaneous	Thrust collar	X		X		
	Rotor position collar	X		X		
	Coupling studs, nuts, sleeves and washers	X		X	X	
	Flange studs, nuts, sleeves and washers	X		X	X	
	Crossover pipe studs, nuts, sleeves and washers	X		X	X	

HP/IP

COMANCHE UNIT 3
STEAM TURBINE NDE REQUIREMENTS
ALL MT IS WFMT EXCEPT WHERE DRY IS SPECIFICALLY ALLOWED

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
HP/IP Turbine Rotor	Perform Rotor Head Shot						
	Measure & Record Any Shroud Offset						
	Inspect HP Blading Rows 1-9						
	Inspect IP Blading Rows 10-15						
	Inspect Shrouds using an AC Yoke						
	Inspect blade roots per ASTMI-16007-C						
	Inspect HP Dummy Ring Area						
	Inspect IP Dummy Ring Area						
	Inspect Turbine End Journal						
	Inspect Generator End Journal						
	Inspect Generator End Coupling						
HP/IP Blade Rings	Inspect HP1 Blade Ring Lower Half Blades, Shrouds, Studs and Horizontal Joints						*MT and UT Studs*
	Inspect HP1 Blade Ring Upper Half Blades, Shrouds and Horizontal Joints						
	Inspect HP2 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						*MT and UT Studs*
	Inspect HP2 Blade Ring Upper Half Blades, Shrouds and Hor. Joints						
	Inspect HP3 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						*MT and UT Studs*
	Inspect HP3 Blade Ring Upper Half Blades, Shrouds and Hor. Joints						

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Inspect IP1 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						*MT and UT Studs*
	Inspect IP1 Blade Ring Upper Half Blades, Shrouds and Hor. Joints						
	Inspect IP2 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						*MT and UT Studs*
	Inspect IP2 Blade Ring Upper Half Blades, Shrouds and Hor. Joints						
	Inspect IP3 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						*MT and UT Studs*
	Inspect IP3 Blade Ring Upper Half Blades, Shrouds and Hor. Joints						
	HP Dummy Ring Lower						*UT bolting, dry MT is approved.*
	HP Dummy Ring Upper						*Dry MT is approved*
	IP Dummy Ring Lower						*UT bolting, dry MT is approved.*
	IP Dummy Ring Upper						*Dry MT is approved*
Cylinders, Cases & Misc.	Inspect Thrust Collar						
	Inspect Rotor Position Collar						
	HP Lower Inner Cylinder fits, seal faces and horizontal joints						*Dry MT is approved*
	Inspect lower half Nozzle Block blades and horizontal joints in the HP cylinder						
	HP Upper Inner Cylinder fits, seal faces and horizontal joints	✓		✓			*Dry MT is approved*
	Inspect upper half Nozzle Block blades and horizontal joints in the HP cylinder	✓		✓			

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	HP Lower outer case fits, seal faces and horizontal joints						*Dry MT is approved*
	HP Upper outer case fits, seal faces and horizontal joints						*Dry MT is approved*
	IP Flow Guide Lower						*UT bolting, dry MT is approved.*
	IP Flow Guide Upper						*Dry MT is approved*
	HP Main Steam Lead Flange faces						
	Main Steam Lead Flange Bolting						
	IP Inlet Flange Bolting						
	HP to LP-A Coupling Bolts						
	HP Crossover Pipe Bolting						
	HP Outer Case Bolting						*UT only if embedded; MT and UT if removed*
	HP Inner Case Bolting						*UT only if embedded; MT and UT if removed*
	HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers						*UT bolting, dry MT is approved.*
	HP Turbine End Steam Gland upper half case	✓					*dry MT is approved*
	HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers						*UT bolting, dry MT is approved.*
	HP Generator End Steam Gland upper half case	✓					*dry MT is approved*
Bearings	Active Thrust Bearing		✓	✓	✓		
	Inactive Thrust Bearing		✓	✓	✓		
	No. 1 Bearing		✓	✓	✓		
	No. 2 Bearing		✓	✓	✓		
	No. 3 Bearing		✓	✓	✓		
	No. 4 Bearing		✓	✓	✓		
	No. 5 Bearing		✓	✓	✓		
	No. 6 Bearing		✓	✓	✓		

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COMANCHE UNIT 3
VALVE NDE REQUIREMENTS

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
VALVES							
Left Throttle (Stop)	Valve body						
V	Anti swirl bar welds						*MT or PT as applicable*
V	Valve seat & seal weld						
	Plug and plug seat(s)						
	Stem						*PT if non-magnetic; UT if possible*
	Stem back seat						
	Pilot Valve Seat						
	Springs						
	Crossheads						*PT if non-magnetic; MT if magnetic*
V	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Washers						*Possibly nitrited*
	Strainer						
V	Strainer Groove						*PT is also acceptable*
Right Throttle (Stop)	Valve body						
	Anti swirl bar welds						*MT or PT as applicable*
	Valve seat & seal weld						
	Plug and plug seat(s)						
	Stem						*PT if non-magnetic; UT if possible*
	Stem Back seat						
	Pilot Valve Seat						
	Springs						
	Crossheads						*PT if non-magnetic; MT if magnetic*
	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Washers						*Possibly nitrited*
	Strainer						
	Strainer Groove						*PT is also acceptable*

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
#1 Governor (Control)	Valve body						
√	Valve seat						
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Cross head						Depending on material
	Spring(s)						
√	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Washers						Possibly nitrited
#2 Governor (Control)	Valve body						
√	Body seat						
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Cross head						Depending on material
	Spring(s)						
√	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Washers						Possibly nitrited
#3 Governor (Control)	Valve body						
√	Valve seat						
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Cross head						Depending on material
	Spring(s)						
√	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Washers						Possibly nitrited
#4 Governor (Control)	Valve body						
√	Valve seat						

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COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Plug and plug seat(s)						
	Stem						*PT if non-magnetic; UT if possible*
	Cross head						*Depending on material*
	Spring(s)						
	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Washers						*Possibly nitrited*
#1 Intercept Valve	Valve body						*Either MT or PT is acceptable*
	Anti-swirl dam welds						*Either MT or PT is acceptable*
	Valve seat						
	Plug and plug seat(s)						
	Stem						*PT if non-magnetic; UT if possible*
	Strainer						
	Spring(s)						
	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Washers						*Possibly nitrited*
#2 Intercept Valve	Valve body						*Either MT or PT is acceptable*
	Anti-swirl dam welds						*Either MT or PT is acceptable*
	Valve seat						
	Plug and plug seat(s)						
	Stem						*PT if non-magnetic; UT if possible*
	Strainer						
	Spring(s)						
	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Washers						
#3 Intercept Valve	Valve body						*Either MT or PT is acceptable*
	Anti-swirl dam welds						*Either MT or PT is acceptable*

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NDE Matrix Comanche Unit 3

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Valve seat						
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Strainer						
	Spring(s)						
	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Washers						Possibly nitrited
#4 Intercept Valve	Valve body						Either MT or PT is acceptable
	Anti-swirl dam welds						Either MT or PT is acceptable
	Valve seat						
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Strainer						
	Spring(s)						
	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Washers						Possibly nitrited
LS Reheat Stop Valve	Valve body						
	Valve seating area						Either MT or PT is acceptable
	Flapper seat						Either MT or PT is acceptable
	Flapper swing arms						Either MT or PT is acceptable
	Stem						
	Stem Bushing						
	Studs						
	Female Threads						MT or PT per MSTB-020
	Nuts						
	Spherical Washer						Per IR-18005
	Washers						
RS Reheat Stop Valve	Valve body						

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NDE Matrix Comanche Unit 3

COMPONENT	ITEM	Contractor Initial(s) METHOD MT	PT	VT	UT	Xcel Witness	Comments
	Valve seating area						*Either MT or PT is acceptable*
	Flapper seat						*Either MT or PT is acceptable*
	Flapper swing arms						*Either MT or PT is acceptable*
	Stem						
	Stem Bushing						
	Studs						
	Female Threads						*MT or PT per MSTB-020*
	Nuts						
	Spherical Washer						*Per IR-18005*
	Washers						

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Project: CF-5862
Site: Comanche Generating Station
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FCSS

FCSS
4200 Wildwood Parkway

Comanche Generating Station

2005 Lime Rd
Pueblo, CO 81006
Attention: Dave Johnson, GE 985-285-6773

3angles Job Number: CF-5862
Purchase Order Number: 4900073380
Nondestructive Testing Report
Mitsubishi Unit #3

Mr. Dave Johnson,

At the request of FCSS, 3angles, Inc. has conducted nondestructive examinations and inspections in accordance with qualified procedures and industry standards. This document presents the findings of the tests and inspections and it provides supporting information regarding how testing was conducted for each respective part or component item defined within the scope of work. NDT was performed between 01/27/2020 to 03/07/2020.

Findings reported in the enclosed document are provided for informational purposes only. Any determinations, actions, recommendations or dispositions should be made by engineering representation or consultants deemed qualified to use the data and test results provided for such purposes.

We at 3angles extend our appreciation for being given the opportunity to support the outage requirements and to perform the work as defined and reported within the enclosed submittal. If you have any questions in regards to this document or if you wish to discuss any aspect of this job or future jobs, please do not hesitate to contact our offices.

Sincerely,

Stephen Renkavinsky

Level III NDT Examiner, 205875
3angles, Inc.
(518) 640-3000

Job Number-File Reference: CF-5862 *Date:* 3/7/2020

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Project: CF-5862
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Xcel Energy

Comanche Generating Station

Pueblo, CO 81006

3ANGLES JOB NUMBER
CF-5862

NDT REPORT OF
Mitsubishi Unit #3

DATES OF EXAMINATIONS
01/26/2020 TO 03/07/20

Job Number-File Reference: CF-5862 *Date:* 3/7/2020

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Project #: CF-5862
Site: Comanche Generating Station
Date: 22-Feb-20 Page 4 of 264

TURBINE ROTOR INSPECTION

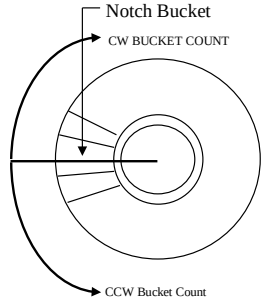
TEST EXAMINER(S): Stephen Renkavinsky, Lawrence Craig, Joop Kraijesteijn
ROTOR UNIT: Unit #3 HPIP
TYPE (SINGLE FLOW / DUAL FLOW): Single NUMBER OF STAGES: 15
TEST METHOD (S) UTILIZEI Magnetic Particle, Liquid Penetrant, Visual Testing
DATE(S) TESTED: 02/20/2020 to 03/05/2020
MISCELLANEOUS INFORMATION:

INSPECTION RESULTS OF:	INDICATIONS NOTED: YES	NO	N/A
ROTOR SPINDLE		X	
PACKING GROOVES	X		
JOURNALS		X	
COUPLING		X	
ROTATING BLADING	X		
EROSION SHIELDS			X
TIE-WIRES			X
COVERS	X		
TENONS			X
PHOTOS INCLUDED	X		

NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL REQUIRE A DETAILED DESCRIPTION OF FINDINGS.

ROTATING BLADE LOCATION KEY

VIEW FACING GENERATOR END COUPLING



[X] CW COUNT [ ] CCW COUNT

NOTE: WHERE APPLICABLE, THE NOTCH BUCKET SHALL BE CALLED #1 AND NUMBERED SEQUENTIALLY IN EITHER A CW OR CCW MANNER; IF NOT, BLADE #1 REFERENCE SHALL BE PROVIDED.

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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		Comanche Unit 3 HPIP	

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	300.7 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	204.2 fc.

Reportable indications found. See following sheet for a list of details and pictures.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Date: 21-Feb-20 Page 6 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results

Stage	Description
1 Dummy Ring Castellations	• Deep groove around entire body. • (1) set of castellations missing
1	• Light foreign object damage to leading edge • Rubbing on all shrouds
2	• Light foreign object damage to leading edge • Rubbing on all shrouds
3	• Light foreign object damage to leading edge • Rubbing on all shrouds
4	• Light foreign object damage to leading edge • Rubbing on all shrouds
5	• Light foreign object damage to leading edge • Rubbing on all shrouds
6	• Light foreign object damage to leading edge • Rubbing on all shrouds
7	• Shroud lifting on all blades on admission side. • Heavy rubbing on all shrouds.
8	• Shroud lifting on all blades on admission side. • Heavy rubbing on all shrouds.
9	• Row to be replaced.
10	• Rubbing on all shrouds. • Foreign object damage to leading edge. • Erosion on shroud edge.
11	• Rubbing on all shrouds • Light foreign object damage to leading edge.
12	• Rubbing on all shrouds. • Light foreign object damage to leading edge.
13	• Rubbing on all shrouds. • Light foreign object damage to leading edge.
14	• Rubbing on all shrouds. • Erosion/mechanical damage to shroud. • Light foreign object damage to leading edge.
15	• Rubbing on all shrouds. • Erosion/mechanical damage to shroud. • Light foreign object damage to leading edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II | Lawrence Craig MT/PT/VT II

n/a | n/a

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Project: CF-5862
Site: Comanche Generating Station
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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 1

Stage	Description
1 Dummy Ring Castellations	• Deep groove around entire body. • (1) set of castellations missing




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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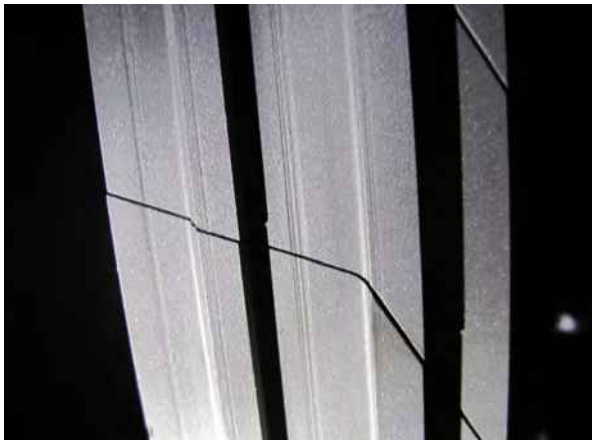
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 2

Stage	Description
1	• Light foreign object damage to leading edge • Rubbing on all shrouds



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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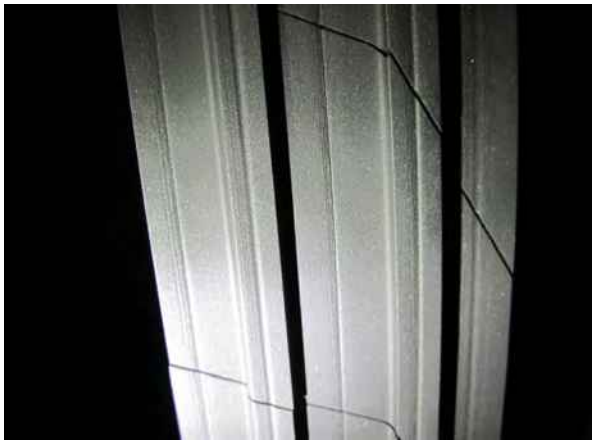
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 3

Stage	Description
2	• Light foreign object damage to leading edge • Rubbing on all shrouds



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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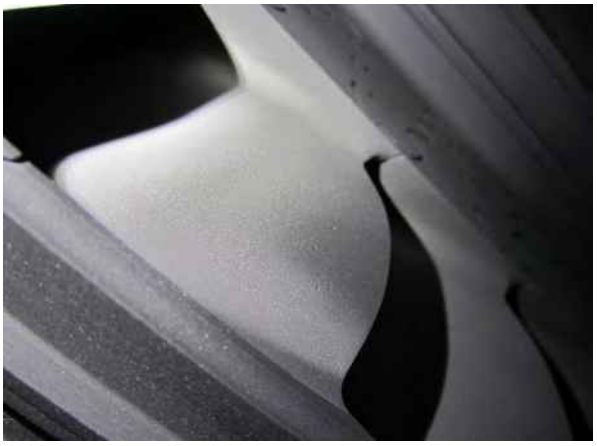
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 4

Stage	Description
3	• Light foreign object damage to leading edge • Rubbing on all shrouds



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 5

Stage	Description
4	• Light foreign object damage to leading edge • Rubbing on all shrouds

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 6

Stage	Description
5	• Light foreign object damage to leading edge • Rubbing on all shrouds




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 7

Stage	Description
6	• Light foreign object damage to leading edge • Rubbing on all shrouds

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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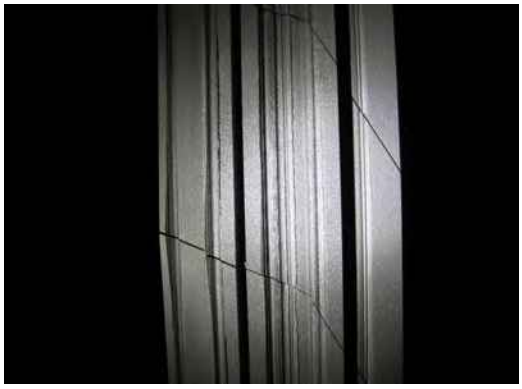
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 8

Stage	Description
7	• Shroud lifting on all blades on admission side. • Heavy rubbing on all shrouds.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 9

Stage	Description
8	• Shroud lifting on all blades on admission side. • Heavy rubbing on all shrouds.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 10

Stage	Description
9	• Row to be replaced.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 11

Stage	Description
10	• Rubbing on all shrouds. • Foreign object damage to leading edge. • Erosion on shroud edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 12

Stage	Description
11	• Rubbing on all shrouds • Light foreign object damage to leading edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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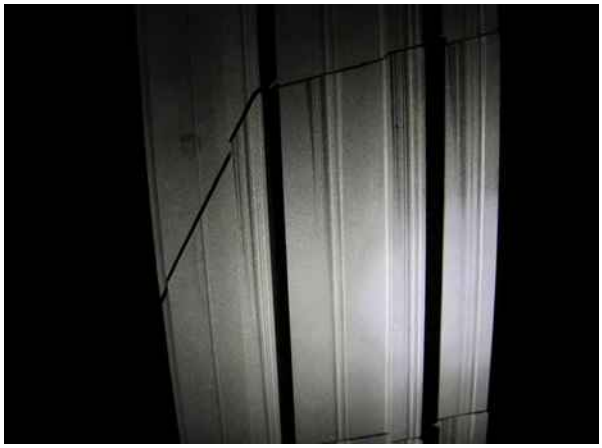
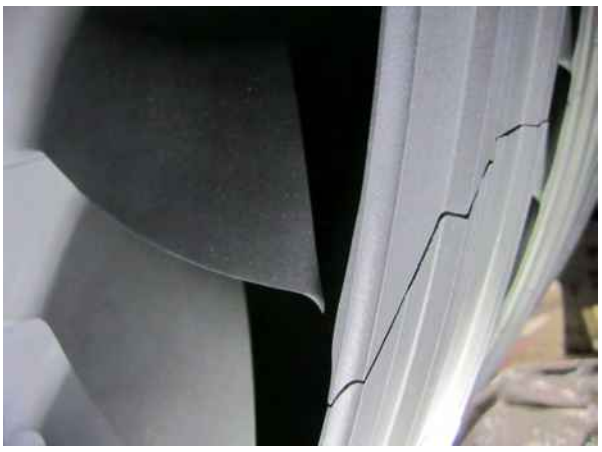
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 13

Stage	Description
12	• Rubbing on all shrouds. • Light foreign object damage to leading edge.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 14

Stage	Description
13	• Rubbing on all shrouds. • Light foreign object damage to leading edge.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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3-Angles NDE Report 2020-CF-5862 …

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Project: CF-5862
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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 15

Stage	Description
14	• Rubbing on all shrouds. • Erosion/mechanical damage to shroud. • Light foreign object damage to leading edge.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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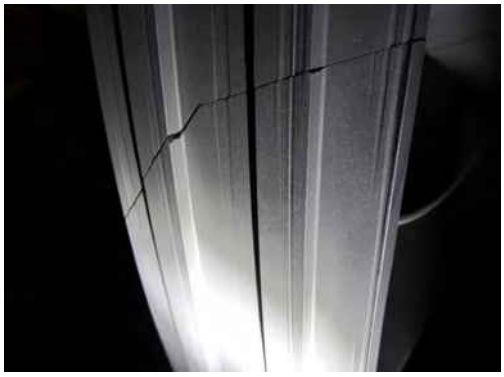
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 16

Stage	Description
15	• Rubbing on all shrouds. • Erosion/mechanical damage to shroud. • Light foreign object damage to leading edge.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 22-Feb-20 Page 23 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 HPIP		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 3726 µW/cm2
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4004 µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.25 fc.
WHITELIGHT: At surface of part READING: 0.41 fc.

MAGNETIZATION:	Head Shot	OUTPUT:	FWDC	Circular Amps	4930	[ ]	TURN
MAGNETIZATION:	Bucking Field	OUTPUT:	FWDC	Longitudinal Amps	1010-1210	6	TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ]	TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Head Shot and Bucking Field performed.

No reportable indications found.

Rotor demagnetized +/- 5 Gauss.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 HPIP		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4004 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.41 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	AC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Hand yoke of covers.

No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 HPIP Nonmagnetic Stages		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-WP2 / 18A044		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	265.4 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	242.2 fc.

PROCESS: [X] Color Contrast [ ] Flourescent [ ] Solvent Removable [X] Water Washable

INSPECTION RESULTS

Stage	Description
9	• No reportable indications found.
10	• No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 HP-IP Stage 7, 8, 9 Blade Attachment Serrations		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 19L02K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 3362 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.28 fc.
WHITELIGHT: Flashlight: Fenix UC35_JK READING: 485 fc.

MAGNETIZATION:	Coil Wrap	OUTPUT:	FWDC	Longitudinal Amps	1400	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: n/a
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: n/a

INSPECTION RESULTS

Coil inspection of the HP-IP stage 7, 8, 9 blade root serrations resulted in no reportable indications.

Visual inspection of the HP-IP stage 7, 8, 9 blade root serrations resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	HPIP Stationary Components		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR:

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux 14AM / 18K20K

WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070

MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: See Following µW/cm2

BLACKLIGHT: n/a READING: n/a µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: See Following fc.

WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

HP-IP Diaphragm set: See following sheet for details.

Stationary parts demagnetized +/- 3 Gauss.

* Diaphragms were not completely blasted therefore headshot could not be performed.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

Stephen Renkavinsky MT/PT/VT III, UT II

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STATIONARY COMPONENTS REPORT FORM HPIP

STAGE #	UPPER/LOWER	Fc.	µW/cm2	REPORTABLE INDICATIONS (YES/NO)	DATE TESTED
Nozzle	Upper	0.41	2421	No - inspected in place discharge side only	2/18/2020
2	Upper	0.43	2966	Yes	2/27/2020
3	Upper	0.43	2966	Yes	2/27/2020
4	Upper	0.32	4056	Yes	2/11/2020
5	Upper	0.32	4056	Yes	2/11/2020
6	Upper	0.32	4056	Yes	2/11/2020
7	Upper	0.32	4056	No	2/27/2020
8	Upper	0.32	4056	No	2/27/2020
9	Upper	0.32	4056	Yes	2/27/2020
10	Upper	0.31	3215	Yes	2/13/2020
11	Upper	0.31	3215	Yes	2/13/2020
12	Upper	0.31	3215	Yes	2/13/2020
13	Upper	0.32	4056	Yes	2/11/2020
14	Upper	0.32	4056	Yes	2/11/2020
15	Upper	0.32	4056	Yes	2/11/2020
Nozzle	Lower	0.43	2966	Yes - inspected in place discharge side only	2/27/2020
2	Lower	0.43	2966	Yes	2/27/2020
3	Lower	0.43	2966	Yes	2/27/2020
4	Lower	0.43	2966	Yes	2/27/2020
5	Lower	0.43	2966	Yes	2/27/2020
6	Lower	0.43	2966	Yes	2/27/2020
7	Lower	0.43	2966	No	2/27/2020
8	Lower	0.43	2966	Yes	2/27/2020
9	Lower	0.43	2966	Yes	2/27/2020
10	Lower	0.43	2966	Yes	2/27/2020
11	Lower	0.43	2966	Yes	2/27/2020
12	Lower	0.43	2966	Yes	2/27/2020
13	Lower	0.43	2966	Yes	2/27/2020
14	Lower	0.43	2966	Yes	2/27/2020
15	Lower	0.43	2966	Yes	2/27/2020

Data sheets of indications and photos on following sheets.

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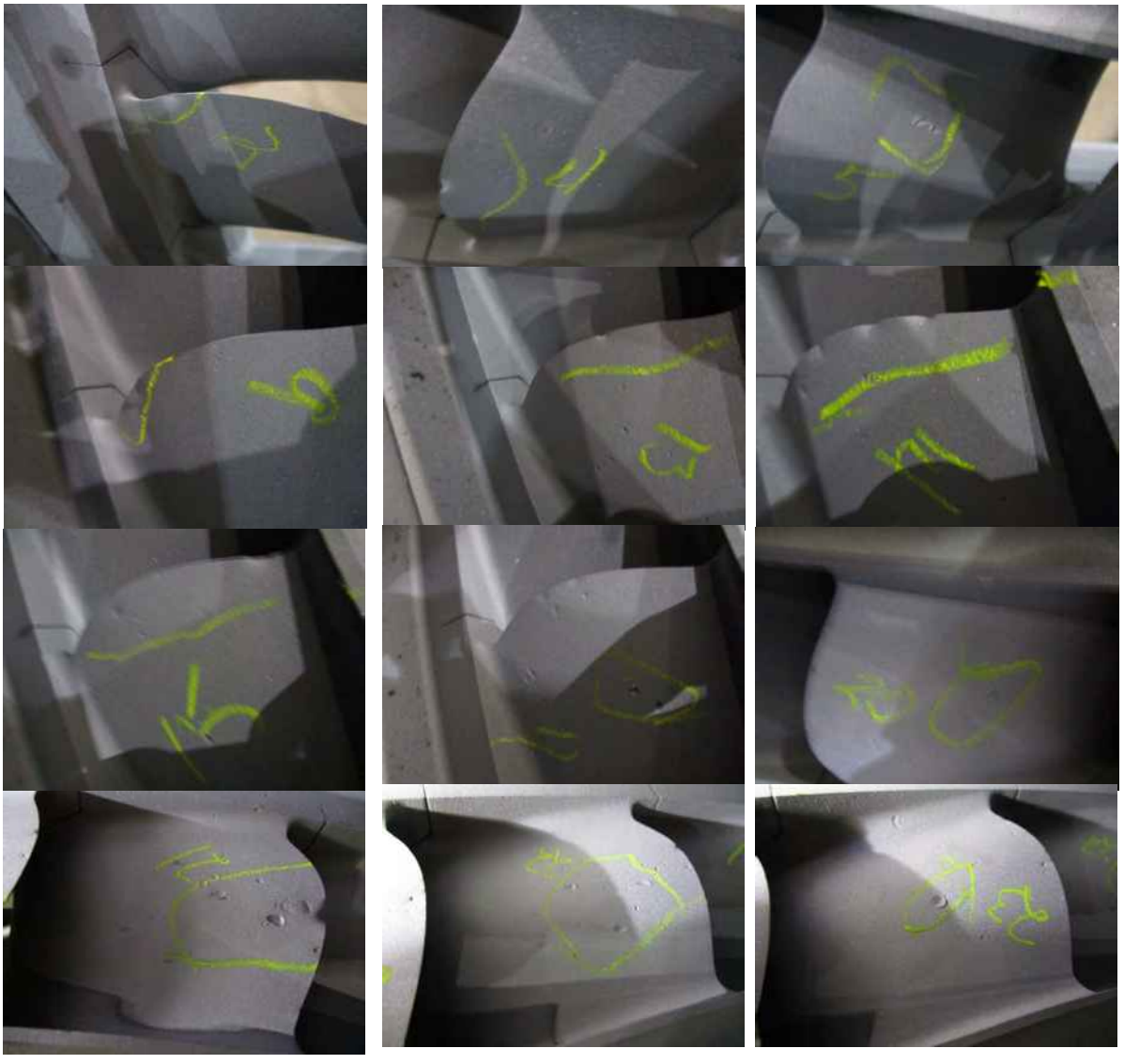
Site: Comanche Generating Station
Date: 27-Feb-20 Page 29 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
2U	• Discharge: #2, 4, 5, 9, 13-15, 17, 20-25 mild/medium FOD • Spill strips damaged



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage	Description
2U (cont.)	• Discharge: #2, 4, 5, 9, 13-15, 17, 20-25 mild/medium FOD • Spill strips damaged






NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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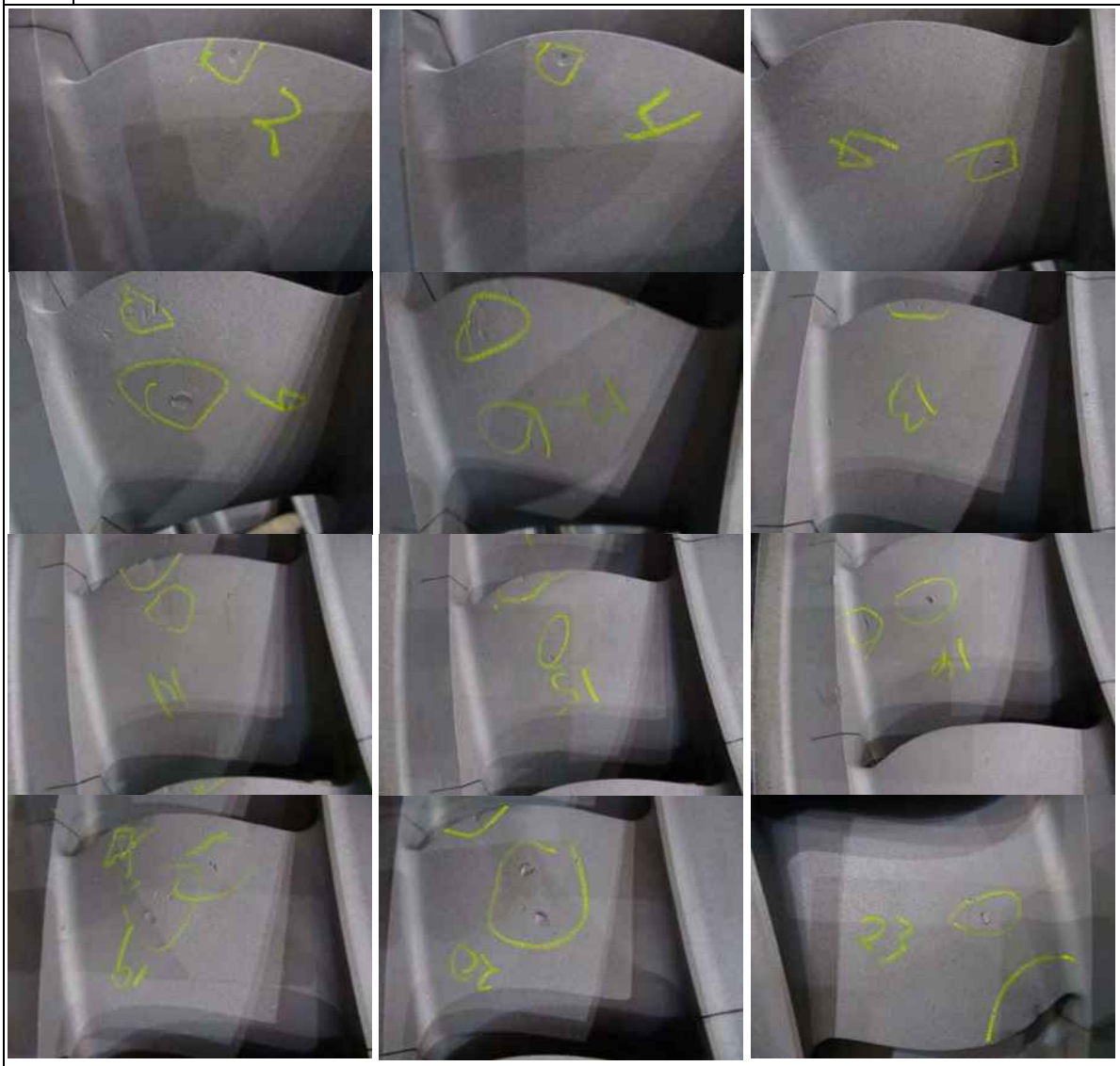
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
3U	• Discharge: #2, 4, 6, 9, 12-16, 19, 20, 23 mild FOD



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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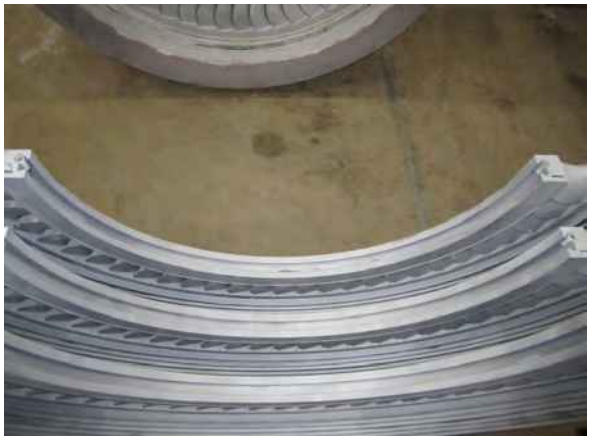
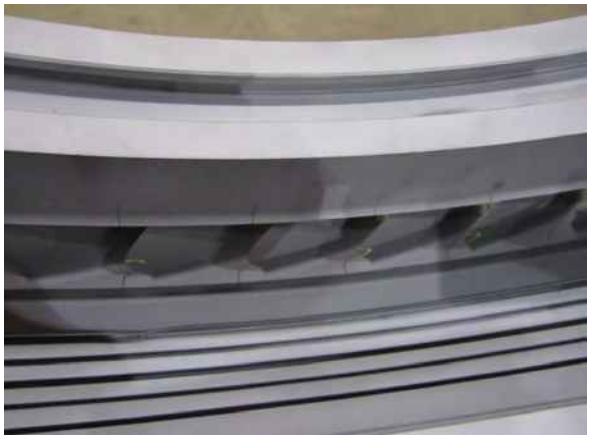
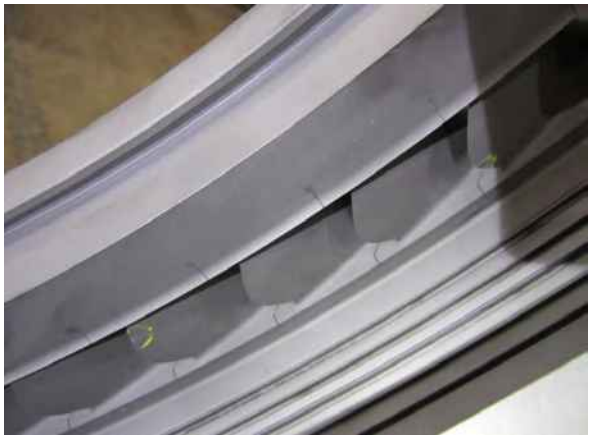
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
4U	• Foreign object damage found on trailing edges.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
5U	• Foreign object damage found on trailing edges.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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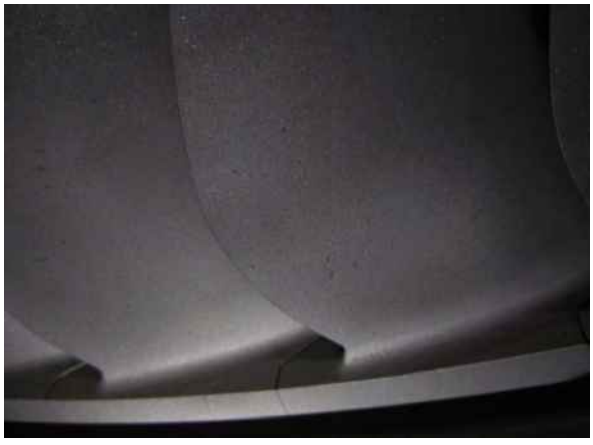
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
6U	• Foreign object damage found on trailing edges.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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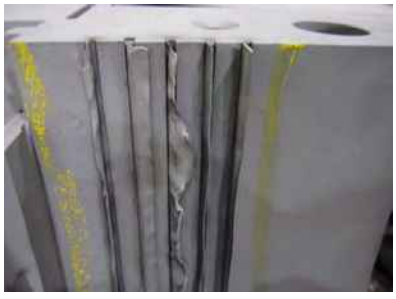
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
9U	• Foreign object damage found on trailing edges. • Spill strips heavily damaged.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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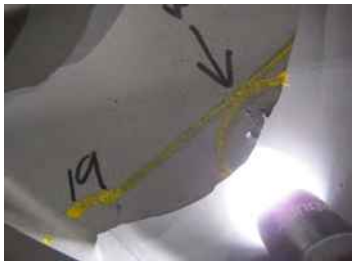
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
10U	• Heavy foreign object damage found on all trailing edges. • Thinning of all trailing edges. • Blade #19: 1/16" hole near trailing edge. • Extensive erosion/thinning of trailing edges near blade roots. Blades 9 and 11 as examples. • Heavy mechanical damage found in spill strips.







NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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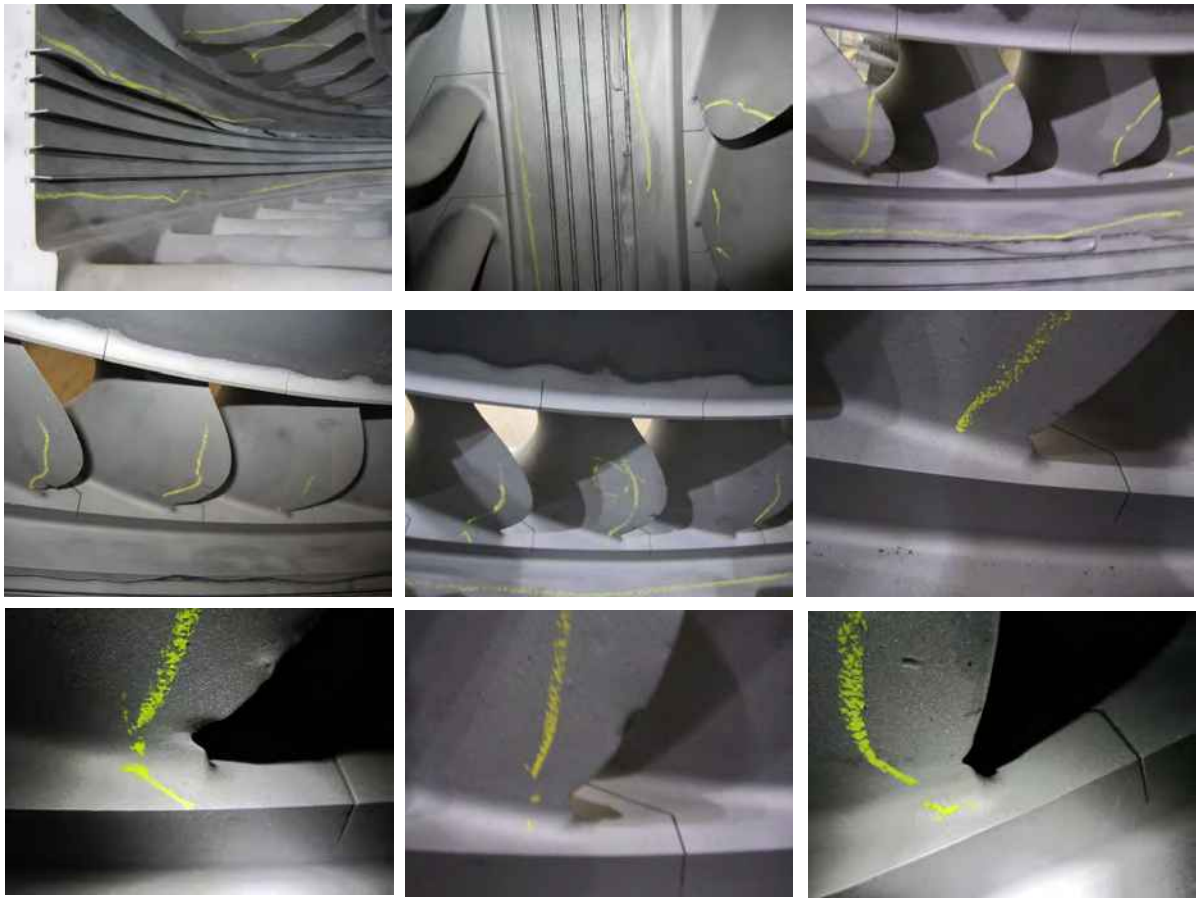
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage	Description
11U	• Foreign object damage found on all trailing edges. • Thinning of all trailing edges. • Extensive erosion/thinning of trailing edges near blade roots. • Heavy mechanical damage found in spill strips.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage	Description
12U	• Foreign object damage found on all trailing edges. • Thinning of all trailing edges. • Erosion/thinning of trailing edges near blade roots. • Heavy mechanical damage found in spill strips.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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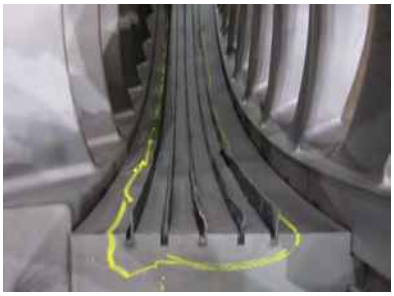
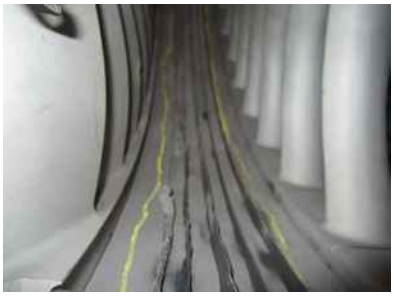
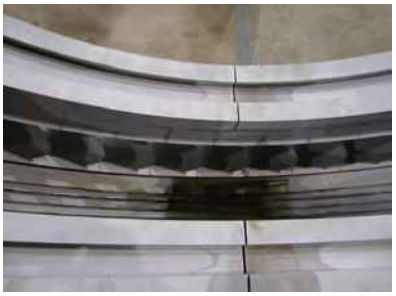
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
13U	• Foreign object damage found on trailing edges. • Spill strips damaged.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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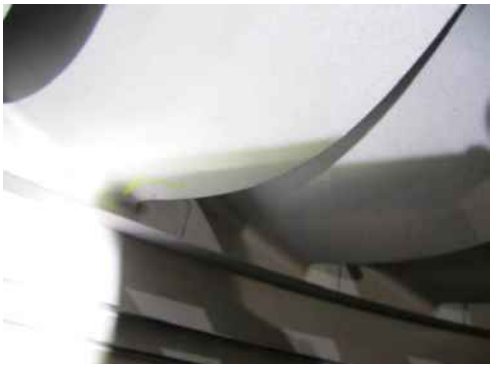
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
14U	• Foreign object damage found on trailing edges. • Spill strips damaged.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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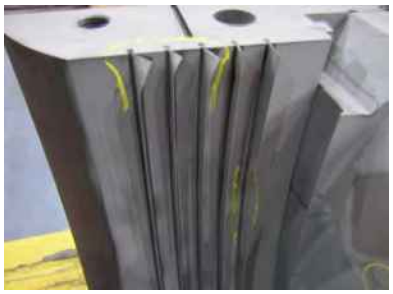
3-Angles NDE Report 2020-CF-5862 …

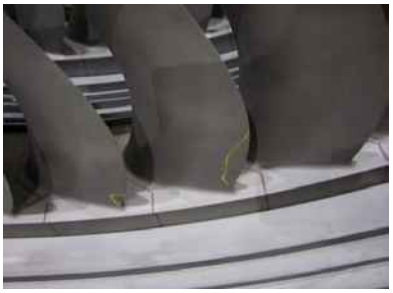
3angles Inc.
2 Access Road
Albany, NY 12205
P: (518) 640-3000
F: (518) 218-0490

Project: CF-5862
Site: Comanche Generating Station
Date: 11-Feb-20 Page 41 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
15U	• Foreign object damage found on trailing edges. • Spill strips damaged.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 42 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
1L	• Nozzle in-place inspected discharge side only • Discharge: # 26, 28, 31, 35, 38, 41, 43, 47-50 mild FOD • Spill strips damaged; mechanical damage horizontal joints

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 43 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
2L	• Discharge: #26, 27, 31-33, 43, 44, 46, 48, 50 mild FOD • Spill strips damaged

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 44 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
3L	• Discharge: #26, 31, 39, 40, 44-47, 49 mild to severe FOD

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 45 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
4L	• Discharge: # 29, 38, 39, 41, 51-53 mild FOD • Spill strips damaged

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 46 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
5L	• Discharge: #29, 33 mild FOD

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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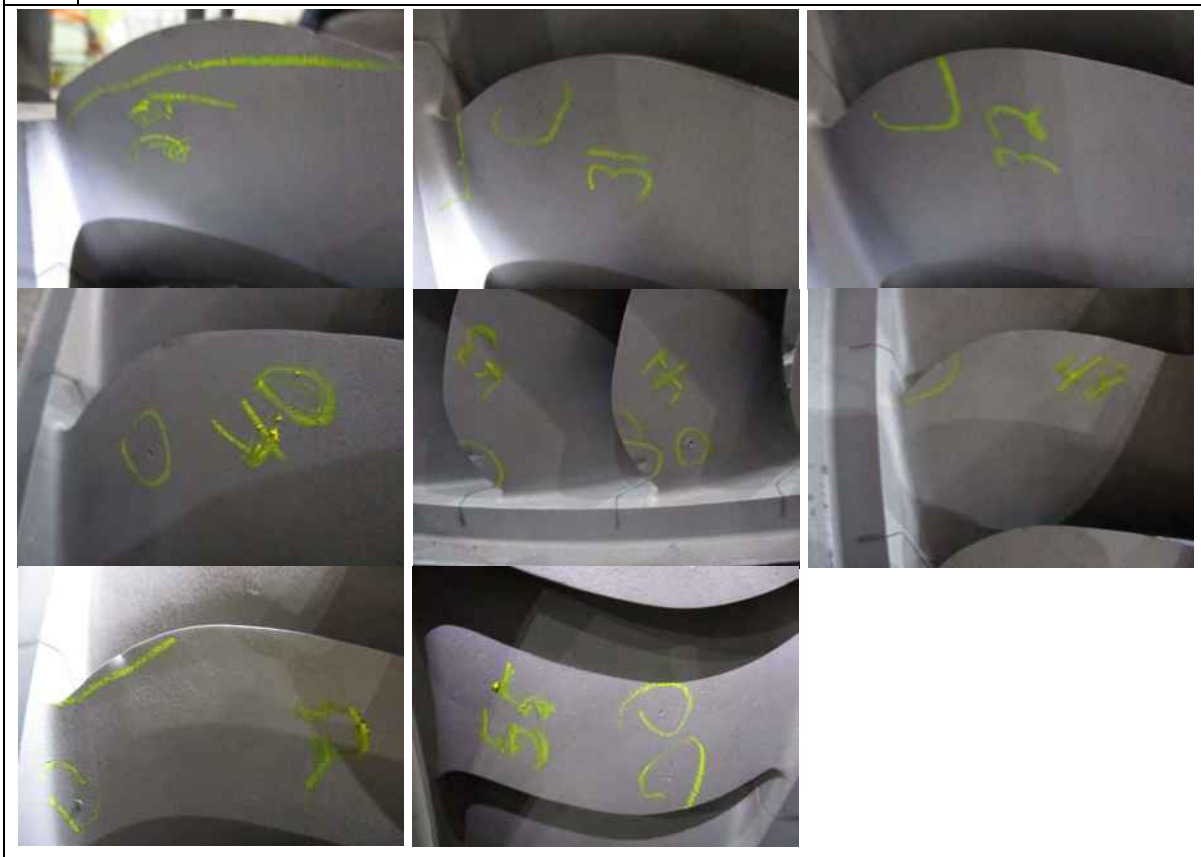
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 47 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
6L	• Discharge: #29, 31, 32, 40, 43, 44, 48, 52, 55 mild FOD



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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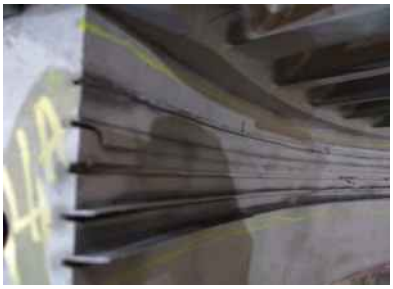
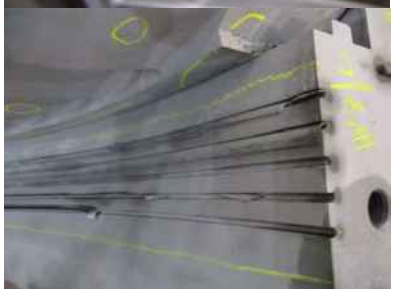
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 48 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
8L	• Discharge: #30 mild FOD • Spill strips damaged




NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 27-Feb-20 Page 49 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
9L	• Discharge: #29, 33-42, 44-46, 48, 49, 54, 56 mild FOD

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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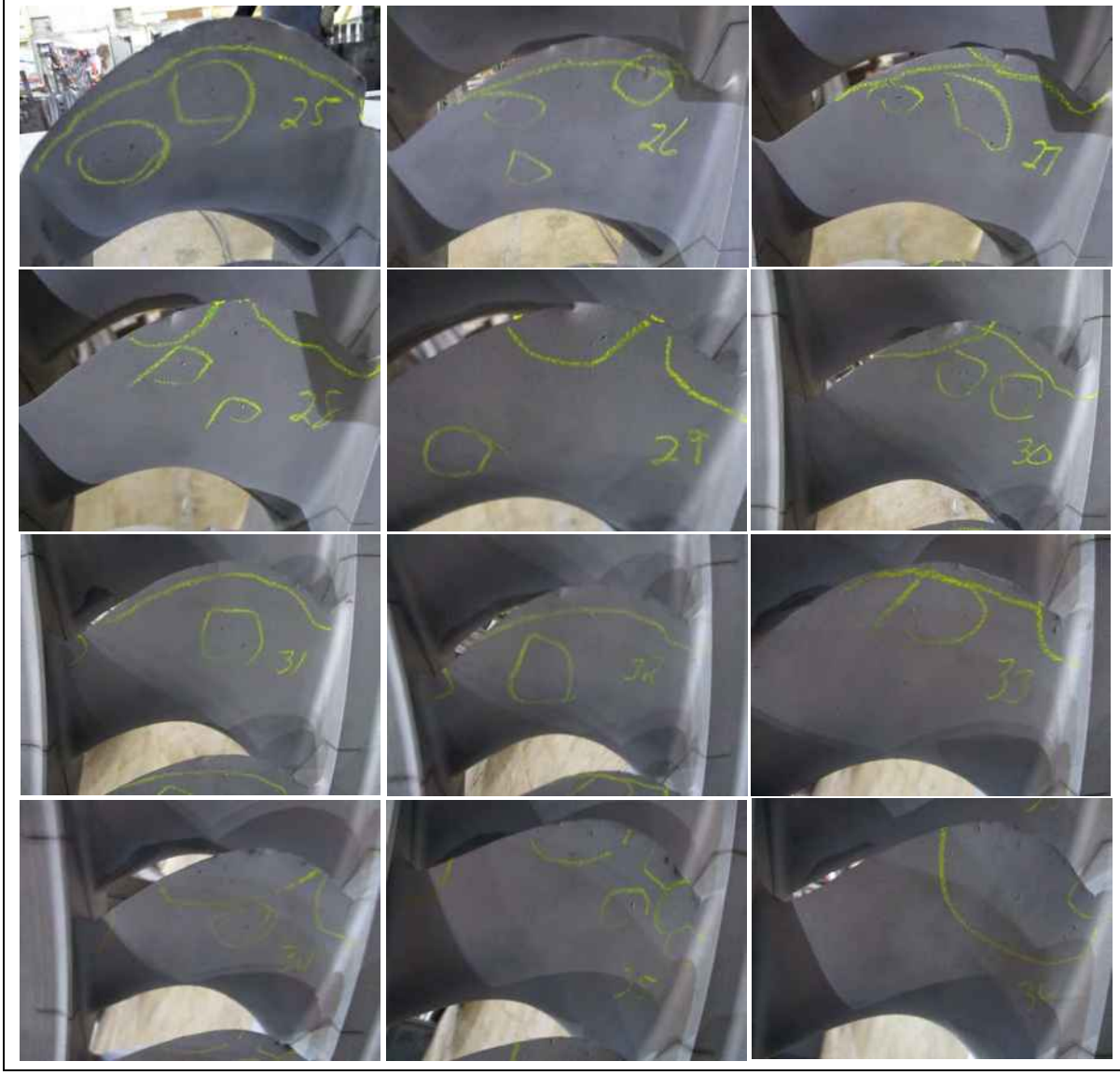
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 50 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage	Description
10L	• Discharge: #25-48 mild to severe FOD; #47, 48 cracklike indications discharge near web • MT: crack like indications discharge # 29-48 • Spill strips damaged



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 51 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
10L (cont.)	• Discharge: #25-48 mild to severe FOD; #47, 48 cracklike indications discharge near web • MT: crack like indications discharge # 29-48 • Spill strips damaged

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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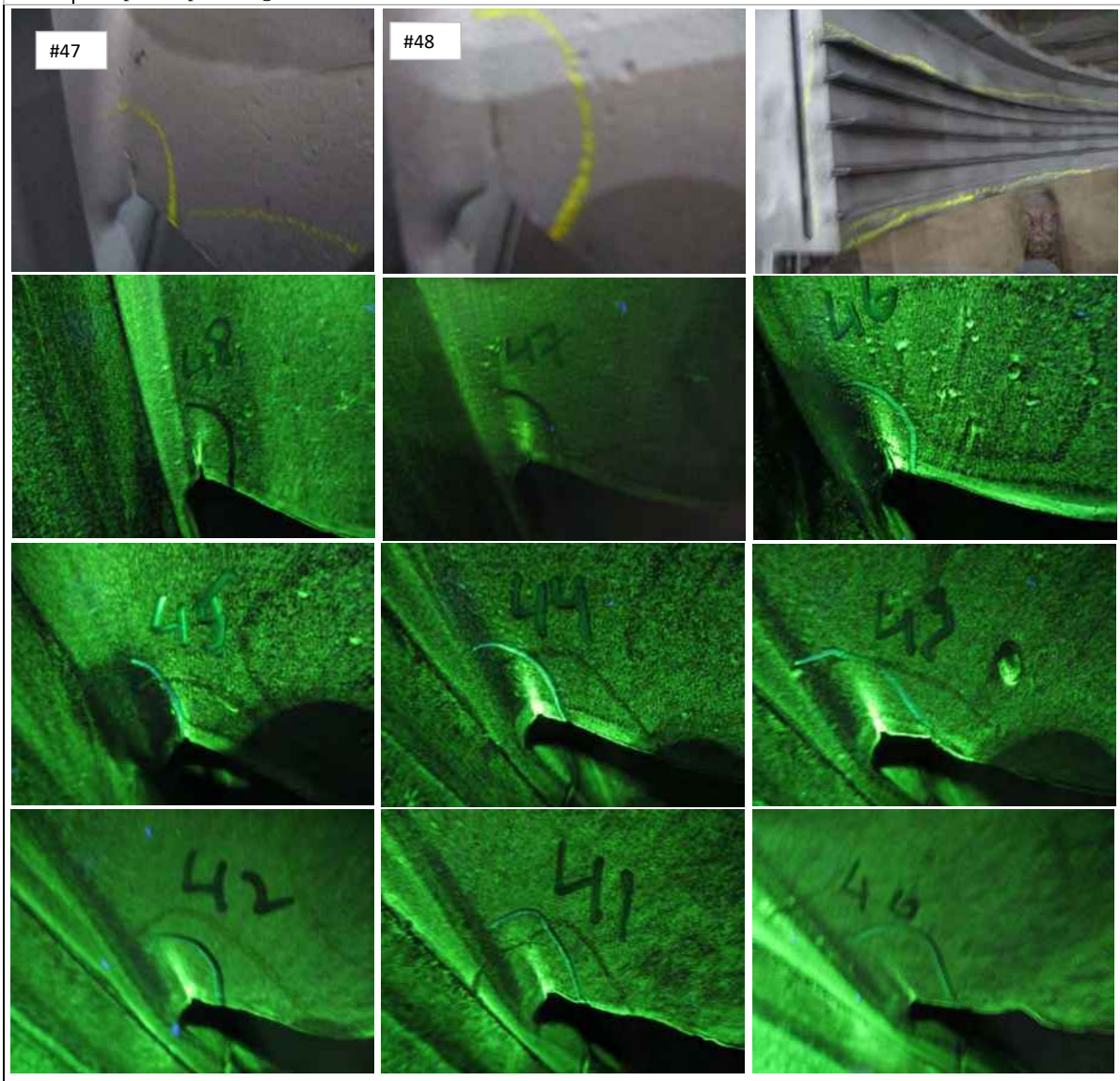
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 52 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
10L (cont.)	• Discharge: #25-48 mild to severe FOD; #47, 48 cracklike indications discharge near web • MT: crack like indications discharge # 29-48 • Spill strips damaged



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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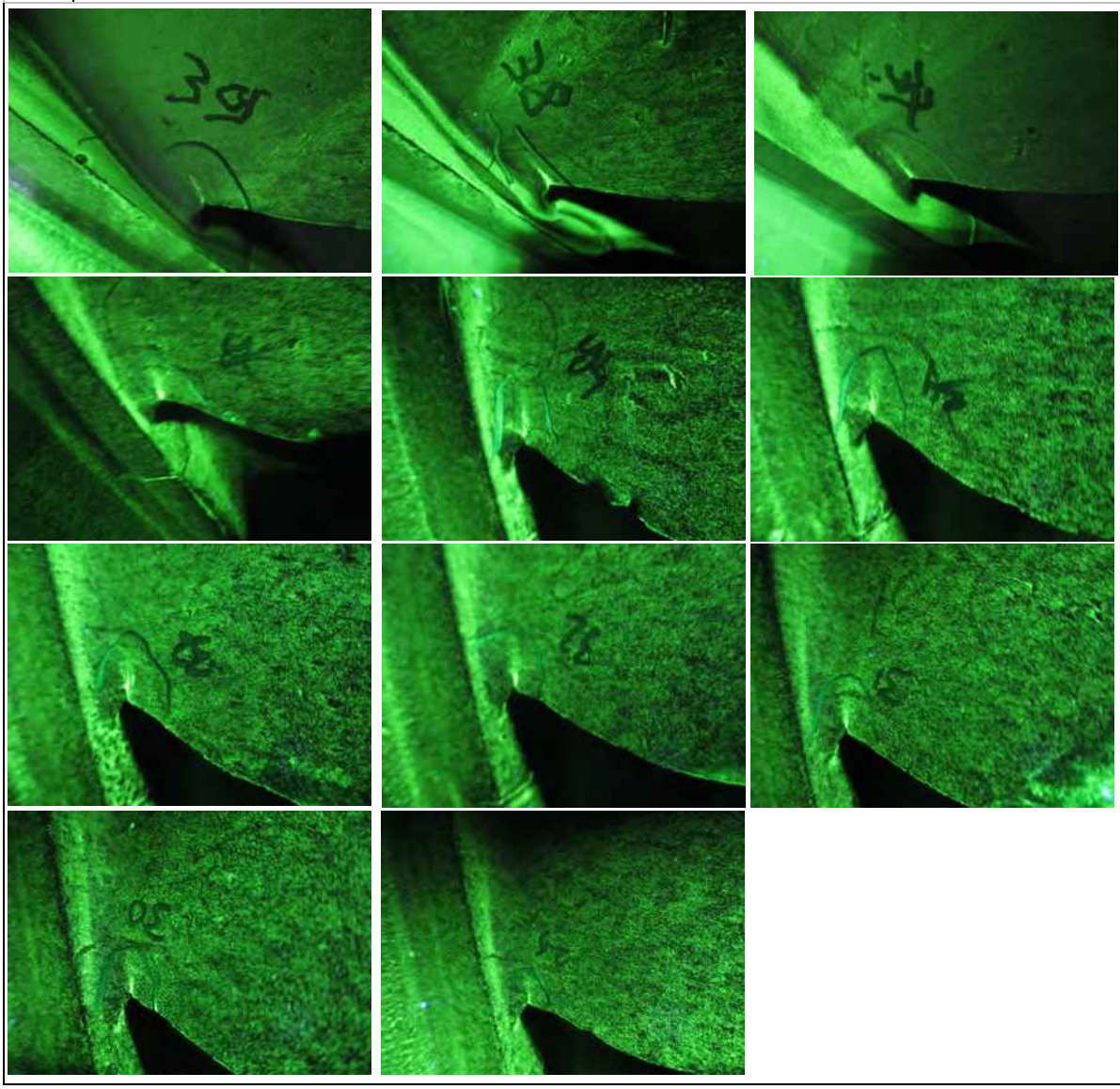
Date: 27-Feb-20 Page 53 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
10L (cont.)	• Discharge: #25-48 mild to severe FOD; #47, 48 cracklike indications discharge near web • MT: crack like indications discharge # 29-48 • Spill strips damaged



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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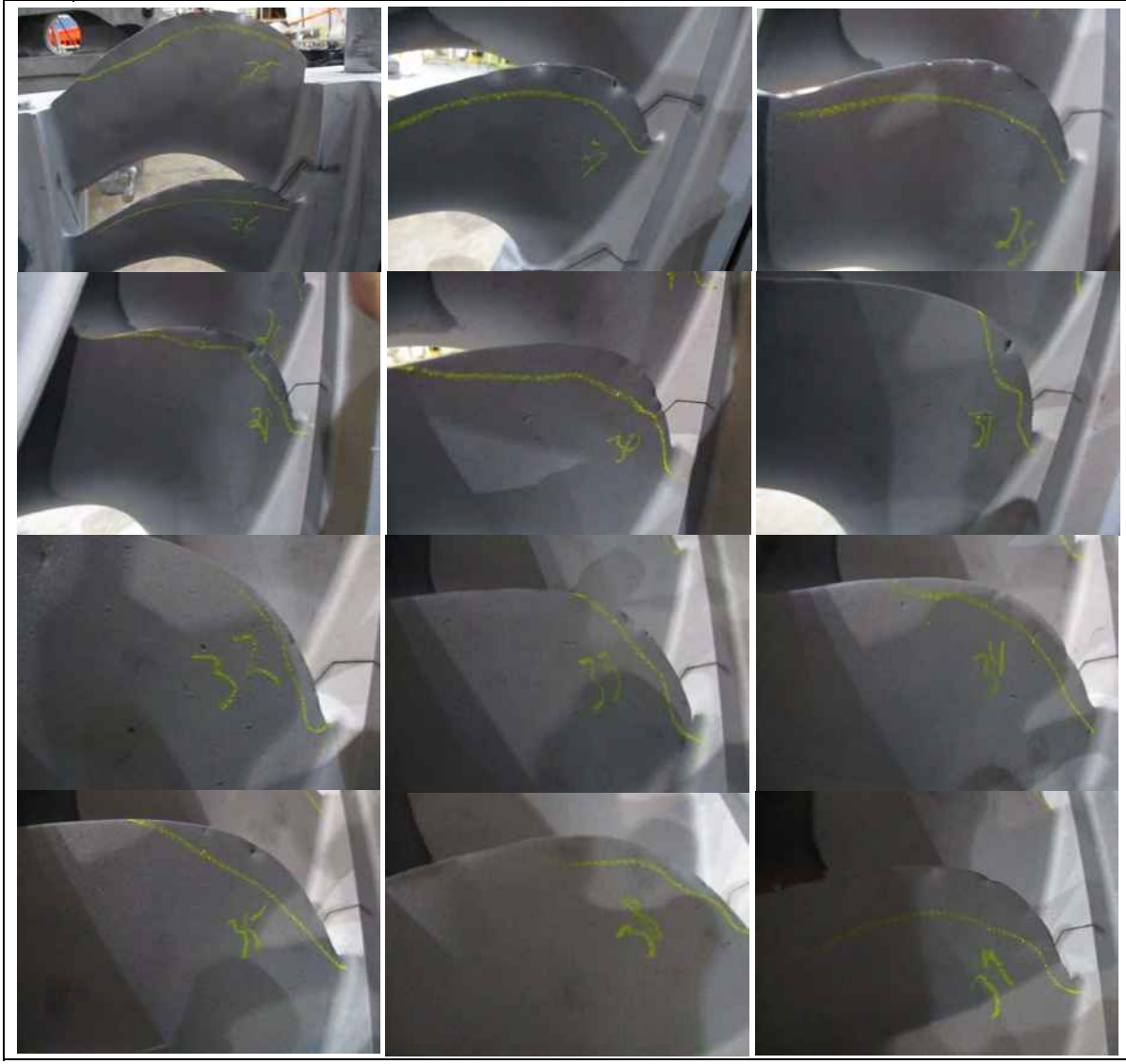
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 54 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
11L	• Discharge: #25-36, 38-46, 48 mild to heavy FOD; Admission: #32 FOD • Spill strips damaged • L/S horizontal joint FOD • R/S horizontal joint one broken stud



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 55 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
11L (cont.)	• Discharge: #25-36, 38-46, 48 mild to heavy FOD • Admission: #32 FOD • L/S horizontal joint FOD • R/S horizontal joint one broken stud

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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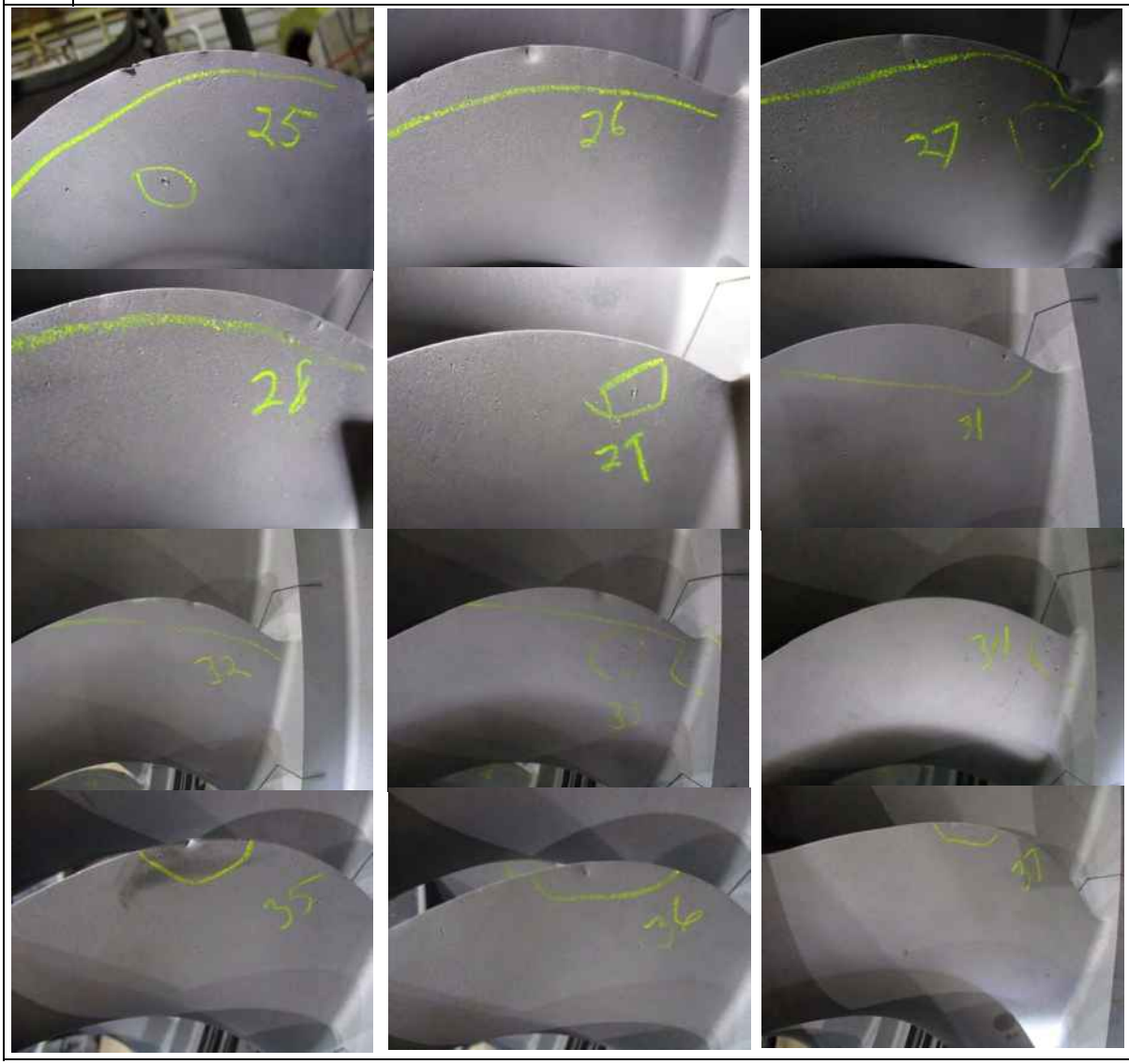
Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 56 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
12L	• Discharge: #25-27, 31-38, 40, 41, 43, 45-48 mild FOD



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Date: 27-Feb-20 Page 57 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage	Description
12L (cont.)	• Discharge: #25-27, 31-38, 40, 41, 43, 45-48 mild FOD

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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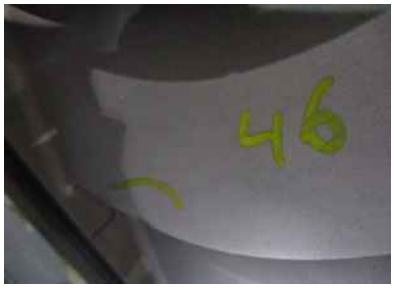
Date: 27-Feb-20 Page 58 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	HPIP Stationary Components		

Stage	Description
13L	• Discharge: #37, 47 mild FOD • Spill strip damaged



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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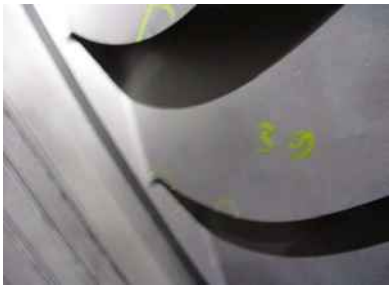
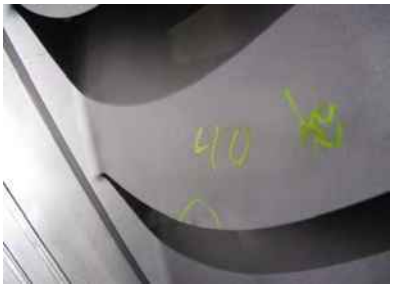
Date: 27-Feb-20 Page 59 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
14L	• Discharge: #37, 39, 40, 45, 48 mild FOD





NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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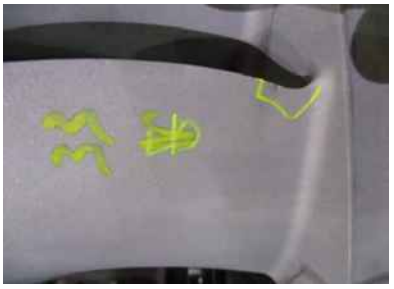
Date: 27-Feb-20 Page 60 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		HPIP Stationary Components	

Stage	Description
15L	• #30, 33 mild FOD



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	HPIP Diaphragm Bolts		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR:
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 2966 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.43 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the HPIP diaphragm bolting resulted in no reportable indications.

Demagnetized +/- 3 Gauss.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II
n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 62 of 264

ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	HPIP Diaphragm Bolting		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	SAE 30	
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	0.305
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:		OK	

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
Stage 2 L/H	50	56	2	9.302	0.75	27-Feb	No reportable indications.
Stage 3 L/H	52.6	58.6	1	8.698	0.75	27-Feb	No reportable indications. L/S bolt Missing.
Stage 4,5 L/H	43	55	4	8.48	0.75	27-Feb	No reportable indications.
Stage 6 L/H	43	55	2	7.882	0.75	27-Feb	No reportable indications.
Stage 7 L/H	40	52	2	9.062	1.125	27-Feb	No reportable indications.
Stage 8 L/H	40	52	2	9.645	0.875	27-Feb	No reportable indications.
Stage 9 L/H	40	52	2	10.435	0.875	27-Feb	No reportable indications.
Stage 10 L/H							No bolts inspected.
Stage 11 L/H	43.6	55.6	1	12.011	1.125	27-Feb	No reportable indications. R/S bolt broken.
Stage 12 L/H	40.6	52.6	2	9.446	1.125	27-Feb	No reportable indications.
Stage 13 L/H	38	50	2	14.475	1.125	27-Feb	No reportable indications.
Stage 14 L/H	43.2	55.2	2	11.154	1.125	27-Feb	No reportable indications.
Stage 15 L/H	41.6	53.6	2	10.748	1.125	27-Feb	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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Project: CF-5862
Site: Comanche Generating Station
Date: 26-Feb-20 Page 63 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	HP and IP Inner Casings L/H		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 7183 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.35 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: n/a
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the HP and IP Inner Casings L/H resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: HP and IP Inner Case Bolting

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
HP Inner case L/H	51.4	57.4	2	24.027	2.5	26-Feb	No reportable indications.
HP Inner case L/H	46.4	58.4	10	22.678	2.5	26-Feb	No reportable indications.
HP Inner case L/H	42.2	54.2	2	24.628	3	26-Feb	No reportable indications.
HP Inner case L/H	41.6	53.6	2	26.806	3.5	26-Feb	No reportable indications.
HP Inner case L/H	42.2	54.2	4	39.094	4.5	26-Feb	No reportable indications.
HP Inner case L/H	42	54	10	36.724	4.5	26-Feb	No reportable indications.
IP Inner case L/H	40	52	4	18.257	2	26-Feb	No reportable indications.
IP Inner case L/H	36.6	48.6	10	18.538	2	26-Feb	No reportable indications.
IP Inner case L/H	39	51	2	18.072	2.5	26-Feb	L78 not acceptable.
IP Inner case L/H	41.4	53.4	2	19.814	2.5	26-Feb	R76 not acceptable.
IP Inner case L/H	44.4	56.4	2	19.549	3.5	26-Feb	No reportable indications.
IP Inner case L/H	48	60	2	22.416	4.5	26-Feb	No reportable indications.
IP Inner case L/H	45.4	57.4	2	18.003	2.5	26-Feb	No reportable indications.
IP Inner case L/H	37.6	49.6	2	16.576	2	26-Feb	R71 not acceptable.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 26-Feb-20 Page 65 of 264

VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4004 REV. 0	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		HP and IP Inner Casings L/H	

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	482.3 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	329.8 fc.

Visual inspection of the HP and IP Inner Casings L/H resulted in the following:

- HP minor mechanical damage steam inlet
- IP mechanical damage in steam inlet
- IP damaged threads on studs #L71, L72 and R71

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 18-Feb-20 Page 66 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Shells and Glands Findings

Stage	Description
N2 Packing Casing UH	• (6) areas with voids, 1/16" to 3/16" in diameter. • Mechanical damage to nozzle spill strips. • Mechanical damage to OD bolt holes and surrounbding areas.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	N2 Packing Casing L/H		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 2966 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.43 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: n/a
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the N2 Packing Casing L/H resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: N2 Packing Casing Bolting L/H

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
R/L 91	n/a	n/a	2	n/a	2.125	n/a	L91 missing; R91 uninspectable
R/L 92	44.4	56.4	2	13,717	1.875	27-Feb	No reportable indications.
R/L 93	52.6	58.6	2	15.261	2.5	27-Feb	No reportable indications.
R/L 94	48.6	60.6	2	16.648	3	27-Feb	No reportable indications.
R/L 95	48.6	60.6	2	16.648	3	27-Feb	No reportable indications.
R/L 96	48.6	60.6	2	16.648	3	27-Feb	No reportable indications.
R/L 97	48.6	60.6	2	16.648	3	27-Feb	No reportable indications.
R/L 98	48.6	60.6	2	17.596	3.125	27-Feb	No reportable indications.
R/L 99	54.8	66.8	2	16.465	3.125	27-Feb	L99 not acceptable. R99 NRI
R/L 100	53.4	65.4	2	17.229	4	27-Feb	L100 not acceptable. L100 NRI
R/L 101	n/a	n/a	2	n/a	n/a	n/a	Both cut out
R/L 102	50	62	2	11.217	1.25	27-Feb	L102 cut out. R102 NRI
R/L 103	38.2	50.2	2	10.355	1.25	27-Feb	No reportable indications.
R/L 104	n/a	n/a	2	n/a	n/a	n/a	Both cut out

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4004 REV. 0	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		N2 Packing Casing Bolting	

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	320.5 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	191 fc.

Visual inspection of the N2 Packing Casing Bolting resulted in the following:

- Damaged studs: #R91, R94, R99, R100, R103, L94, L100, L103

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: HP Dummy Rings U/H and L/H; N3 inner L/H; N1 inner L/H

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a

WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070

MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 2966 µW/cm2

BLACKLIGHT: n/a READING: n/a µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: 0.43 fc.

WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: n/a

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the following components resulted in no reportable indications:

- HP Dummy Rings U/H and L/H
- N3 inner L/H
- N1 inner L/H: some mechanical damage see picture

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 71 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: N2 Packing Casing Bolting

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
HP Dummy rings studs L/H	47.2	59.2	2	12.458	2.25	27-Feb	No reportable indications.
HP Dummy rings studs L/H	49.8	61.8	2	11.51	1.5	27-Feb	No reportable indications.
N3 inner L/H	43.2	55.2	2	9.184	0.75	27-Feb	No reportable indications.
N3 inner L/H	39	51	2	4.9	0.75	27-Feb	No reportable indications.
N1 inner L/H	34.8	46.8	2	10.527	1	27-Feb	No reportable indications.
N1 inner L/H	38.2	50.2	2	5.853	1	27-Feb	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4004 REV. 0	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: IP Inlet Casing U/H and L/H Welds

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	485 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

Visual inspection of the IP Inlet Casing U/H and L/H Welds resulted in the following:

- U/H: in one location material missing from weld
- L/H: no reportable indications

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II | n/a

n/a | n/a

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	HPIP Casing Studs		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	SAE 30	
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	0.293
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:		OK	

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
R/L 1	53.8	65.8	2	40.854	4.5	2-Mar	No reportable indications.
R/L 2, 3, 34, 35	44	56	8	35.695	3.75	2-Mar	No reportable indications.
R/L 4, 5, 6, 32, 33	48.2	60.2	10	50.091	3.75	2-Mar	No reportable indications.
R/L 7, 29, 30, 31	51.6	63.6	8	50.888	4	2-Mar	No reportable indications.
R/L 8, 9, 10, 12, 13, 14, 15, 16, 17	55.2	67.2	18	51.51	4.25	2-Mar	No reportable indications.
R/S 11	50	62	2	53.014	4.5	2-Mar	No reportable indications.
R/L 18, 19, 20, 21, 22, 23	51.6	63.6	12	37.864	4.25	2-Mar	No reportable indications.
R/L 24	46.6	58.6	2	42.35	4.75	2-Mar	No reportable indications.
R/L 25, 26	51.6	63.6	4	39.789	4.75	2-Mar	No reportable indications.
R/L 27, 28	51.6	63.6	4	51.489	4.5	2-Mar	No reportable indications.
R/L 36, 37, 38	51.8	63.8	6	29.045	3.75	2-Mar	No reportable indications.
R/L 39	59	71	2	23.234	3.5	2-Mar	No reportable indications.
R/L 40	50.2	62.2	2	40.357	3.5	2-Mar	No reportable indications.
R/L 41	53.2	65.2	2	37.662	3.5	2-Mar	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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3-Angles NDE Report 2020-CF-5862 …

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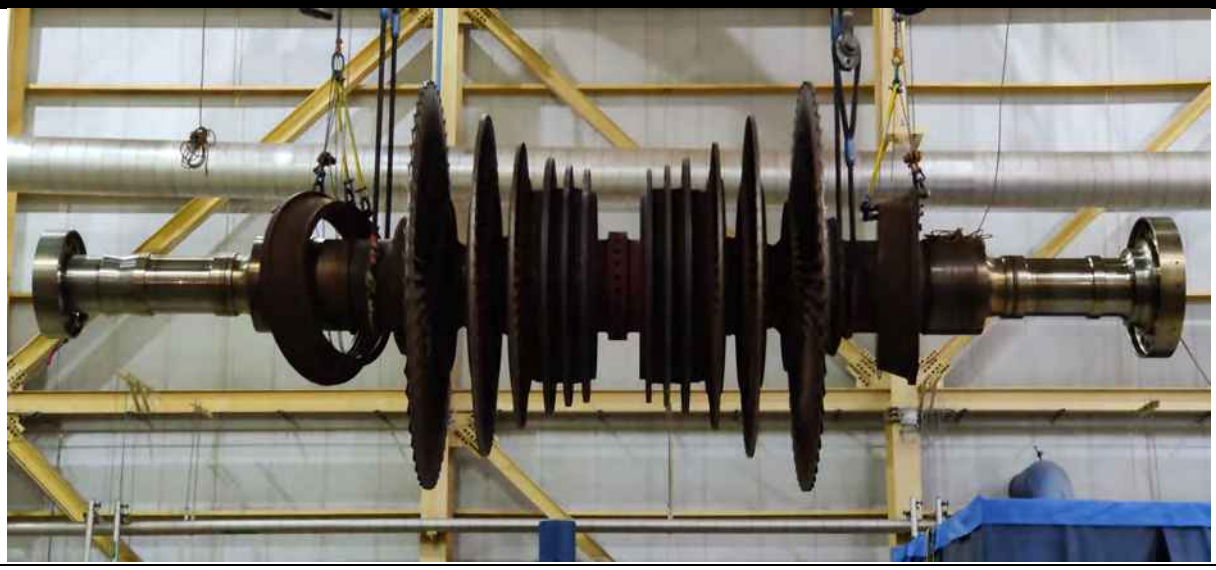
Date: 8-Feb-20 Page 74 of 264

TURBINE ROTOR INSPECTION



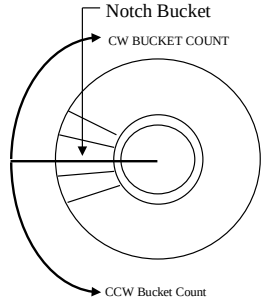
TEST EXAMINER(S): Stephen Renkavinsky, Lawrence Craig, Joop Kraijesteijn
ROTOR UNIT: Unit #3 LPA
TYPE (SINGLE FLOW / DUAL FLOW): Dual NUMBER OF STAGES: 6 (12)
TEST METHOD (S) UTILIZEI Magnetic Particle, Liquid Penetrant, Visual Testing
DATE(S) TESTED: 02/05/2020 - 03/03/2020
MISCELLANEOUS INFORMATION:

INSPECTION RESULTS OF:	INDICATIONS NOTED: YES	NO	N/A
ROTOR SPINDLE		X	
PACKING GROOVES		X	
JOURNALS		X	
COUPLING		X	
ROTATING BLADING	X		
EROSION SHIELDS	X		
TIE-WIRES			X
COVERS	X		
TENONS			X
PHOTOS INCLUDED	X		

NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL REQUIRE A DETAILED DESCRIPTION OF FINDINGS.

ROTATING BLADE LOCATION KEY

VIEW FACING GENERATOR END COUPLING



[X] CW COUNT [ ] CCW COUNT

NOTE: WHERE APPLICABLE, THE NOTCH BUCKET SHALL BE CALLED #1 AND NUMBERED SEQUENTIALLY IN EITHER A CW OR CCW MANNER; IF NOT, BLADE #1 REFERENCE SHALL BE PROVIDED.

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Project: CF-5862
Site: Comanche Generating Station
Date: 5-Feb-20 Page 75 of 264

VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		Comanche Unit 3 LPA	

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	175.5 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	171.6 fc.

Reportable indications found. See following pages for a list of details and pictures.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results

Stage	Description
L-0 T	• Erosion found on all Z locks. • General erosion found on erosion shields. • Foreign object damage found in Erosion Shields on blades: 27,32,35,42,46,51 and 62 • Light pitting found on wheel dovetails and body.
L-1 T	• Erosion/pitting present • Pitting found on all blades. Mostly around snubbers and on the admission side.
L-2 T	• Erosion/pitting present • Light pitting found on wheel dovetails and body.
L-3 T	• Erosion/pitting present
L-4 T	• Light foreign object damage found on leading edges. • Pitting found on all blades.
L-5 T	• Light foreign object damage found on leading edges. • Pitting found on all blades.
L-5 G	• Light foreign object damage found on leading edges. • Pitting found on all blades.
L-4 G	• Light foreign object damage found on leading edges. • Pitting found on all blades.
L-3 G	• Erosion/pitting present
L-2 G	• Erosion/pitting present • Light pitting found on wheel dovetails and body. • Above foreign object damage found on blade #7
L-1 G	• Erosion/pitting present • Pitting found on all blades. Mostly around snubbers and on the admission side.
L-0 G	• Erosion found on all Z locks. • General erosion found on erosion shields. • Light pitting found on wheel dovetails and body.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 1

Stage	Description
L-0 T	• Erosion found on all Z locks. • General erosion found on erosion shields. • Foreign object damage found in Erosion Shields on blades: 27,32,35,42,46,51 and 62 • Light pitting found on wheel dovetails and body.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 2

Stage	Description
L-1 T	• Erosion/pitting present • Pitting found on all blades. Mostly around snubbers and on the admission side.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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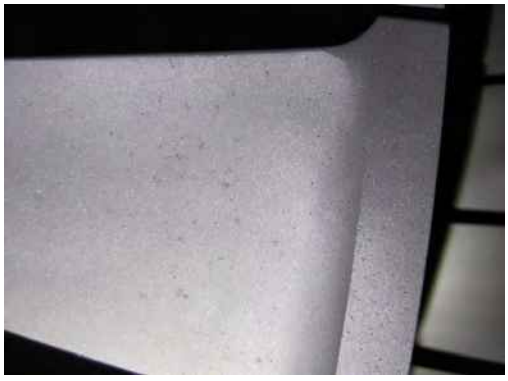
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 3

Stage	Description
L-2 T	• Erosion/pitting present • Light pitting found on wheel dovetails and body.







NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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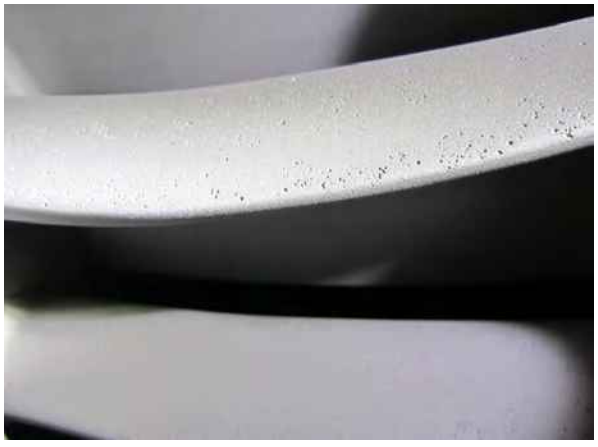
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 4

Stage	Description
L-3 T	• Erosion/pitting present






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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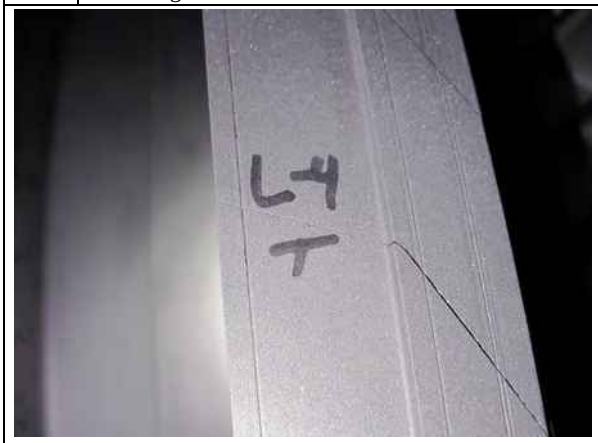
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 5

Stage	Description
L-4 T	• Light foreign object damage found on leading edges. • Pitting found on all blades.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 6

Stage	Description
L-5 T	• Light foreign object damage found on leading edges. • Pitting found on all blades.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 7

Stage	Description
L-0 G	• Erosion found on all Z locks. • General erosion found on erosion shields. • Light pitting found on wheel dovetails and body.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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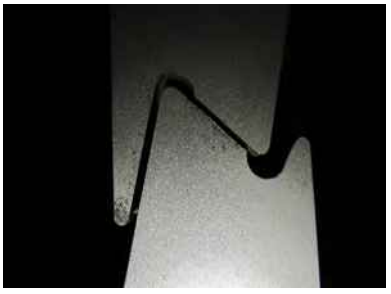
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 8

Stage	Description
L-1 G	• Erosion/pitting present • Pitting found on all blades. Mostly around snubbers and on the admission side.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 9

Stage	Description
L-2 G	• Erosion/pitting present • Light pitting found on wheel dovetails and body. • Above foreign object damage found on blade #7





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 10

Stage	Description
L-3 G	• Erosion/pitting present




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 11

Stage	Description
L-4 G	• Light foreign object damage found on leading edges. • Pitting found on all blades.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 12

Stage	Description
L-5 G	• Light foreign object damage found on leading edges. • Pitting found on all blades.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPA		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 4161 µW/cm2
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4322 µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.64 fc.
WHITELIGHT: At surface of part READING: 0.48 fc.

MAGNETIZATION: Head Shot OUTPUT: FWDC Circular Amps 3220-8820 [ ] TURN
MAGNETIZATION: Bucking Field OUTPUT: FWDC Longitudinal Amps 1000-1300 6 TURN
MAGNETIZATION: n/a OUTPUT: n/a n/a [ ] TURN
FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Head Shot and Bucking Field performed.

Reportable indications found. See following sheet for a list of details and pictures.

Rotor demagnetized +/- 5 Gauss.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results

Stage	Description
L-0 G	• No reportable indications found.
L-1 G	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas
L-2 G	• No reportable indications found.
L-3 G	• No reportable indications found.
L-4 G	• No reportable indications found.
L-5 G	• No reportable indications found.
L-5 T	• No reportable indications found.
L-4 T	• No reportable indications found.
L-3 T	• No reportable indications found.
L-2 T	• No reportable indications found.
L-1 T	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas
L-0 T	• No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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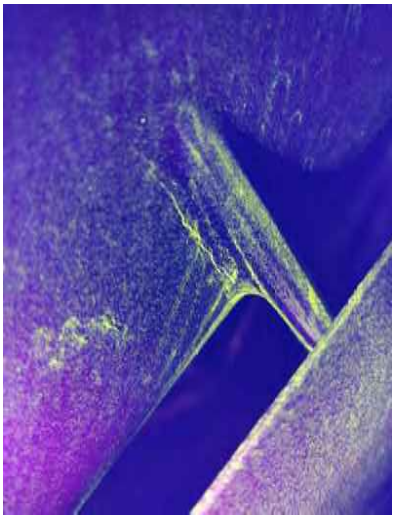
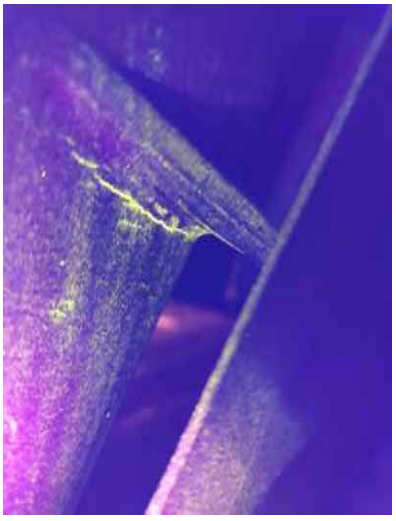
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Page 1

Stage	Description
L-1 G	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas • Examples shown below





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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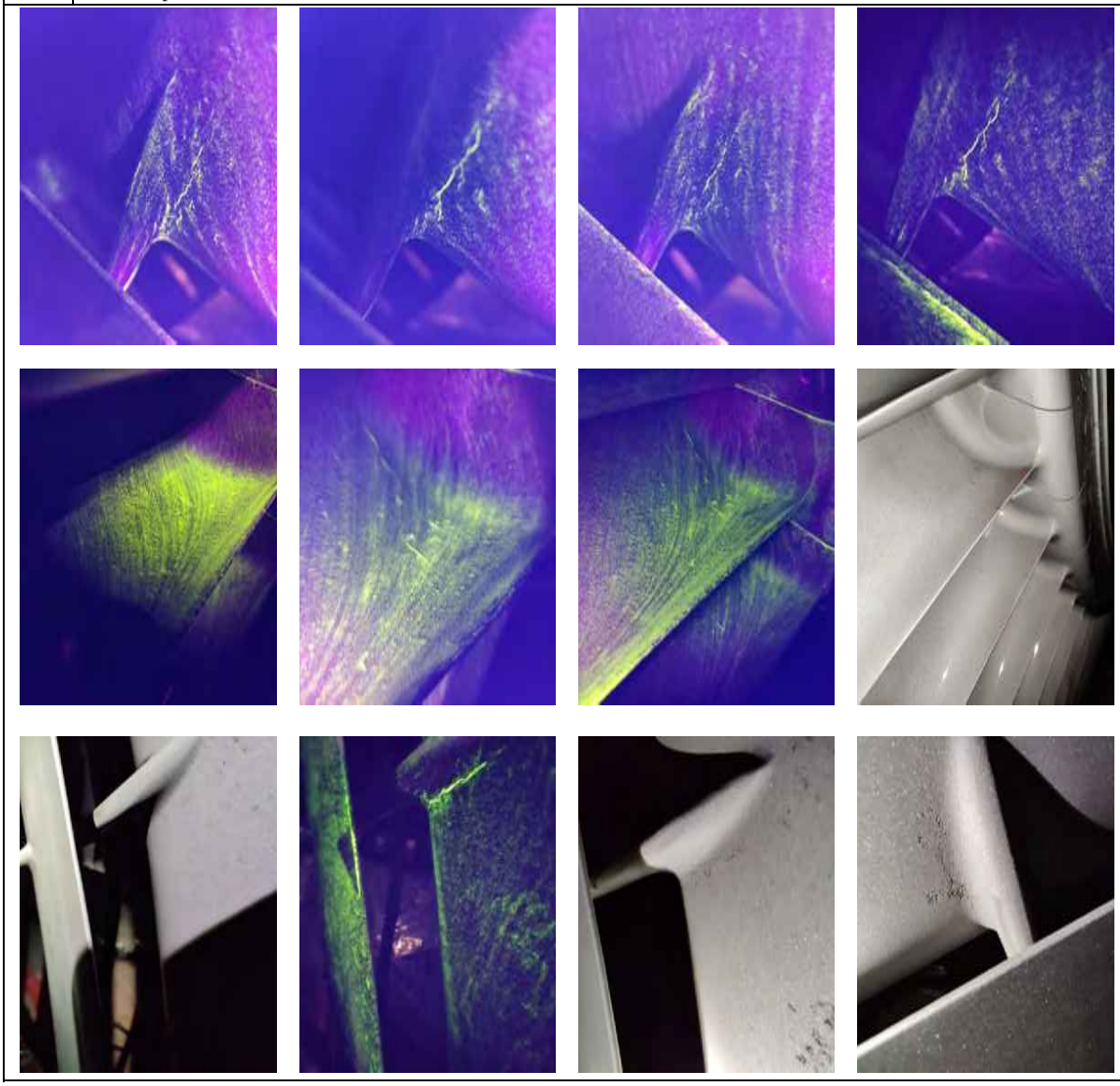
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Page 2

Stage	Description
L-1 T	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas • Examples shown below



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPA		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4491 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.44 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	AC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: Parker B-300 s/n: 25694 Cal Due: 06/09/20
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Hand yoke of covers and blade roots.

No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPA Erosion Shields		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	311.7 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	245.1 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [ ] Solvent Removable [X] Water Washable

INSPECTION RESULTS

Stage	Description
L-0 G	• Bleedout found of the following blades. 1,3,5,8,9,12-15,18-20,23,24,27,31,33,34,37,38,40,41-47,48,49,53-56,58
L-0 T	• Bleedout found of the following blades. 1,2,4,6-8,14-16,18-20,22,26-29,31-34,35-38,41-44,46,48,51,53-55,58

See following pages for pictures.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 1

Stage	Description
L-0 G	• Bleedout found of the following blades. 1,3,5,8,9,12-15,18-20,23,24,27,31,33,34,37,38,40,41-47,48,49,53-56,58

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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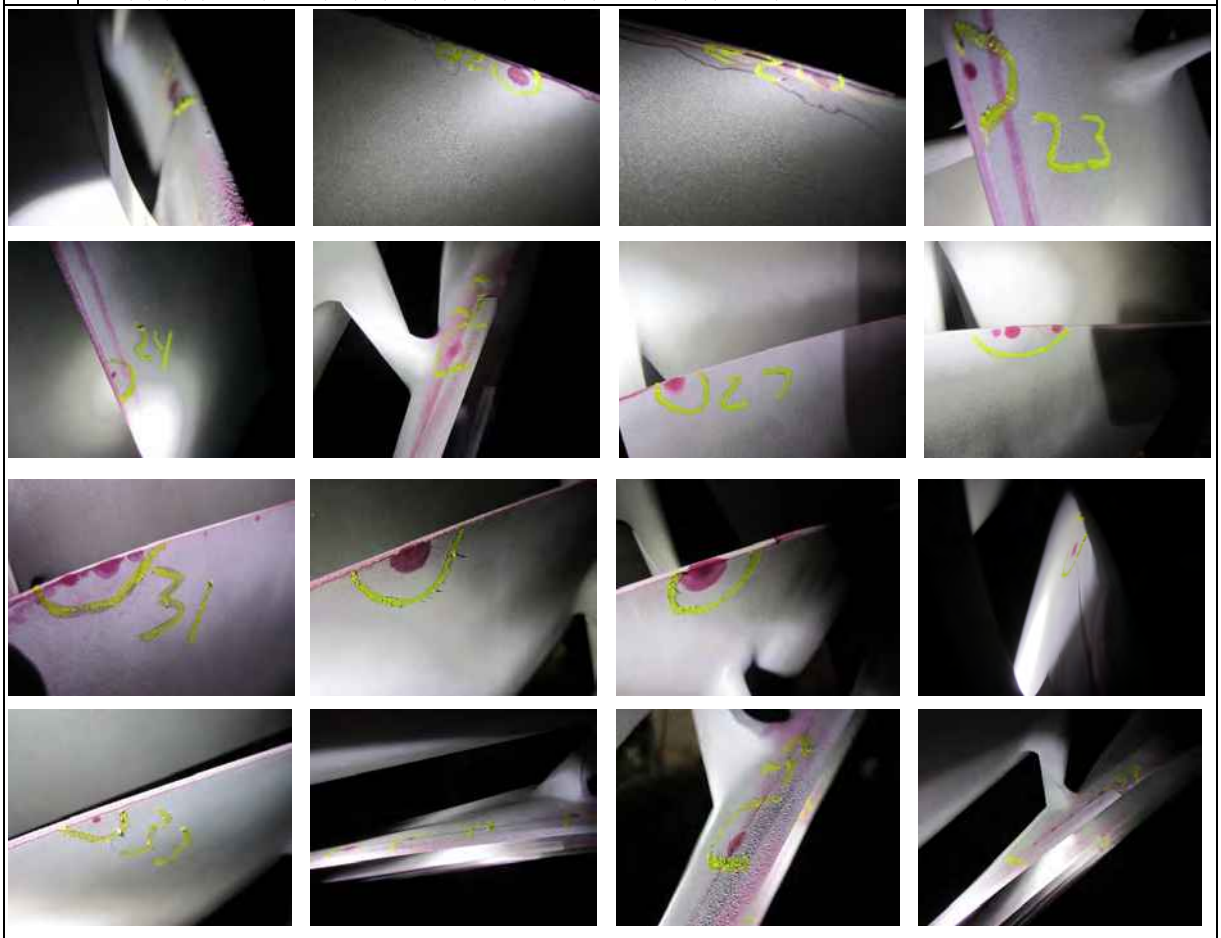
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 2

Stage	Description
L-0 G	• Bleedout found of the following blades. 1,3,5,8,9,12-15,18-20,23,24,27,31,33,34,37,38,40,41-47,48,49,53-56,58



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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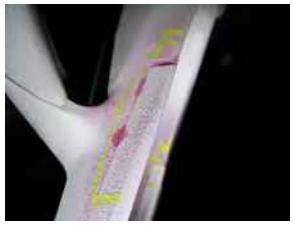
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

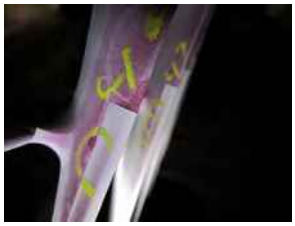
MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 3

Stage	Description
L-0 G	• Bleedout found of the following blades. 1,3,5,8,9,12-15,18-20,23,24,27,31,33,34,37,38,40,41-47,48,49,53-56,58










NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 7-Feb-20 Page 98 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 4

Stage	Description
L-0 T	• Bleedout found of the following blades. 1,2,4,6-8,14-16,18-20,22,26-29,31-34,35-38,41-44,46,48,51,53-55,58

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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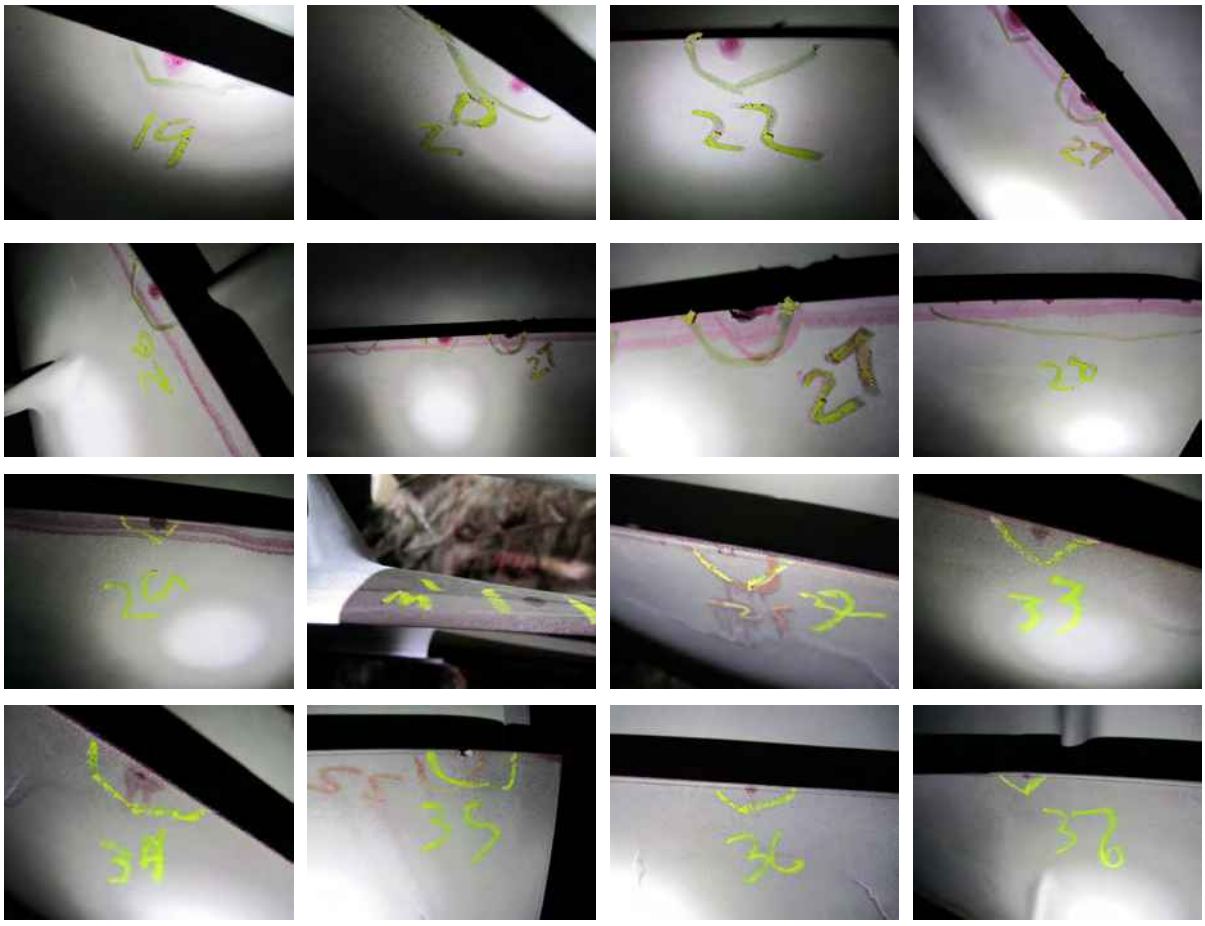
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 5

Stage	Description
L-0 T	• Bleedout found of the following blades. 1,2,4,6-8,14-16,18-20,22,26-29,31-34,35-38,41-44,46,48,51,53-55,58



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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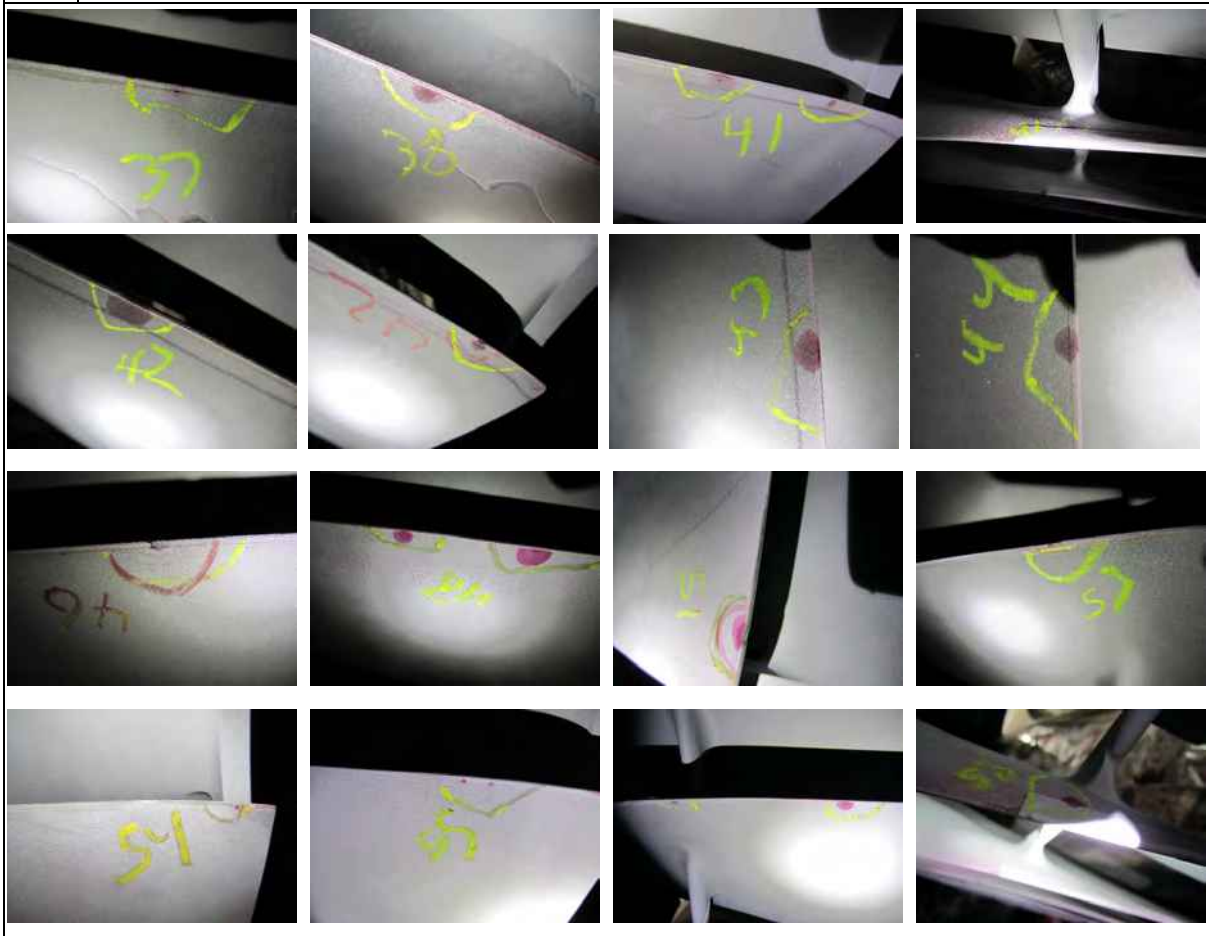
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 6

Stage	Description
L-0 T	• Bleedout found of the following blades. 1,2,4,6-8,14-16,18-20,22,26-29,31-34,35-38,41-44,46,48,51,53-55,58



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Comanche Unit 3 LPA L-1 Blade Attachment Serrations

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 19L02K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4537 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.17 fc.
WHITELIGHT: Flashlight: Fenix UC35_JK READING: 410.8 fc.

MAGNETIZATION:	Coil Wrap	OUTPUT:	FWDC	Longitudinal Amps	1900	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: n/a
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: n/a

INSPECTION RESULTS

Coil inspection of the LPA L-1 blade root serrations resulted in no reportable indications.

Visually the following was observed:
- overall pitting
- (1) Folded metal GE

See following page for pictures.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA L-1 Blade Attachment Serrations

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPA Stationary Components		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux WA-2B / 18J070

WATER CONDITIONER MFG. / BATCH: n/a

MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: See Following µW/cm2

BLACKLIGHT: n/a READING: n/a µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: See Following fc.

WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

LPA Diaphragm set: See following sheet for details.

Stationary parts demagnetized +/- 3 Gauss.

* Diaphragms were not completely blasted therefore headshot could not be performed.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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STATIONARY COMPONENTS REPORT FORM LPA

STAGE #	UPPER/LOWER	Fc.	µW/cm2	REPORTABLE INDICATIONS (YES/NO)	DATE TESTED
6G	Upper	0.66	3761	No	2/4/2020
5G	Upper	0.66	3761	No	2/4/2020
4G	Upper	0.39	4265	Yes	2/5/2020
3G	Upper	0.39	4265	Yes	2/5/2020
2G	Upper	0.39	4265	Yes	2/5/2020
1G	Upper	0.15	4047	Yes	2/8/2020
1T	Upper	0.15	4047	Yes	2/8/2020
2T	Upper	0.39	4265	Yes	2/5/2020
3T	Upper	0.39	4265	Yes	2/5/2020
4T	Upper	0.39	4265	Yes	2/5/2020
5T	Upper	0.66	3761	Yes	2/4/2020
6T	Upper	0.66	3761	No	2/4/2020
6G	Lower	0.47	3712	No	2/10/2020
5G	Lower	0.15	4047	No	2/8/2020
4G	Lower	0.15	4047	Yes	2/8/2020
3G	Lower	0.15	4047	Yes	2/8/2020
2G	Lower	0.15	4047	Yes	2/8/2020
1G	Lower	0.15	4047	Yes	2/8/2020
1T	Lower	0.15	4047	Yes	2/8/2020
2T	Lower	0.15	4047	Yes	2/8/2020
3T	Lower	0.15	4047	Yes	2/8/2020
4T	Lower	0.15	4047	Yes	2/8/2020
5T	Lower	0.15	4047	No	2/8/2020
6T	Lower	0.47	3712	No	2/10/2020

Data sheets of indications and photos on following sheets.

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
1TU	• Foreign object damage found on the following blades: 2,3,7,9,11,16,19,34,37,41 and 51.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
1TL	• Foreign object damage found on the following blades: 62,65,67,69,74,765,78,79,81-83,86,87,89,90,92 and 98.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
1GU	• Foreign object damage found on the following blades: 3,4,11,12,16,48,50,51,54-56,59 and 60.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
1GL	• Foreign object damage found on the following blades: 62,63,75,80,85,87,90-92,115 and 117.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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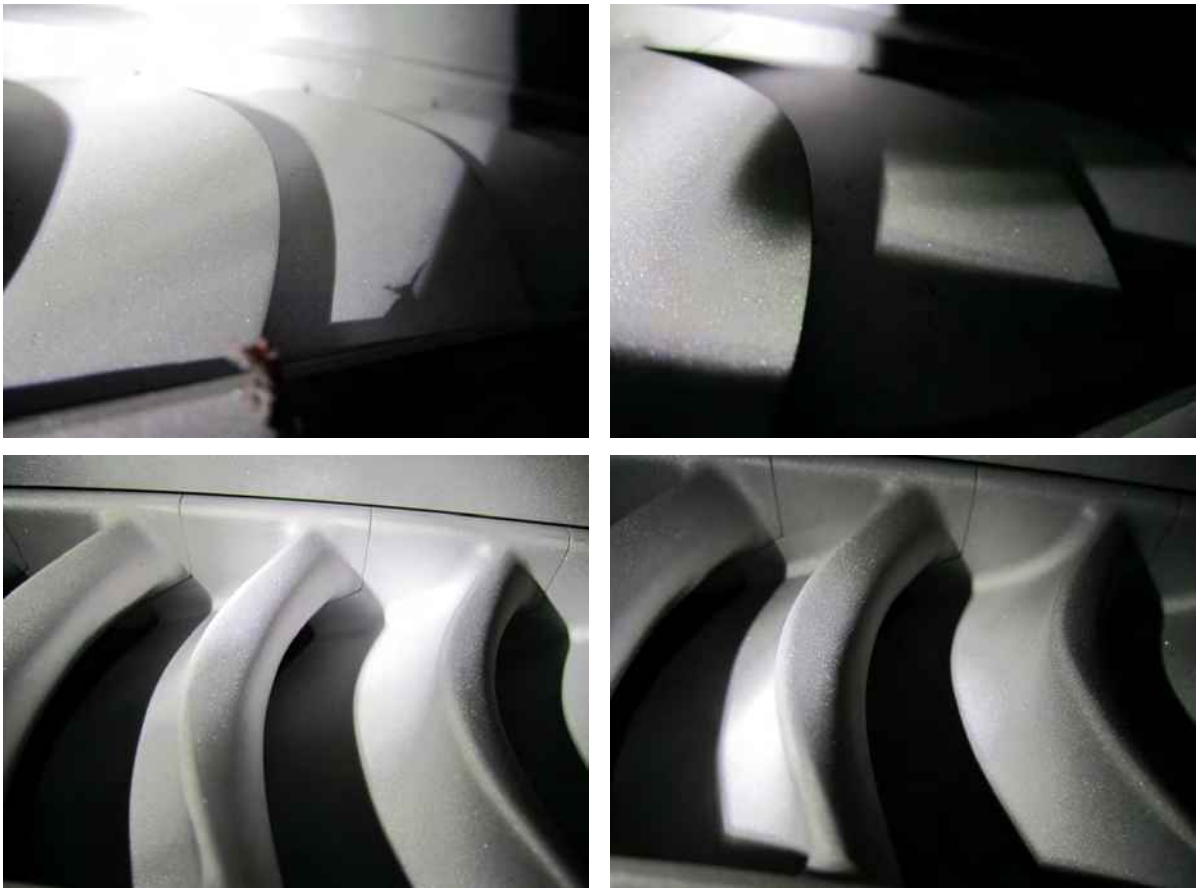
Project: CF-5862
Site: Comanche Generating Station
Date: 5-Feb-20 Page 109 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
2TU	• Lite pitting on all surfaces.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
2TL	• Pitting on all surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
2GU	• Lite pitting on all surfaces. • Blade 51: Foreign object damage on trailing edge.






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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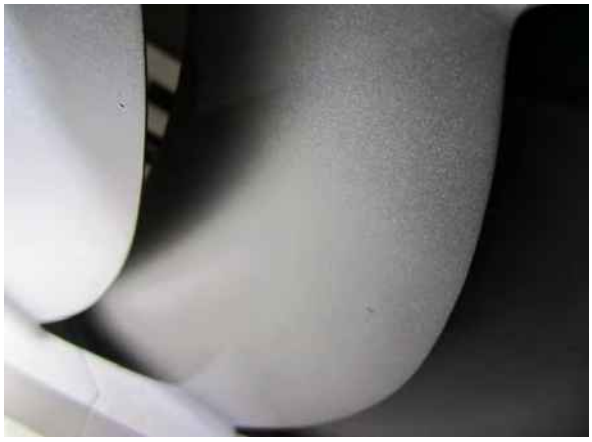
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
2GL	• Pitting on all surfaces.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
3GL	• Pitting on all surfaces.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
3GU	• Moderate pitting on all surfaces.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
3TL	• Pitting on all surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

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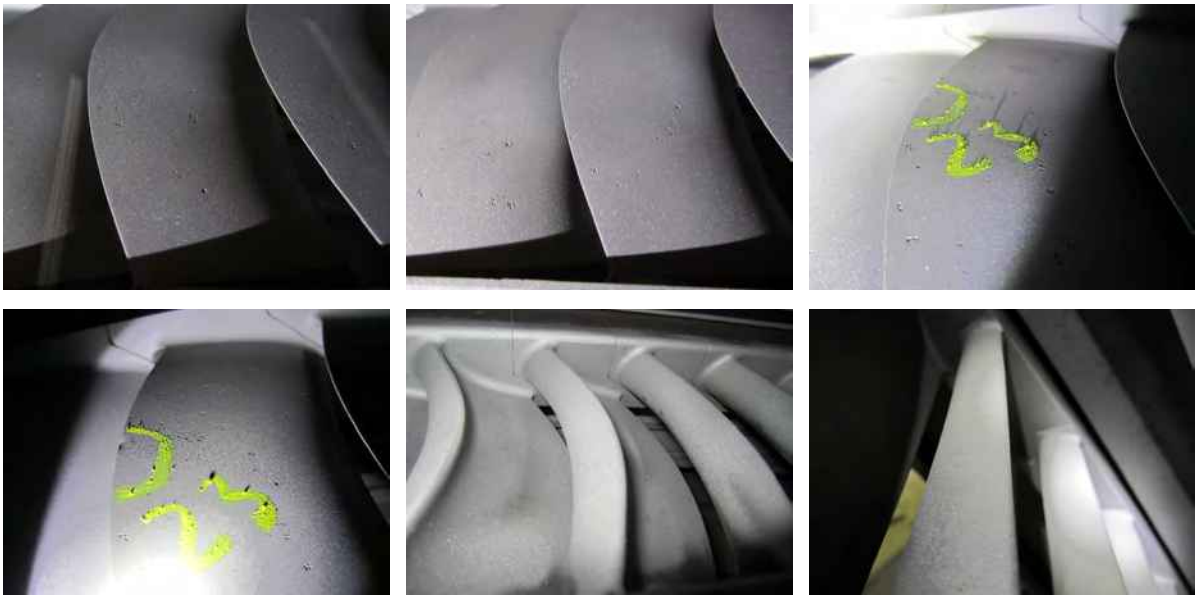
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
3GU	• Pitting on all surfaces. • Blade 23: Foreign object damage on trailing edge.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
4TU	• Pitting on all surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
4TL	• Pitting on all surfaces.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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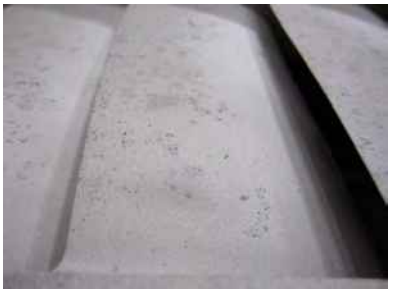
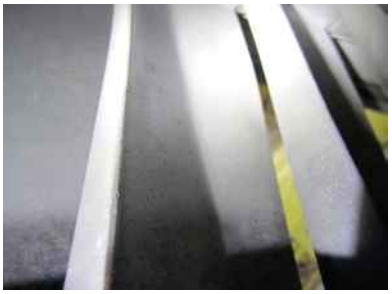
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
4GU	• Pitting on all surfaces.








NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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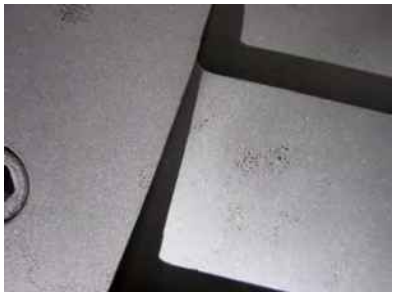
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPA Stationary Components		

Stage	Description
4GL	• Pitting on all surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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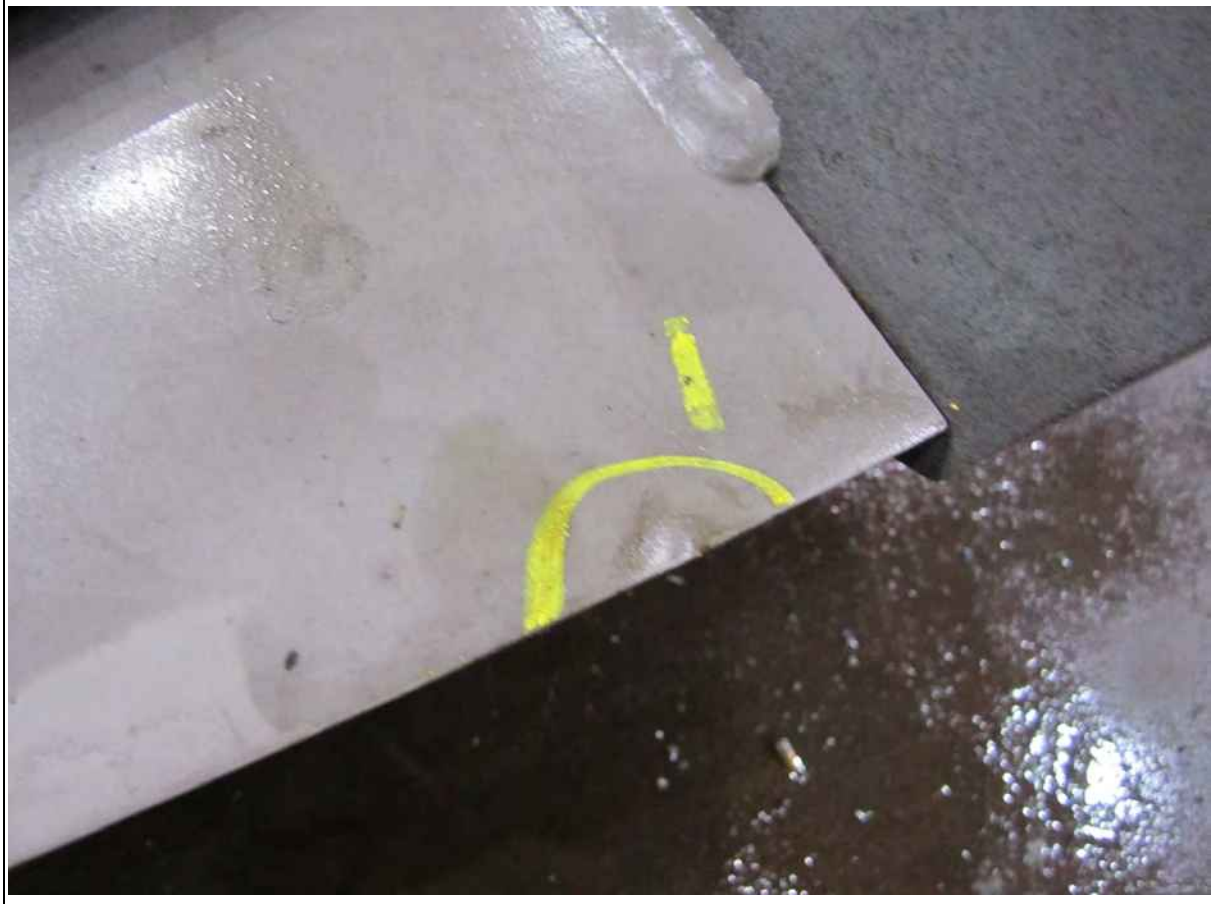
Project: CF-5862
Site: Comanche Generating Station
Date: 4-Feb-20 Page 121 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPA Stationary Components	

Stage	Description
5TU	• Foreign object damage found on blade 1



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 8-Feb-20 Page 122 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPA Diaphragm Bolts		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux 14AM / 18K20K

WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070

MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 2999-4047 µW/cm2

BLACKLIGHT: n/a READING: n/a µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: 0.15 fc.

WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

Stage 6T: (4) Bolts - No reportable indications.
Stage 5T: (4) Bolts - No reportable indications.
Stage 4,3,2T: (9) Bolts - No reportable indications.
Stage 1T: (2) Bolts - No reportable indications.
Stage 6G: (4) Bolts - No reportable indications.
Stage 5G: (4) Bolts - No reportable indications.
Stage 4,3,2G: (15) Bolts - No reportable indications.
Stage 1G: (2) Bolts - No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

n/a n/a

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPA Diaphragm Bolting		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	Ultragel II / 19E099	
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma	.500" Round	Frequency: 5MHz. S/N: 14A0010A	DELAY:	
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:	OK		

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
LPA Diaphragm Bolts	53.6	59.6	4	6.6	0.75	2/8/2020	No reportable indications.
	51.2	63.2	4	9.92	1	2/8/2020	No reportable indications.
	50.4	62.4	2	11.762	1	2/8/2020	No reportable indications.
	52.4	64.4	2	7.08	1	2/8/2020	No reportable indications.
	49.8	61.8	1	11.39	2	2/8/2020	No reportable indications.
	54.6	66.5	3	12.58	1.75	2/8/2020	No reportable indications.
	46	58	3	11.39	1.75	2/8/2020	No reportable indications.
	44.4	56.4	6	7.65	1.25	2/8/2020	No reportable indications.
	45.4	57.4	1	13.95	1.75	2/8/2020	No reportable indications.
	42.4	54.2	4	18.29	1.75	2/8/2020	No reportable indications.
	46.8	58.8	5	7.85	1.25	2/8/2020	No reportable indications.
	47.4	59.4	2	15.52	1.75	2/8/2020	No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

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Site: Comanche Generating Station
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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPA Casing Studs		

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER: LONGITUDNAL					
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	0.293
TRANSDUCER: SHEAR		WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:			OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
R/L 201, 244	39	51	4	14.146	2.25	29-Feb	No reportable indications.
R/L 202, 243	39	51	4	11.014	1.75	29-Feb	No reportable indications.
R/L 203, 204, 206, 208, 209, 236, 237, 239, 241, 242	39	51	20	11.79	2	29-Feb	No reportable indications.
R/L 210-221 223-235	39	51	50	13.363	2.75	29-Feb	No reportable indications.
R/L 222	39	51	2	14.339	2.75	29-Feb	No reportable indications.
R/L 205, 207, 238, 240	39	51	8	13.341	2	29-Feb	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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Site: Comanche Generating Station
Date: 1-Feb-20 Page 125 of 264

TURBINE ROTOR INSPECTION

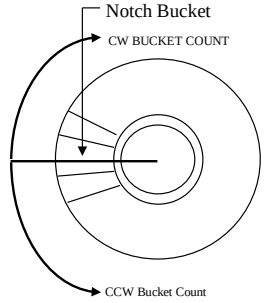
TEST EXAMINER(S): Stephen Renkavinsky, Lawrence Craig, Joop Kraijesteijn
ROTOR UNIT: Unit #3 LPB
TYPE (SINGLE FLOW / DUAL FLOW): Dual NUMBER OF STAGES: 6 (12)
TEST METHOD (S) UTILIZEI Magnetic Particle, Liquid Penetrant, Visual Testing
DATE(S) TESTED: 01/28/2020 - 02/01/2020
MISCELLANEOUS INFORMATION:

INSPECTION RESULTS OF:	INDICATIONS NOTED: YES	NO	N/A
ROTOR SPINDLE		X	
PACKING GROOVES		X	
JOURNALS		X	
COUPLING		X	
ROTATING BLADING	X		
EROSION SHIELDS	X		
TIE-WIRES			X
COVERS	X		
TENONS			X
PHOTOS INCLUDED	X		

NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL REQUIRE A DETAILED DESCRIPTION OF FINDINGS.

ROTATING BLADE LOCATION KEY

VIEW FACING GENERATOR END COUPLING



[X] CW COUNT [ ] CCW COUNT

NOTE: WHERE APPLICABLE, THE NOTCH BUCKET SHALL BE CALLED #1 AND NUMBERED SEQUENTIALLY IN EITHER A CW OR CCW MANNER; IF NOT, BLADE #1 REFERENCE SHALL BE PROVIDED.

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Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 126 of 264

VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		Comanche Unit 3 LPB	

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	247 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	192.7 fc.

Reportable indications found. See following sheet for a list of details and pictures.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 127 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		Comanche Unit 3 LPB VT Results	

Stage	Description
L-0 G	• Erosion/pitting and foreign object damage found on all blades and erosion shields. • Erosion found on all Z locks. • Medium to heavy mechanical damage found on the leading edges of the following blades. Numbered as marked: 11-54, 56, 57 and 58.
L-1 G	• (7) Blades removed. • Pitting found on all blades. Mostly around snubbers and on the admission side. • Foreign object damage and missing material found on the following blades. Numbered as marked: 8, 9, 13, 14, 20, 22, 26, 27, 29, 31, 37, 38, 46, 49-51, 54, 55, 56, 57. • Blade 34: Foreign object strike to cover.
L-2 G	• Erosion/pitting present
L-3 G	• Erosion/pitting present
L-4 G	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.
L-5 G	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.
L-5 T	• Erosion/pitting present • Light foreign object damage present.
L-4 T	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.
L-3 T	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.
L-2 T	• Erosion/pitting present
L-1 T	• Pitting found on all blades. Mostly around snubbers and on the admission side.
L-0 T	• Erosion found on all Z locks. • Erosion/pitting found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades: 10, 15, 17, 23, 28, 30 and 40.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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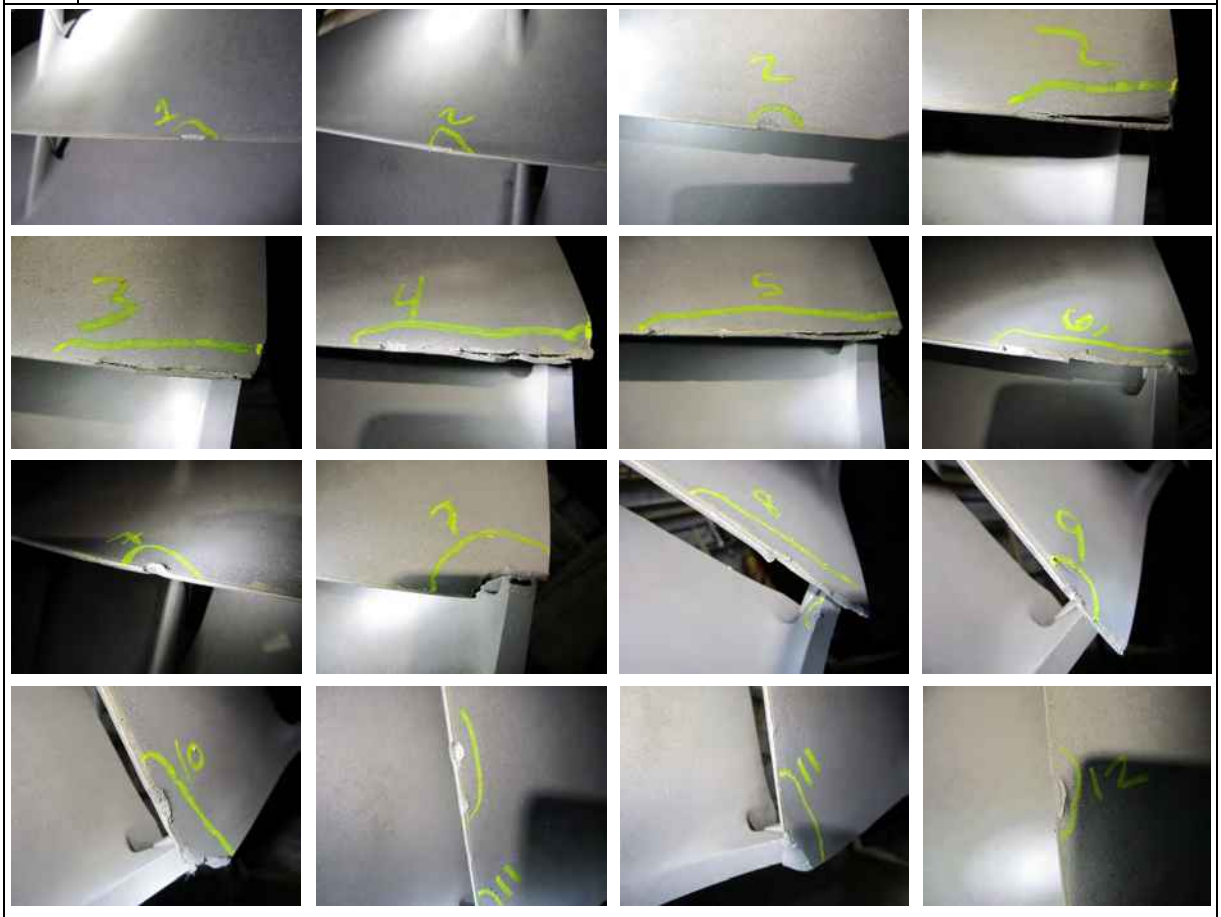
Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 128 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-0 G	• Erosion/pitting and foreign object damage found on all blades and erosion shields. • Erosion found on all Z locks. • Medium to heavy mechanical damage found on the leading edges of the following blades. Numbered as marked: 1-54, 56, 57 and 58.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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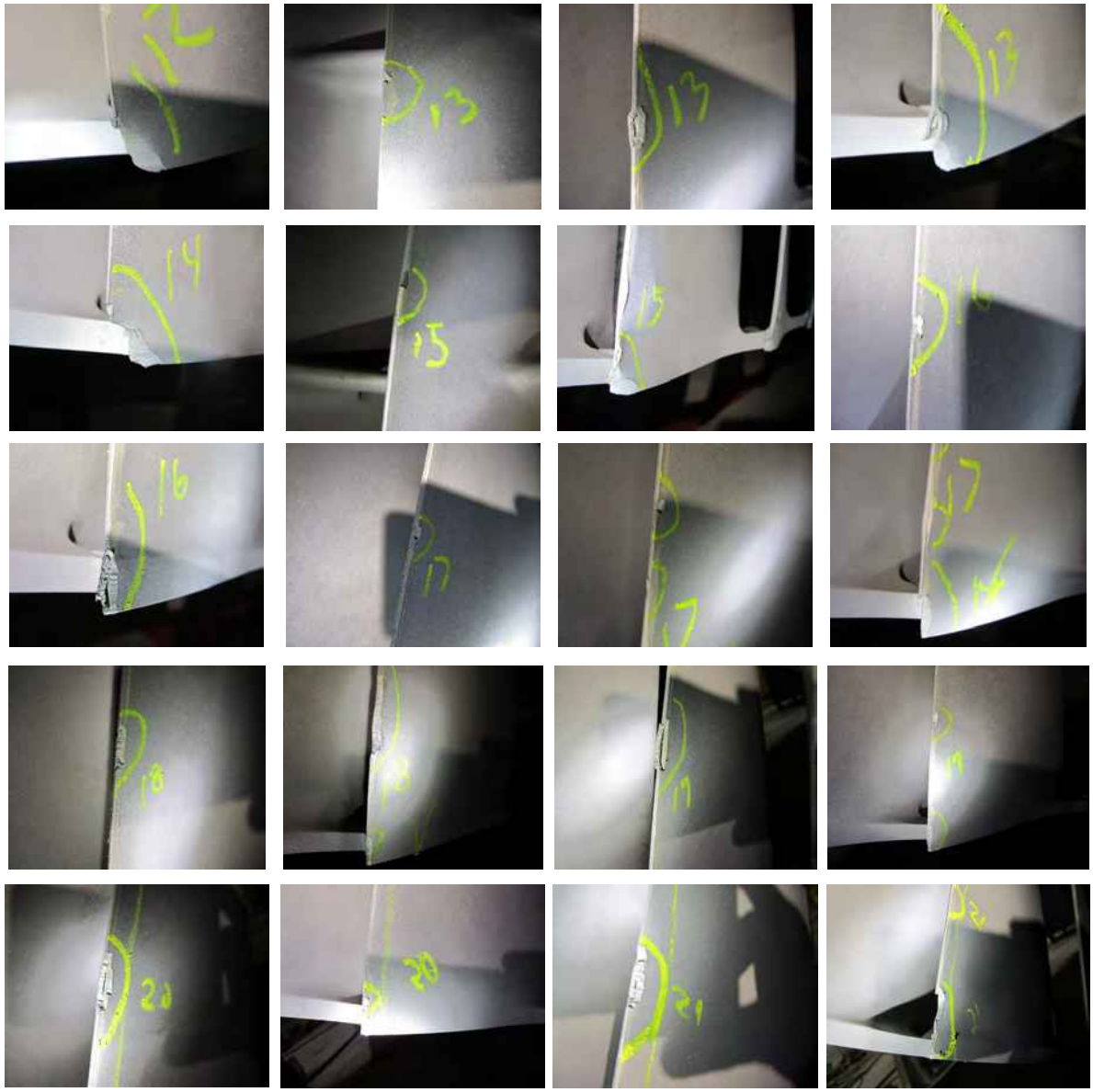
Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 129 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 2



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 3

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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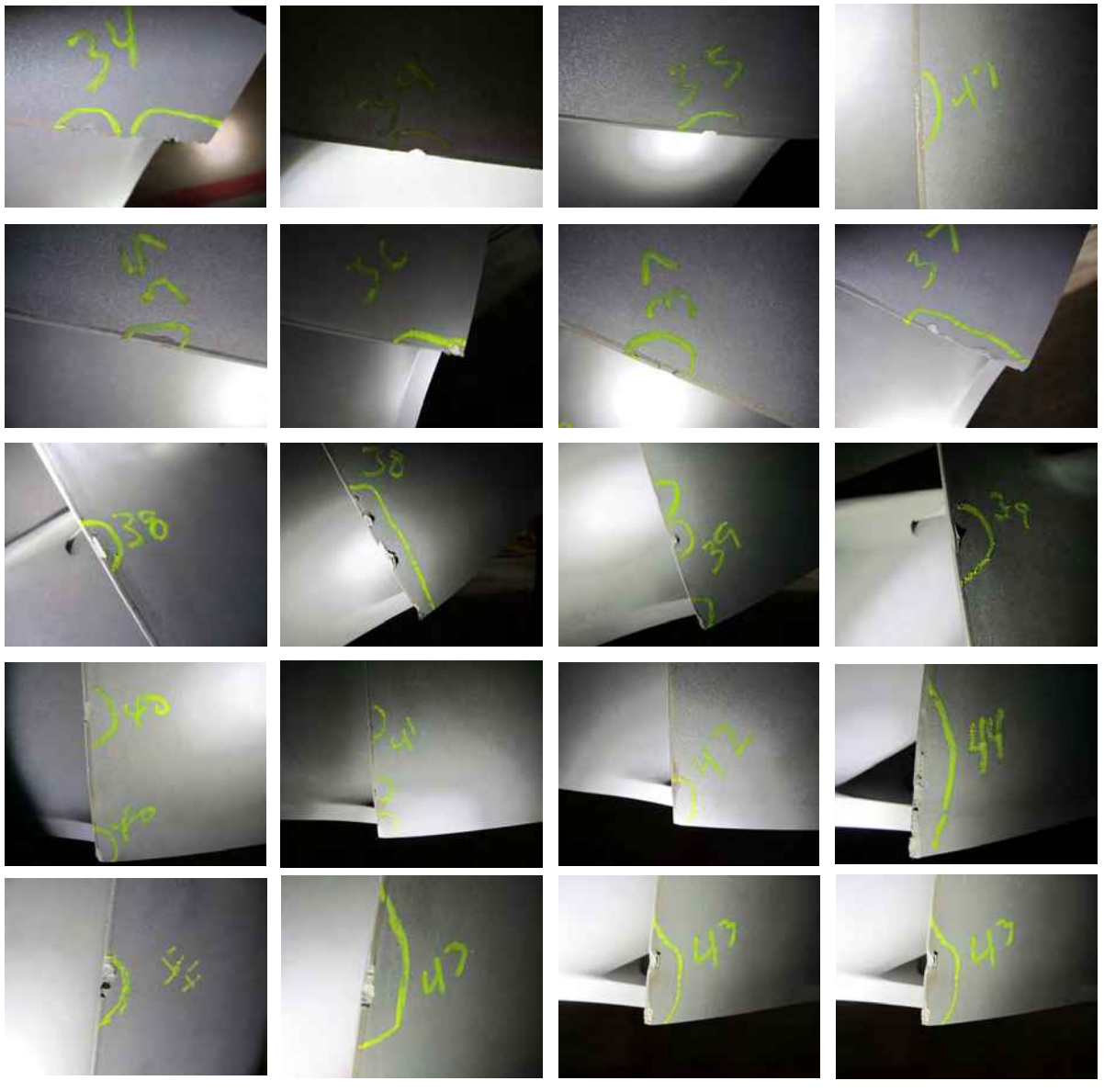
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 4



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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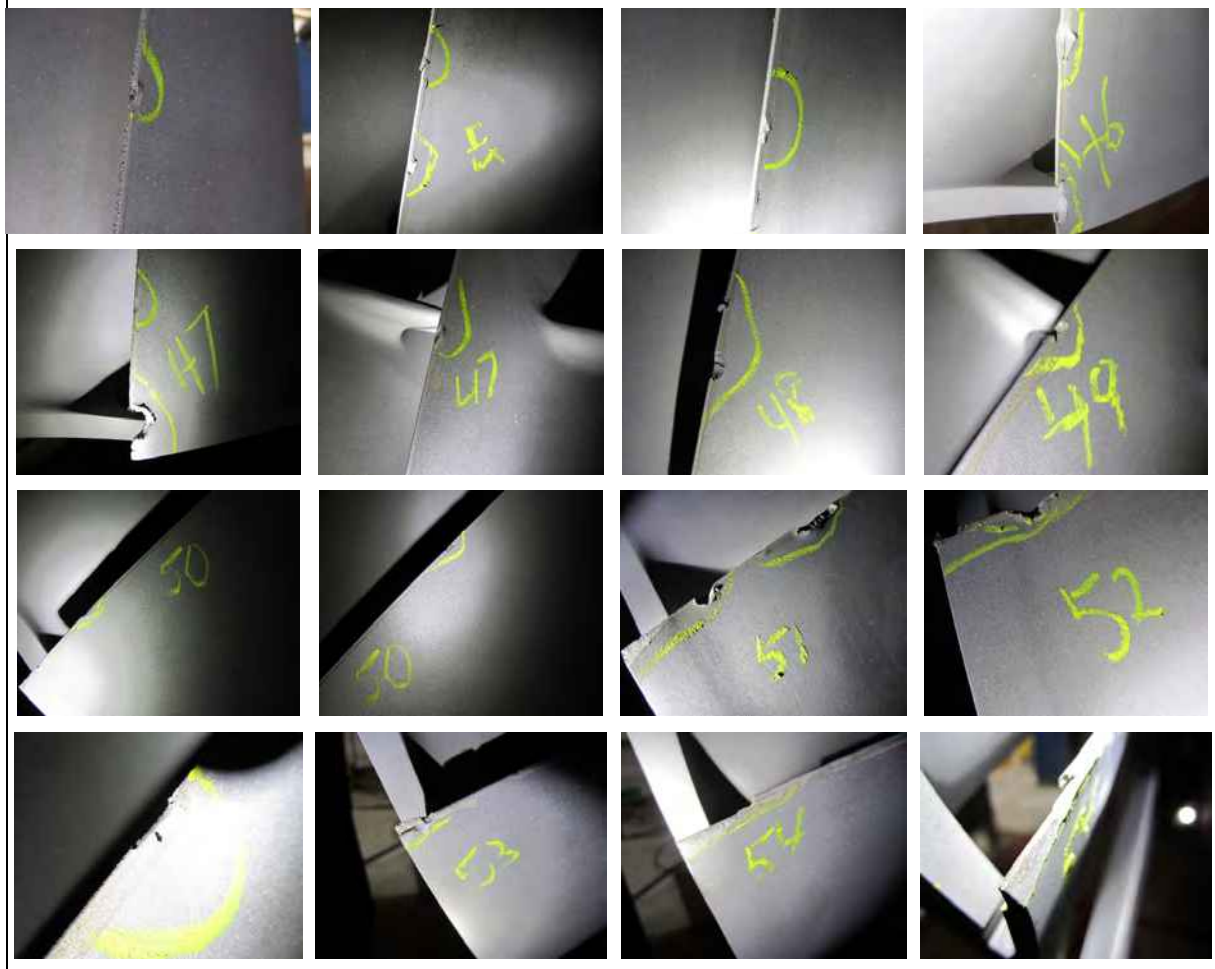
Date: 29-Jan-20 Page 132 of 264

CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 5



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 29-Jan-20 Page 133 of 264

CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 6

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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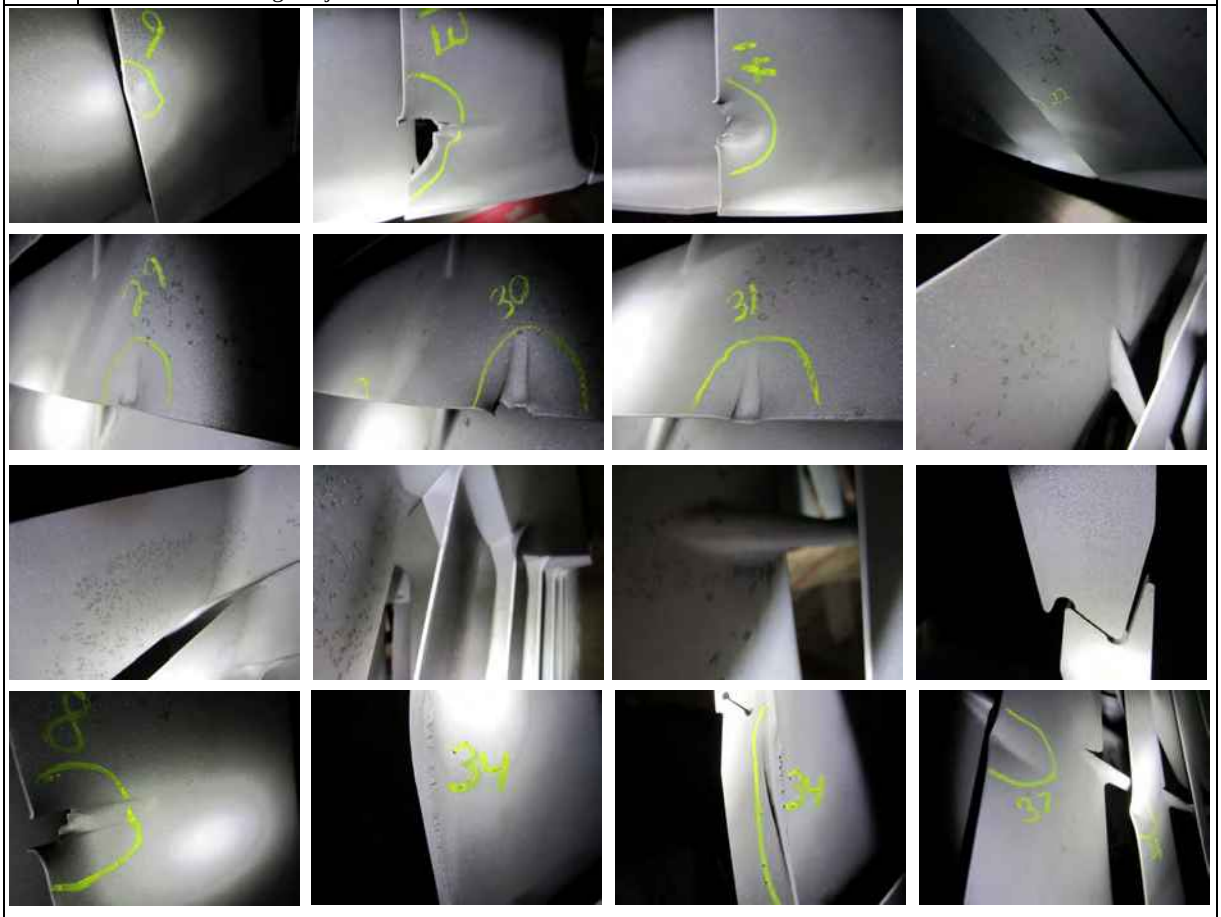
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-1 G	• (7) Blades removed. • Pitting found on all blades. Mostly around snubbers and on the admission side. • Foreign object damage and missing material found on the following blades. Numbered as marked: 8, 9, 13, 14, 20, 22, 26, 27, 29, 31, 37, 38, 46, 49-51, 54, 55, 56, 57. • Blade 34: Foreign object strike to cover.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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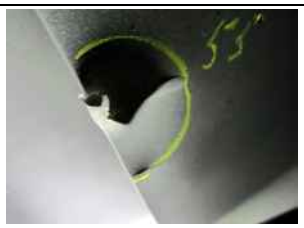
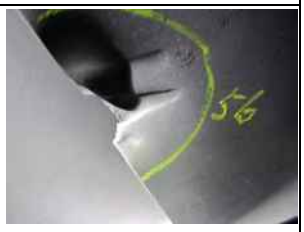
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 2

Stage	Description
L-1 G	• (7) Blades removed. • Pitting found on all blades. Mostly around snubbers and on the admission side. • Foreign object damage and missing material found on the following blades. Numbered as marked: 8, 9, 13, 14, 20, 22, 26, 27, 29, 31, 37, 38, 46, 49-51, 54, 55, 56, 57. • Blade 34: Foreign object strike to cover.






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-2 G	• Erosion/pitting present

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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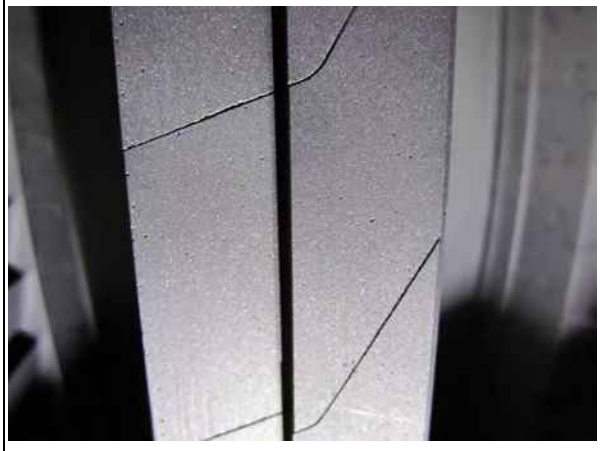
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-3 G	• Erosion/pitting present






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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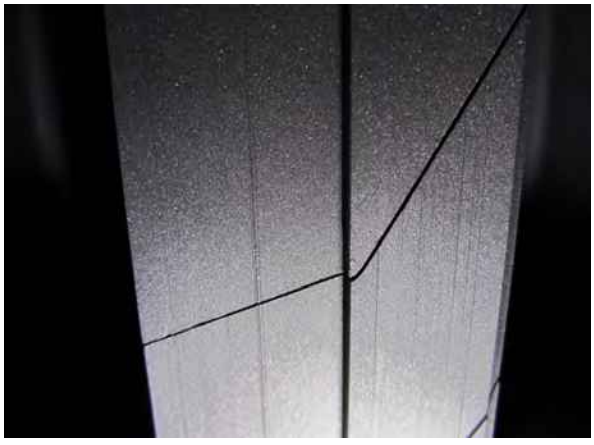
Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 138 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-4 G	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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3angles Inc.
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F: (518) 218-0490

Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 139 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-5 G	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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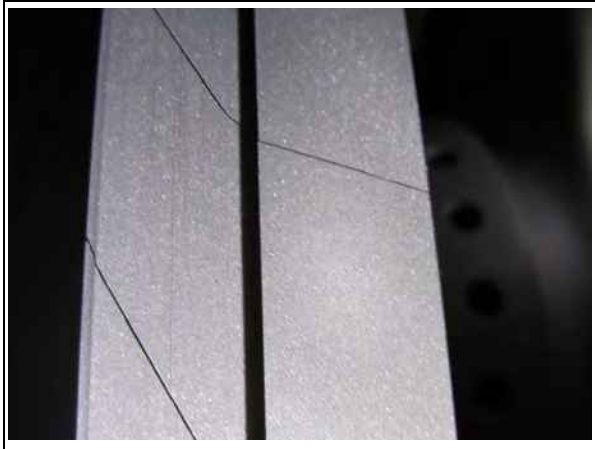
Project: CF-5862
Site: Comanche Generating Station
Date: 29-Jan-20 Page 140 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-5 T	• Erosion/pitting present • Light foreign object damage present.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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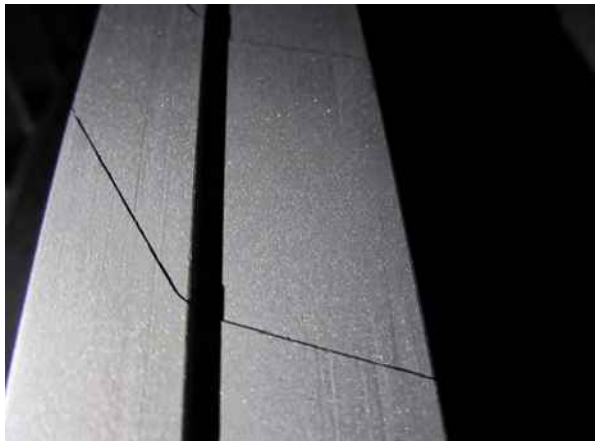
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-4 T	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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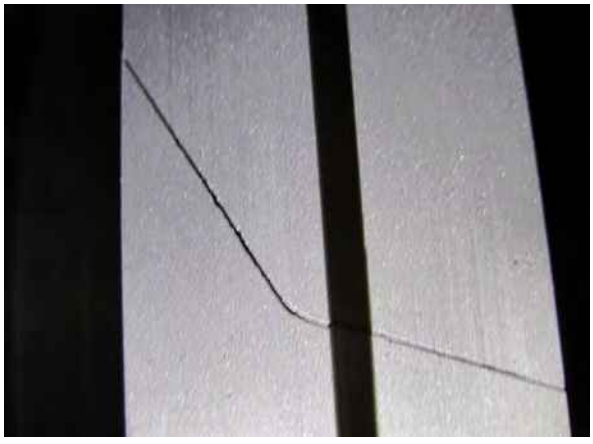
Site: Comanche Generating Station
Date: 29-Jan-20 Page 142 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-3 T	• Erosion/pitting present • Light foreign object damage present. • Deposits under covers.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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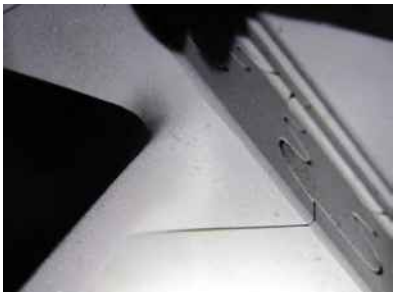
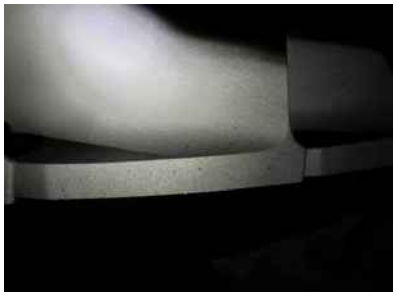
Site: Comanche Generating Station
Date: 29-Jan-20 Page 143 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-2 T	• Erosion/pitting present



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 29-Jan-20 Page 144 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-1 T	• Pitting found on all blades. Mostly around snubbers and on the admission side.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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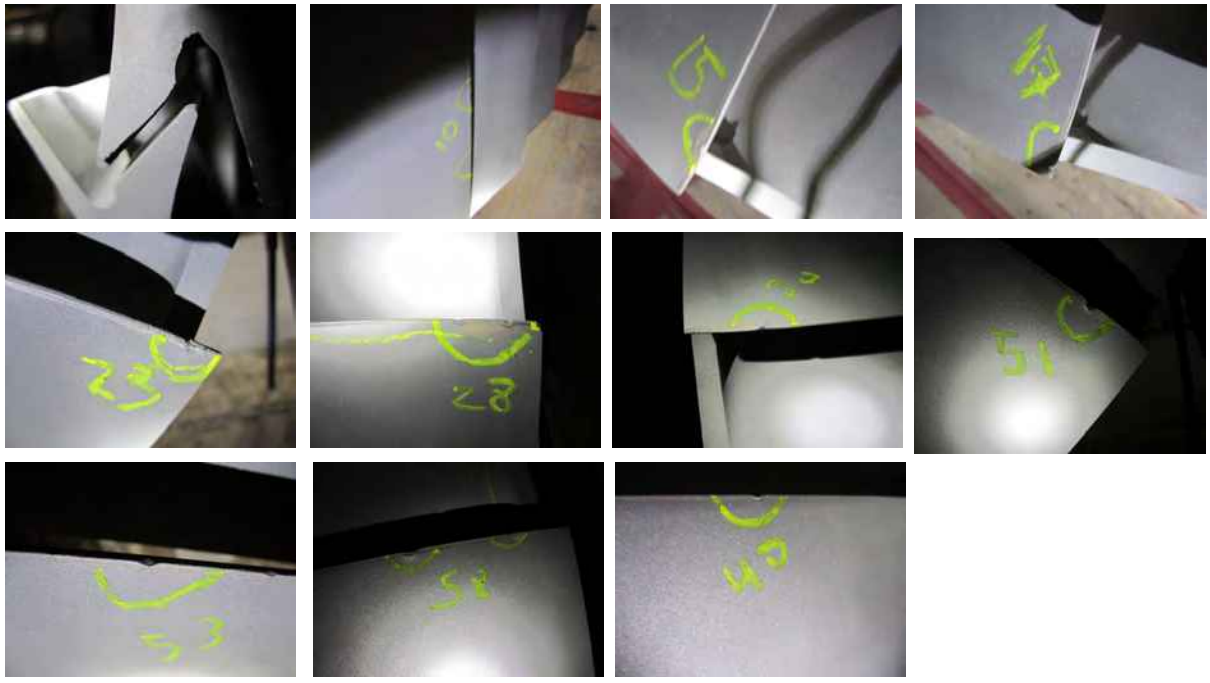
Date: 29-Jan-20 Page 145 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage	Description
L-0 T	• Erosion found on all Z locks. • Erosion/pitting found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades: 10, 15, 17, 23, 28, 30 and 40.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 31-Jan-20 Page 146 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPB		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 2542 µW/cm2
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 2966 µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.19 fc.
WHITELIGHT: At surface of part READING: 0.42 fc.

MAGNETIZATION:	Head Shot	OUTPUT:	FWDC	Circular Amps	3220-5730	[ ]	TURN
MAGNETIZATION:	Bucking Field	OUTPUT:	FWDC	Longitudinal Amps	1000-1300	6	TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ]	TURN

FIELD VERIFICATION INDICATOR: n/a
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Head Shot and Bucking Field performed.

Reportable indications found. See following sheet for a list of details and pictures.

Rotor demagnetized +/- 5 Gauss.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 147 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB MT Results

Stage	Description
L-0 G	• No reportable indications found.
L-1 G	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas
L-2 G	• No reportable indications found.
L-3 G	• No reportable indications found.
L-4 G	• No reportable indications found.
L-5 G	• No reportable indications found.
L-5 T	• No reportable indications found.
L-4 T	• No reportable indications found.
L-3 T	• No reportable indications found.
L-2 T	• No reportable indications found.
L-1 T	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas
L-0 T	• No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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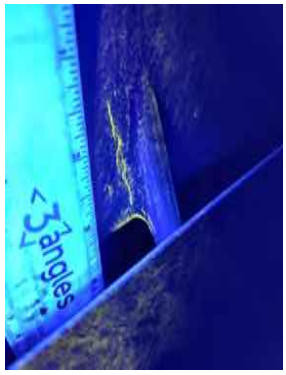
Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 148 of 264

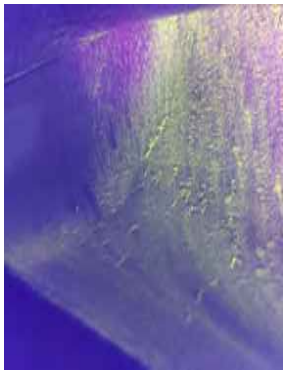
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB MT Results Page 1

Stage	Description
L-1 G	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas • Examples shown below






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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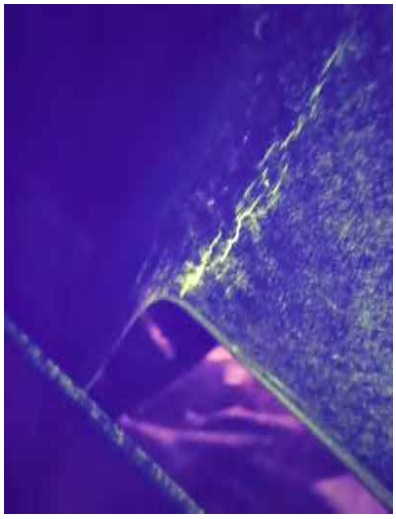
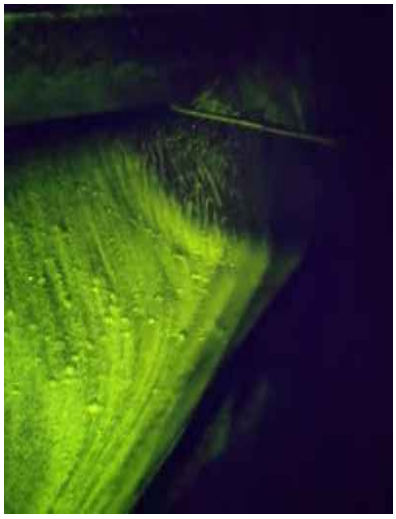
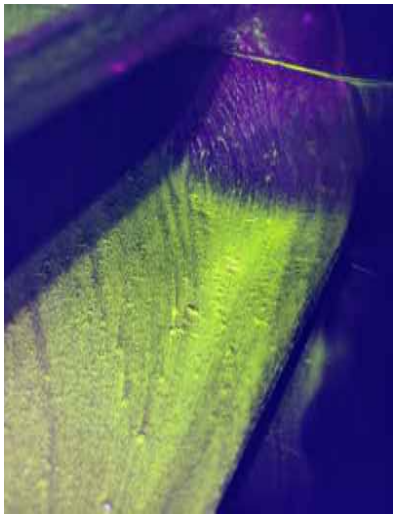
Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 149 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB MT Results Page 1

Stage	Description
L-1 T	• 1-1.5" crack-like indications on discharge side of all snubbers. • Multiple crack-like indications found on all blades on admission side towards root in corrosion areas • Examples shown below


NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 1-Feb-20 Page 150 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPB		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 3225 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.45 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION: Yoke OUTPUT: AC Longitudinal Amps [ ] [ ] TURN
MAGNETIZATION: n/a OUTPUT: n/a n/a [ ] [ ] TURN
MAGNETIZATION: n/a OUTPUT: n/a n/a [ ] [ ] TURN
FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: Parker B-300 s/n: 25694 Cal Due: 06/09/20
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20

INSPECTION RESULTS

Hand yoke of covers and blade roots.

No reportable indications found.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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Project: CF-5862
Site: Comanche Generating Station
Date: 31-Jan-20 Page 151 of 264

LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Comanche Unit 3 LPB Erosion Shields		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS			
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	µW/cm2
BLACKLIGHT:	n/a	READING:	µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_SR	READING:	265.7 fc.
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	249 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [ ] Solvent Removable [X] Water Washable

INSPECTION RESULTS

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.
L-0 T	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1, 2, 4, 5, 9-11, 17, 19, 20, 24, 26-30, 36, 37, 38, 40, 45, 46, 48, 49, 51-53, 55, 57 and 58.

See following pages for pictures.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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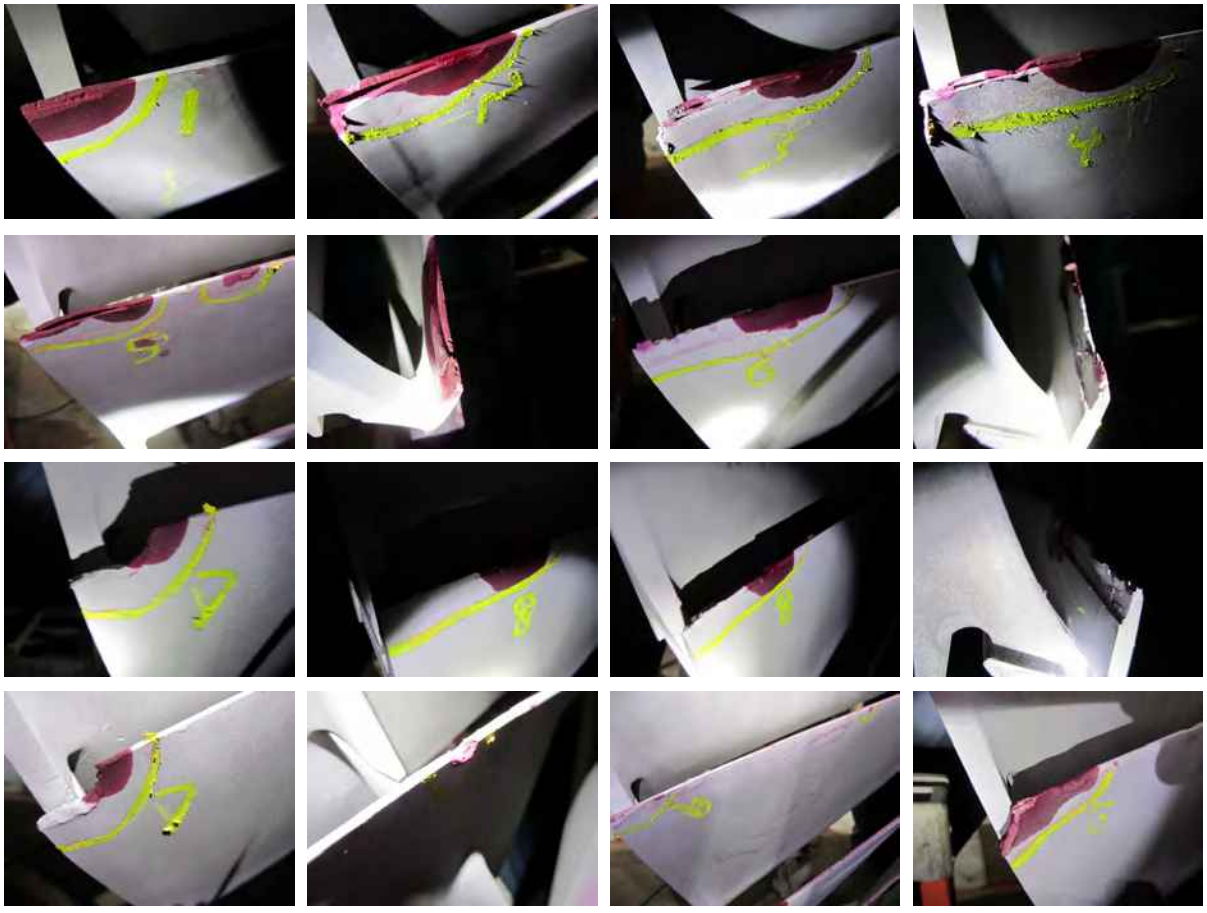
Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 152 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 1

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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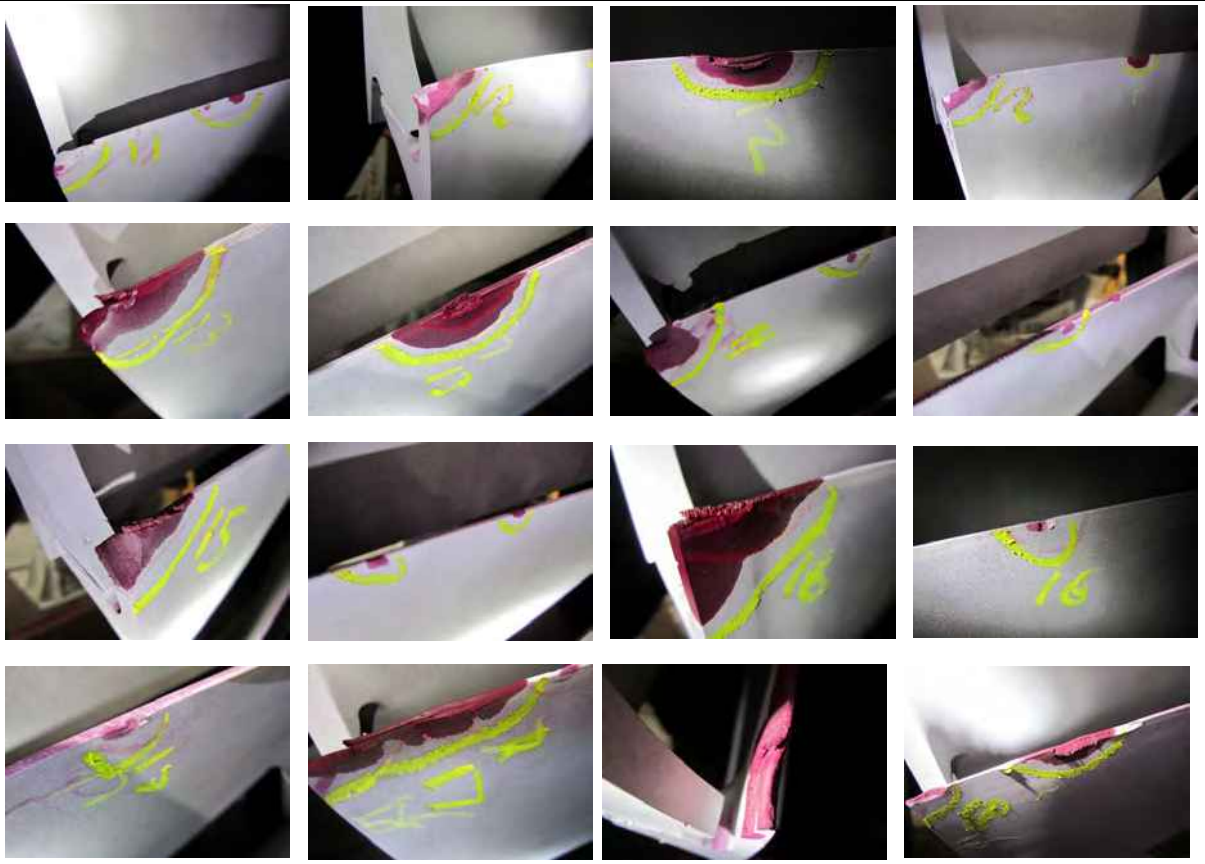
Site: Comanche Generating Station
Date: 30-Jan-20 Page 153 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 2

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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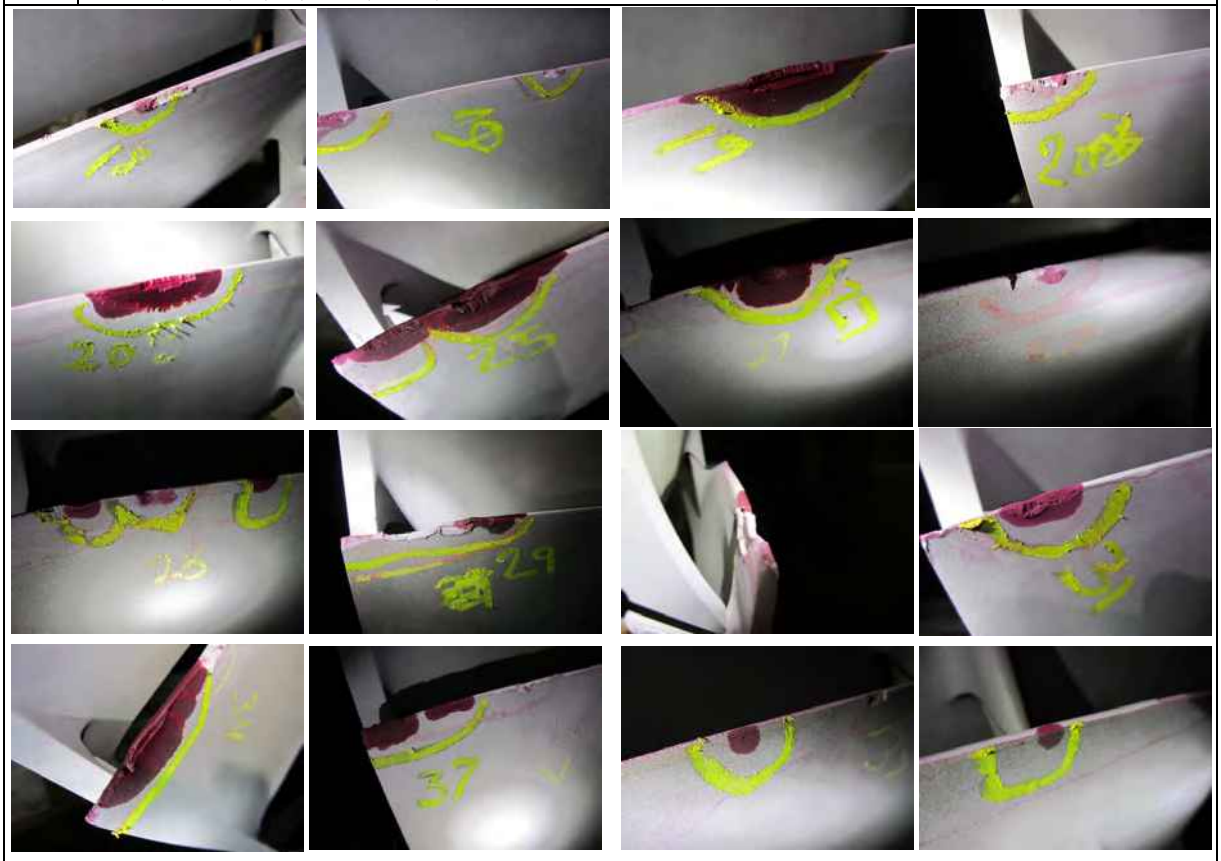
Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 154 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 3

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 30-Jan-20 Page 155 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 4

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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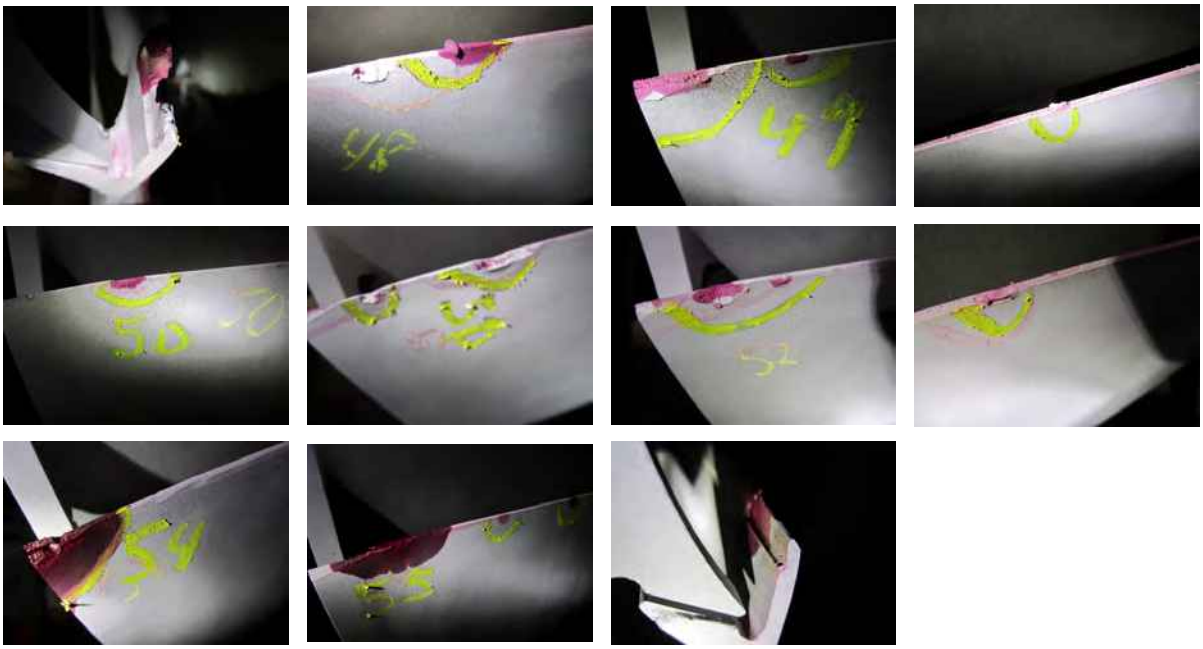
Date: 30-Jan-20 Page 156 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 5

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 30-Jan-20 Page 157 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 6

Stage	Description
L-0 G	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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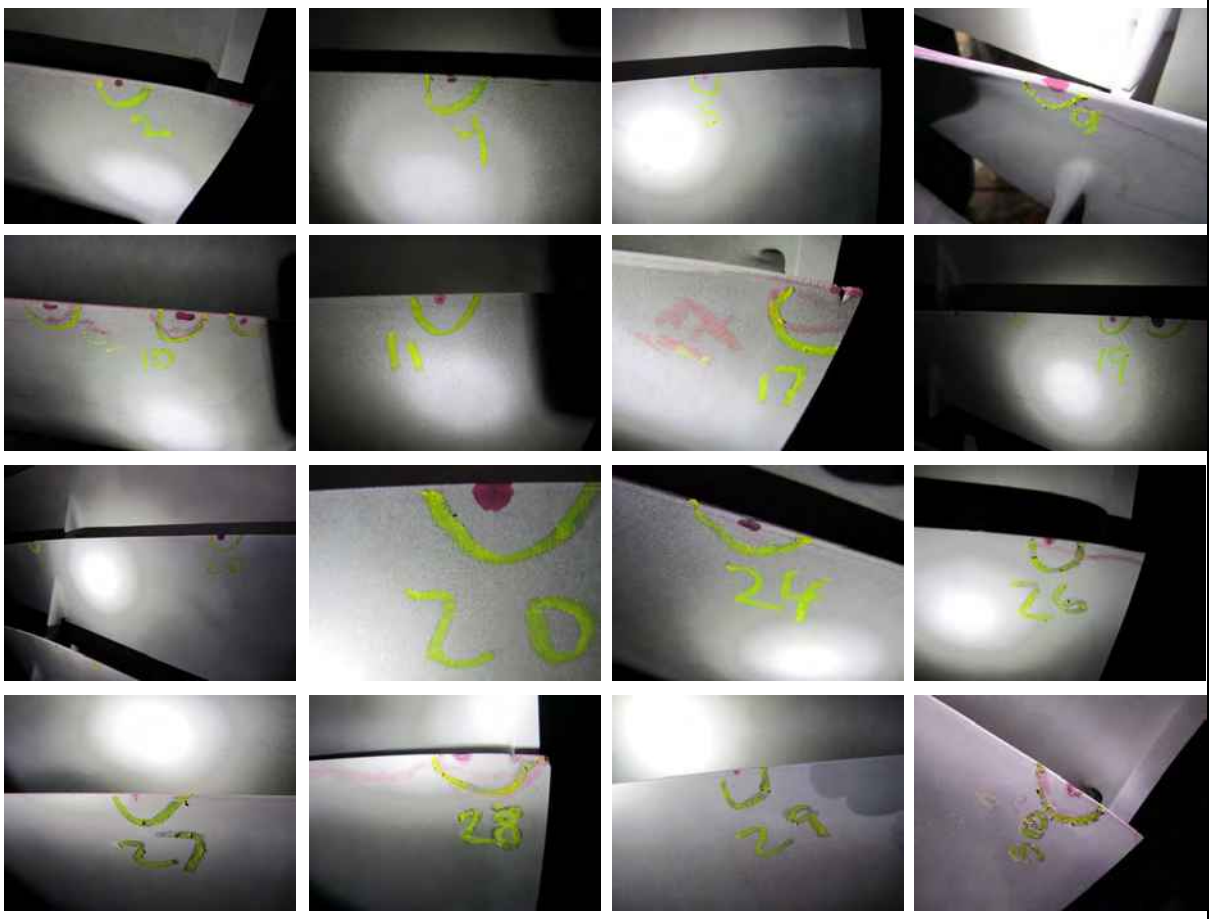
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 1

Stage	Description
L-0 T	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1, 2, 4, 5, 9-11, 17, 19, 20, 24, 26-30, 36, 37, 38, 40, 45, 46, 48, 49, 51-53, 55, 57 and 58.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 2

Stage	Description
L-0 T	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1, 2, 4, 5, 9-11, 17, 19, 20, 24, 26-30, 36, 37, 38, 40, 45, 46, 48, 49, 51-53, 55, 57 and 58.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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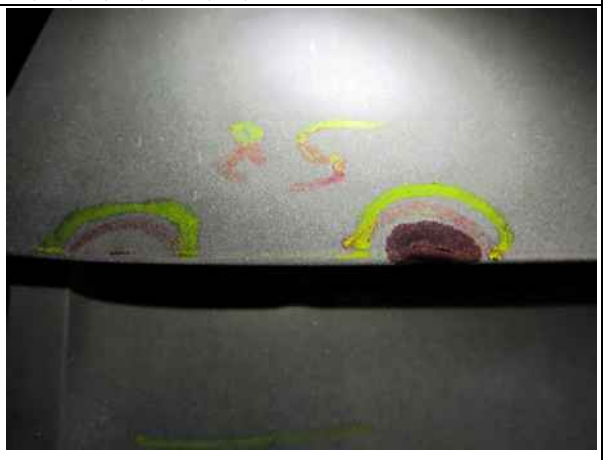
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 3

Stage	Description
L-0 T	• Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: 1, 2, 4, 5, 9-11, 17, 19, 20, 24, 26-30, 36, 37, 38, 40, 45, 46, 48, 49, 51-53, 55, 57 and 58.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Comanche Unit 3 LPB L-1 Blade Attachment Serrations

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 19L02K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 3164 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.32 fc.
WHITELIGHT: Flashlight: Fenix UC35_JK READING: 464.4 fc.

MAGNETIZATION:	Coil Wrap	OUTPUT:	FWDC	Longitudinal Amps	2300	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: MXI 10KFW3 s/n: 71000 Cal Due: 06/18/2020
MFG: n/a

INSPECTION RESULTS

Coil inspection of the LPB L-1 blade root serrations resulted in no reportable indications.

Visually the following was observed:
- overall pitting
- (1) FOD location GE
- (6) FOD locations TE

See following pages for pictures.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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Date: 24-Feb-20 Page 162 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB L-1 Blade Attachment Serrations

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 24-Feb-20 Page 163 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB L-1 Blade Attachment Serrations






NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPB Stationary Components		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux WA-2B / 18J070

WATER CONDITIONER MFG. / BATCH: n/a

MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: See Following µW/cm2

BLACKLIGHT: n/a READING: µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: See Following fc.

WHITELIGHT: n/a READING: fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3	TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a			TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a			TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

LPB Diaphragm set: See following pages for details.

Stationary parts demagnetized +/- 3 Gauss.

* Diaphragms were not completely blasted therefore headshot could not be performed.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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STATIONARY COMPONENTS REPORT FORM LPB

STAGE #	UPPER/LOWER	Fc.	µW/cm2	REPORTABLE INDICATIONS (YES/NO)	DATE TESTED
6G	Upper	0.28	3717	Yes	2/1/2020
5G	Upper	0.28	3717	No	2/1/2020
4G	Upper	0.45	3753	Yes	2/3/2020
3G	Upper	0.45	3753	Yes	2/3/2020
2G	Upper	0.45	3753	Yes	2/3/2020
1G	Upper	0.16	2559	Yes	1/31/2020
1T	Upper	0.16	2559	Yes	1/31/2020
2T	Upper	0.45	3753	Yes	2/3/2020
3T	Upper	0.45	3753	Yes	2/3/2020
4T	Upper	0.45	3753	Yes	2/3/2020
5T	Upper	0.28	3717	No	2/1/2020
6T	Upper	0.28	3717	No	2/1/2020
6G	Lower	0.16	2559	Yes	1/31/2020
5G	Lower	0.16	2559	Yes	1/31/2020
4G	Lower	0.45	3753	Yes	2/3/2020
3G	Lower	0.45	3753	Yes	2/3/2020
2G	Lower	0.45	3753	Yes	2/3/2020
1G	Lower	0.16	2559	Yes	1/31/2020
1T	Lower	0.16	2559	Yes	1/31/2020
2T	Lower	0.45	3753	Yes	2/3/2020
3T	Lower	0.45	3753	Yes	2/3/2020
4T	Lower	0.45	3753	Yes	2/3/2020
5T	Lower	0.28	3717	No	2/1/2020
6T	Lower	0.28	3717	No	2/1/2020

Data sheets of indications and photos on following sheets.

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
1TU	• Partitions: 3,7,14,19,24,29,32,37,51,60: Foreign object damage in trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 31-Jan-20 Page 167 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
1TL	• Partitions: 102,110,111,112,119: Foreign object damage in trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPB Stationary Components	

Stage	Description
1GU	• Partitions 6: 1/16" Tear in trailing edge • Partitions: 4,6,14,19,20,25,27,28,30,32,35,40,44,45,47,50,51,53-55,58,60-61:Foreign object damage in trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 31-Jan-20 Page 169 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
1GL	• Partitions: 98,72,78,87,88,90,94,100,102,105,107,110-113,150,122: Foreign object damage in trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Date: 02/03/209 Page 170 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPB Stationary Components	

Stage	Description
2TU	• Damage to spill strips. • Erosion/pitting of blade surfaces.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
2TL	• Damage to spill strips. • Erosion/pitting of blade surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
2GU	• Blade 21: foreign object damage on trailing edge. • Erosion/pitting of blade surfaces. • Minor foreign object damage on trailing edge.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
2GL	• Damage to spill strips. • Erosion/pitting of blade surfaces. • Blades 74 and 84: Foreign object damage on trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPB Stationary Components	

Stage	Description
3TU	• Thinning of trailing edges. • Erosion/pitting of blade surfaces.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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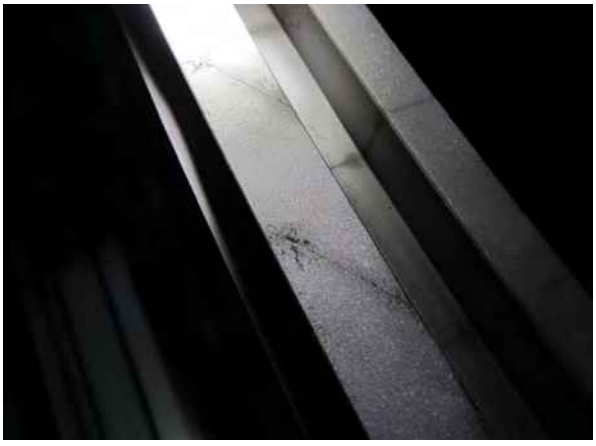
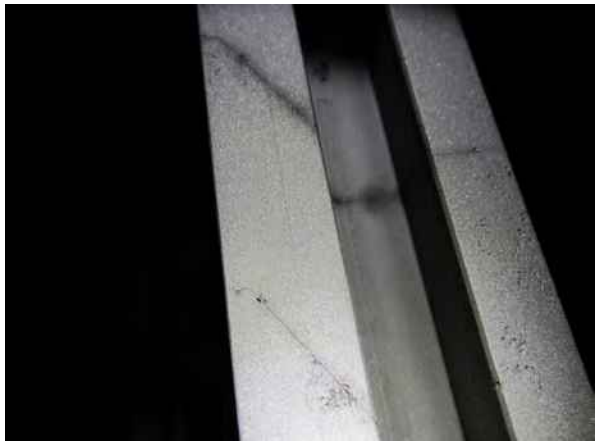
CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
3TL	• Thinning of trailing edges. • Erosion/pitting of blade surfaces.


NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
3GU	• Thinning of trailing edges. • Erosion/pitting of blade surfaces. • Blades 23-25: Foreign object damage on trailing edge.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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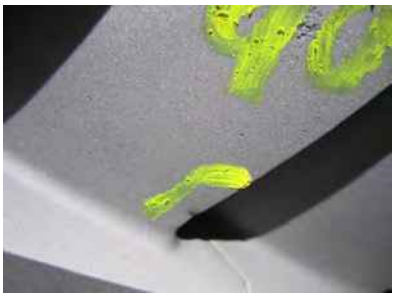
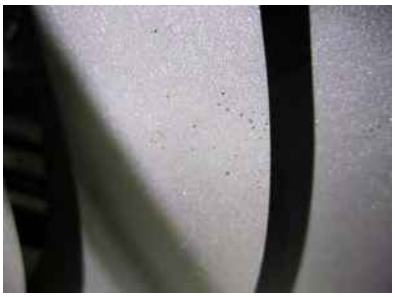
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
3GL	• Thinning of trailing edges. • Erosion/pitting of blade surfaces. • Blades 83 90: Foreign object damage on trailing edge.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		LPB Stationary Components	

Stage	Description
4TU	• Thinning of trailing edges. • Erosion/pitting of blade surfaces.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
4TL	• Thinning of trailing edges. • Erosion/pitting of blade surfaces.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
4GU	• Thinning of trailing edges. • Erosion/pitting of blade surfaces.






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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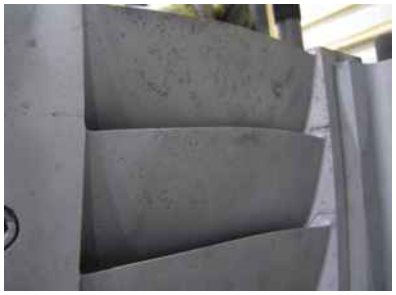
Project: CF-5862
Site: Comanche Generating Station
Date: 02/03/209 Page 181 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
4GL	• Thinning of trailing edges. • Erosion/pitting of blade surfacs.






NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 31-Jan-20 Page 182 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:	LPB Stationary Components		

Stage	Description
5GL	• Damage to spill strip on discharge side.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 1-Feb-20 Page 183 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
6GU	• Partitions 3,10,13 and 27: Mechanical damage to admission side • Ring by partition 20: 1/4" tear in foreign object damage area, admission side. • Ring between partition 13: foreign object damage, admission side. • Partitions 2,4,5,7,10,11,13-15,17,19,20-23,25-27: foreign object damage, discharge side.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage	Description
6GL	• Partition 28: Multiple crack-like indications in foreign object strike area in leading edge. • Partition 29: foreign object damage. • Ring between partition 28 and 30: foreign object damage.




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
Date: 3-Feb-20 Page 185 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPB Diaphragm Bolts		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR:

MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux 14AM / 18K20K

WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070

MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: µW/cm2

BLACKLIGHT: n/a READING: µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: fc.

WHITELIGHT: n/a READING: fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	1000-1300	3	TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a			TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a			TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI

MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

MFG: n/a

INSPECTION RESULTS

Stage 6T: (4) Bolts - No reportable indications.
Stage 5T: (4) Bolts - No reportable indications.
Stage 4T: (4) Bolts - No reportable indications.
Stage 4,3,2T: (11) Bolts - No reportable indications.
Stage 1T: (2) Bolts - No reportable indications.
Stage 6G: (4) Bolts - No reportable indications.
Stage 5G: (4) Bolts - No reportable indications.
Stage 4G: (4) Bolts - No reportable indications.
Stage 4,3,2G: (11) Bolts - (10) No reportable indications. (1) Threads Heavily galled.
Stage 1G: (2) Bolts - No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 4-Feb-20 Page 186 of 264

ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPB Diaphragm Bolting		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	Ultragel II / 19E099	
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:	OK		

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
LPB Diaphragm Bolts	66.2	72.2	4	11.98	1.125	2/4/2020	No reportable indications
	56.8	68.8	2	15.61	1.125	2/4/2020	No reportable indications
	64.8	70.8	2	8.9	1.125	2/4/2020	No reportable indications
	61.2	67.2	4	6.6	0.75	2/4/2020	No reportable indications
	58.6	70.6	2	11.7	0.75	2/4/2020	No reportable indications
	50.8	62.8	2	9.9	0.75	2/4/2020	No reportable indications
	58.2	64.2	2	7.08	0.75	2/4/2020	No reportable indications
	53	59	2	9.9	0.75	2/4/2020	No reportable indications
	54.4	66.4	3	18.31	1.75	2/3/2020	No reportable indications
	70.4	76.4	2	7.89	1.25	2/3/2020	No reportable indications
	46.2	58.2	4	11.4	2	2/3/2020	No reportable indications
	48.4	60.4	4	11.4	1.75	2/3/2020	No reportable indications
	48.4	60.4	4	12.6	1.75	2/3/2020	No reportable indications

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

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Project: CF-5862
Site: Comanche Generating Station
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CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: LPB Diaphragm Bolting

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
LPB Diaphragm Bolts	45.8	57.8	2	13.96	1.75	2/3/2020	No reportable indications
	55	67	1	15.5	1.75	2/3/2020	No reportable indications
	41.4	53.4	1	18.3	1.75	2/3/2020	No reportable indications
	55.5	77.5	1	7.9	1.25	2/3/2020	No reportable indications

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	LPB Casing Studs		

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER: LONGITUDNAL					
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	0.293
TRANSDUCER: SHEAR		WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:			OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
R/L 401, 444	39	51	4	14.146	2.25	29-Feb	No reportable indications.
R/L 402, 443	39	51	4	11.014	1.75	29-Feb	No reportable indications.
R/L 403, 404, 406, 408, 409, 436, 437, 439, 441, 442	39	51	20	11.79	2	29-Feb	No reportable indications.
R/L 410-421 423-435	39	51	49/50	13.363	2.75	29-Feb	No reportable indications. R413 not inspected. Was already rejected.
R/L 422	39	51	2	14.339	2.75	29-Feb	No reportable indications.
R/L 405, 407, 438, 440	39	51	8	13.341	2	29-Feb	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Coupling Bolts		

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma	.500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY: n/a
TRANSDUCER:	SHEAR		WEDGE:		
MFG:		n/a			DELAY:
CAL BLOCK:	IIW: B06111		LINEARITY PERFORMED:		OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
"A" Coupling Bolts	54.8	66.8	16	15.07	2.25	2/17/2020	No reportable indications.
"B" Coupling Bolts	62.4	68.4	20	14.631	2.25	2/17/2020	No reportable indications.
"C" Coupling Bolts	68	74	18	19.79	2.375	2/17/2020	No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

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Site: Comanche Generating Station
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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Shells and Glands Page 1		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR:
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: Magnaflux 14AM / 18K20K
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070
MAGNETIC PARTICLE BATH CONCENTRATION: .15-.25

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 4047 µW/cm2
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4056 µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.15 fc.
WHITELIGHT: At surface of part READING: 0.32 fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	Coil	OUTPUT:	HWDC	Circular Amps	1000-1250	[X] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

INSPECTION RESULTS

- LP2 Gov T Upper: No reportable indications.
- LP2 Gen T Upper: No reportable indications.
- LP1 Gov T Upper: No reportable indications.
- LP1 Gen T Upper: No reportable indications.
- N1 Inner Upper: No reportable indications.
  N3 Inner Upper: No reportable indications.
- N3 Outer Upper: No reportable indications.
- LPB Inner Case Upper: No reportable indications.
- LPA Inner Case Upper: No reportable indications.
- IP Inner Cylinder Upper: No reportable indications.
- HP Inner Cylinder Upper: No reportable indications.
- LPB Inner Case Lower: No reportable indications.
- LPA Inner Case Lower: No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: Shells and Glands Page 2

- N7 Upper: No reportable indications.
- N7 Lower: No reportable indications.
- N6 Upper: No reportable indications.
- N6 Lower: No reportable indications.
- N5 Upper: No reportable indications.
- N5 Lower: No reportable indications.
- N4 Upper: No reportable indications.
- N4 Lower: No reportable indications.
- HP Outer Shell_Lower: No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II | Lawrence Craig MT/PT/VT II

n/a | n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Steam Inlet Flanges		

MATERIALS / EQUIPMENT

PARTICLES: [ ] WET [X] DRY [ ] FLUORESCENT [X] COLOR: Red
MFG. / BATCH: Magnaflux 8A-RED / 16J078 MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: n/a
BLACKLIGHT: n/a READING: µW/cm2
BLACKLIGHT: n/a READING: µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Fenix UC35_SR READING: 265.4 fc.
WHITELIGHT: n/a READING: fc.

MAGNETIZATION:	Yoke	OUTPUT:	AC	Longitudinal Amps		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI
MFG: Parker B-300 s/n: 25694 Cal Due: 06/09/20
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020

INSPECTION RESULTS

- Reheat Steam Inlet Flange_RS_Valve Side: No reportable indications.
- Reheat Steam Inlet Flange_LS_Valve Side: No reportable indications.
- HP Steam Inlet Flange_RS_Valve Side: No reportable indications.
- HP Steam Inlet Flange_LS_Valve Side: No reportable indications.
- Reheat Steam Inlet Flange_RS_Shell Side: No reportable indications.
- Reheat Steam Inlet Flange_LS_Shell Side: No reportable indications.
- HP Steam Inlet Flange_RS_Shell Side: No reportable indications.
- HP Steam Inlet Flange_LS_Shell Side: No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Joop Kraijesteijn MT/PT/VT III, UT II

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Expansion Bellows		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH: Magnaflux SKC-S / 19J01K
PENETRANT MFG / BATCH: Magnaflux SKL-WP2 / 18A044
DEVELOPER MFG / BATCH: Magnaflux SKD-S2 / 19A08K
OTHER MATERIALS: n/a
BLACKLIGHT METER: n/a
BLACKLIGHT: n/a READING: µW/cm2
BLACKLIGHT: n/a READING: µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Fenix UC35_SR READING: 295.4 fc.
WHITELIGHT: Flashlight: Coast HX5_LC READING: 198.7 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [ ] Solvent Removable [X] Water Washable

INSPECTION RESULTS

- LPA_GE_Top: No reportabel indications.
- LPA_TE_Top: No reportabel indications.

- LPB_GE_Top: No reportabel indications.
- LPB_GE_Top: No reportabel indications.

Note: areas that were not cleaned could not be inspected.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Bearings		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	µW/cm2
BLACKLIGHT:	n/a	READING:	µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	251.4 fc.
WHITELIGHT:	n/a	READING:	fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

T1_Upper: Reportable indications found. See following sheets for data.
T2_Upper: Reportable indications found. See following sheets for data.
T3_Upper: Reportable indications found. See following sheets for data.
T4_Upper: Reportable indications found. See following sheets for data.
T5_Upper: Reportable indications found. See following sheets for data.
T6_Upper: Reportable indications found. See following sheets for data.
T7_Upper: No reportable indications.
T8_Upper: No reportable indications.
T9_Upper: No reportable indications.
T1_Lower: Reportable indications found. See following sheets for data.
T2_Lower: Reportable indications found. See following sheets for data.
T3_Lower: Reportable indications found. See following sheets for data.
T4_Lower: Reportable indications found. See following sheets for data.
T5_Lower: Reportable indications found. See following sheets for data.
T6_Lower: Reportable indications found. See following sheets for data.
T7_Lower: No reportable indications.
T8_Lower: No reportable indications.
T9_Lower: No reportable indications.
TE Thrust Bearing_Upper: No reportable indications.
TE Thrust Bearing_Lower: No reportable indications.

GE Thrust Bearing_Upper: No reportable indications.
GE Thrust Bearing_Lower: No reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II; Stephen Renkavinsky MT/PT/VT III, UT II; Joop Kraijesteijn MT/PT/VT III, UT II; n/a

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Project: CF-5862
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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Bearings		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	SAE 30	
TRANSDUCER: LONGITUDNAL					
MFG:	Sensor Networks .250" Round	Frequency: 10MHz.	S/N: 1161719	DELAY:	23.01
TRANSDUCER: SHEAR		WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	RF: E-UT-261	LINEARITY PERFORMED:	OK		

INSPECTION RESULTS

T1_Upper: No reportable indications.
T2_Upper: No reportable indications.
T3_Upper: No reportable indications.
T4_Upper: No reportable indications.
T5_Upper: No reportable indications.
T6_Upper: No reportable indications.
T7_Upper: No reportable indications.
T8_Upper: No reportable indications.
T9_Upper: No reportable indications.
T1_Lower: No reportable indications.
T2_Lower: No reportable indications.
T3_Lower: No reportable indications.
T4_Lower: No reportable indications.
T5_Lower: No reportable indications.
T6_Lower: No reportable indications.
T7_Lower: No reportable indications.
T8_Lower: No reportable indications.
T9_Lower: No reportable indications.

TE Thrust Bearing_Upper: No reportable indications.
TE Thrust Bearing_Lower: No reportable indications.

GE Thrust Bearing_Upper: No reportable indications.
GE Thrust Bearing_Lower: No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Joop Kraijesteijn MT/PT/VT III, UT II

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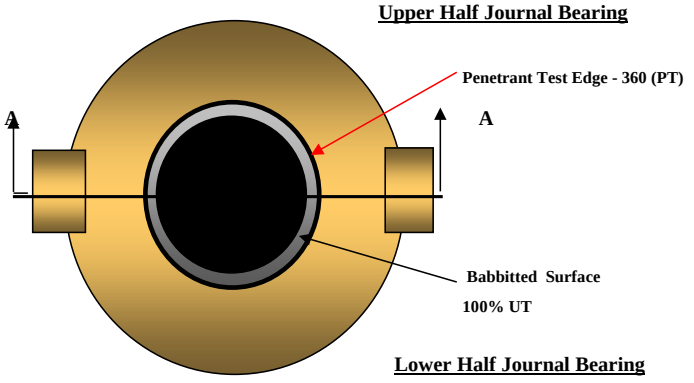

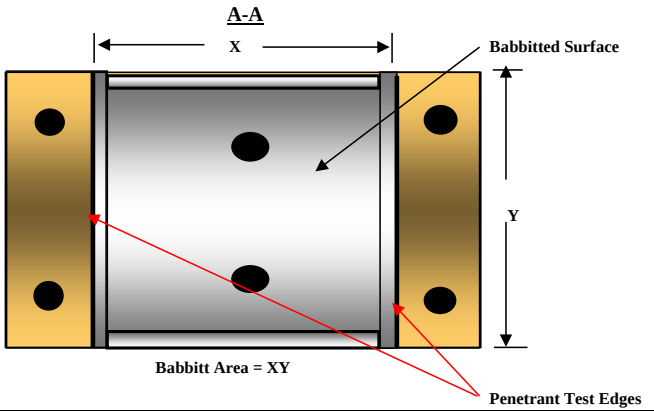

ULTRASONIC TESTING RESULTS							LIQUID PENETRANT TEST RESULTS				
Bearing	Upper/Lower	X (in)	Y (in)	Area (in²)	LOB (in²)	LOB %	Bearing	Upper/Lower	Area (in)	LOB (in)	% PT Lack of Bond
1	Upper	16.25	10.13	258.45	0	0.0%	1	Upper	71.275	0	0.0%
	Lower	16.25	10.13	258.45	0	0.0%		Lower	71.275	0	0.0%
2	Upper	17.00	10.75	287.06	0	0.0%	2	Upper	74.88	0	0.0%
	Lower	17.00	10.75	287.06	0	0.0%		Lower	74.88	0	0.0%
3	Upper	17.25	14.31	387.80	0	0.0%	3	Upper	82.789	0	0.0%
	Lower	17.25	14.31	387.80	0	0.0%		Lower	82.789	5.25	6.3%
4	Upper	17.25	14.31	387.80	0	0.0%	4	Upper	82.789	0	0.0%
	Lower	17.25	14.31	387.80	0	0.0%		Lower	82.789	3.5	4.2%
5	Upper	17.25	14.31	387.80	0	0.0%	5	Upper	82.789	0	0.0%
	Lower	17.25	14.31	387.80	0	0.0%		Lower	82.789	3.5	4.2%
6	Upper	18.25	15.00	430.01	0	0.0%	6	Upper	87.305	3.75	4.3%
	Lower	18.25	15.00	430.01	0	0.0%		Lower	87.305	0.5	0.6%
7	Upper	21.00	17.50	577.27	0	0.0%	7	Upper	100.94	0	0.0%
	Lower	21.00	17.50	577.27	0	0.0%		Lower	100.94	0	0.0%
8	Upper	19.25	16.38	495.14	0	0.0%	8	Upper	93.195	0	0.0%
	Lower	19.25	16.38	495.14	0	0.0%		Lower	93.195	0	0.0%
9	Upper	8.75	3.50	48.11	0	0.0%	9	Upper	34.475	0	0.0%
	Lower	8.75	3.50	48.11	0	0.0%		Lower	34.475	0	0.0%

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Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 197 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

Stage	Description
T1U	• Porosity found on surface. • Scoring on the babbitt

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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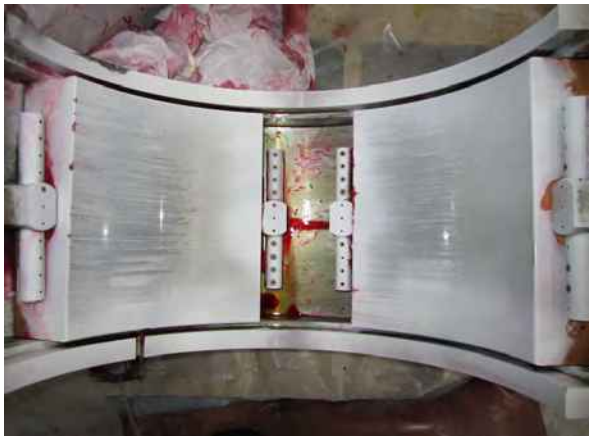
CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearings

Stage	Description
T1L	• Heavy whipping and scoring on the babbitt



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Date: 15-Feb-20 Page 199 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearings		

Stage	Description
T2U	• 3/16" oval indication found in babbitt • Porosity found on surface.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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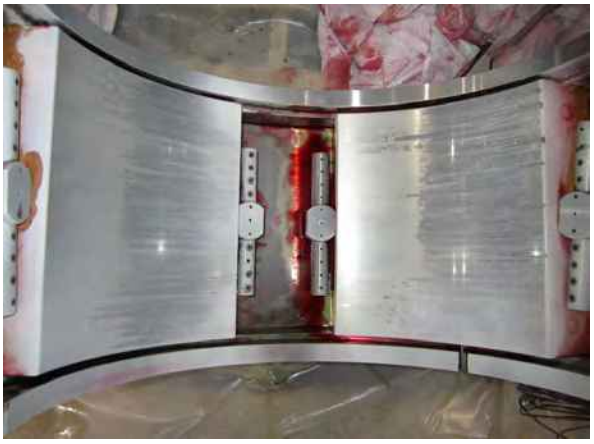
Date: 15-Feb-20 Page 200 of 264

CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearings

Stage	Description
T2L	• Whipping and scoring on the babbitt




NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 201 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:		Unit #3 Bearings	

Stage	Description
T3U	• Porosity found on surface.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 202 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:		Unit #3 Bearings	

Stage	Description
T3L	• 6.3% PT lack of bond • Porosity found on surface.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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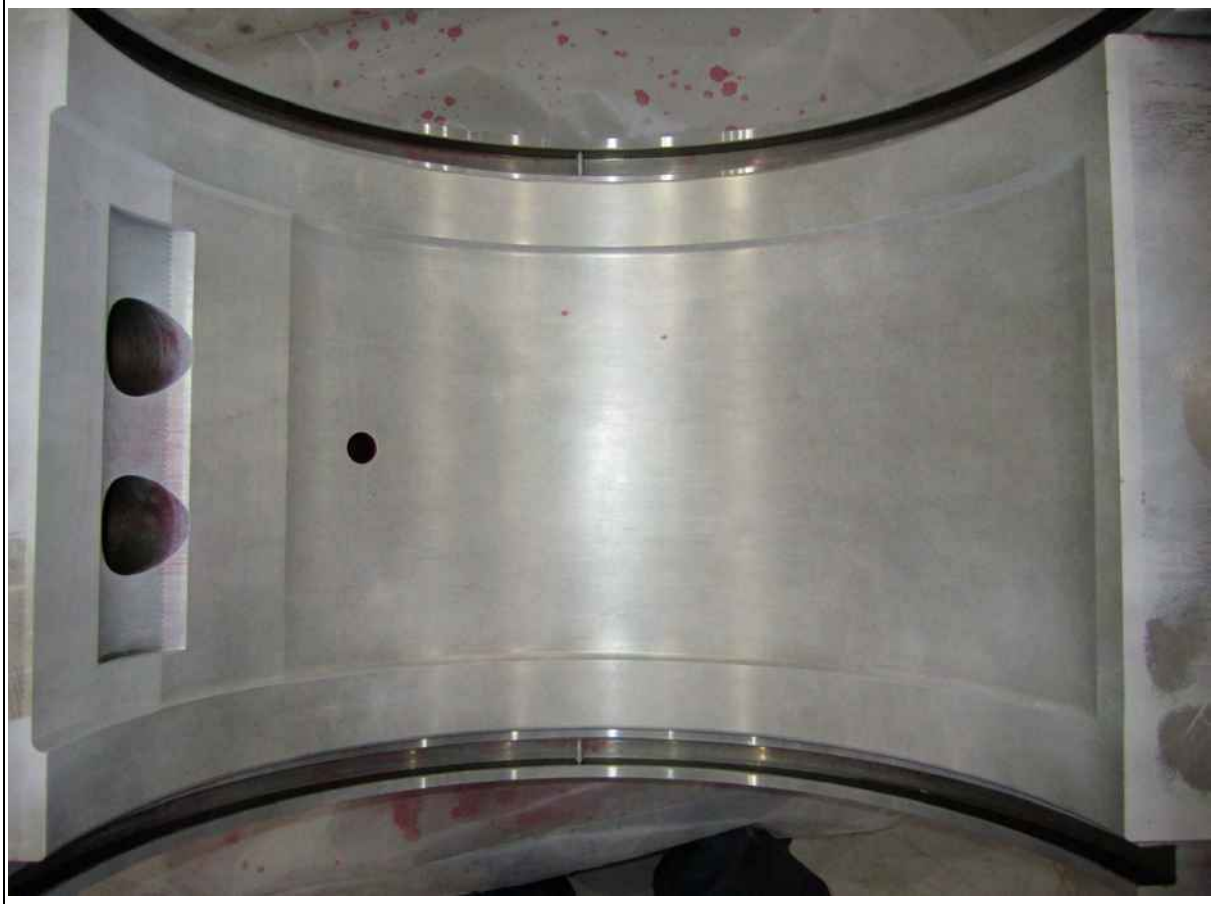
Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 203 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:		Unit #3 Bearings	

Stage	Description
T4L	• Porosity found on surface.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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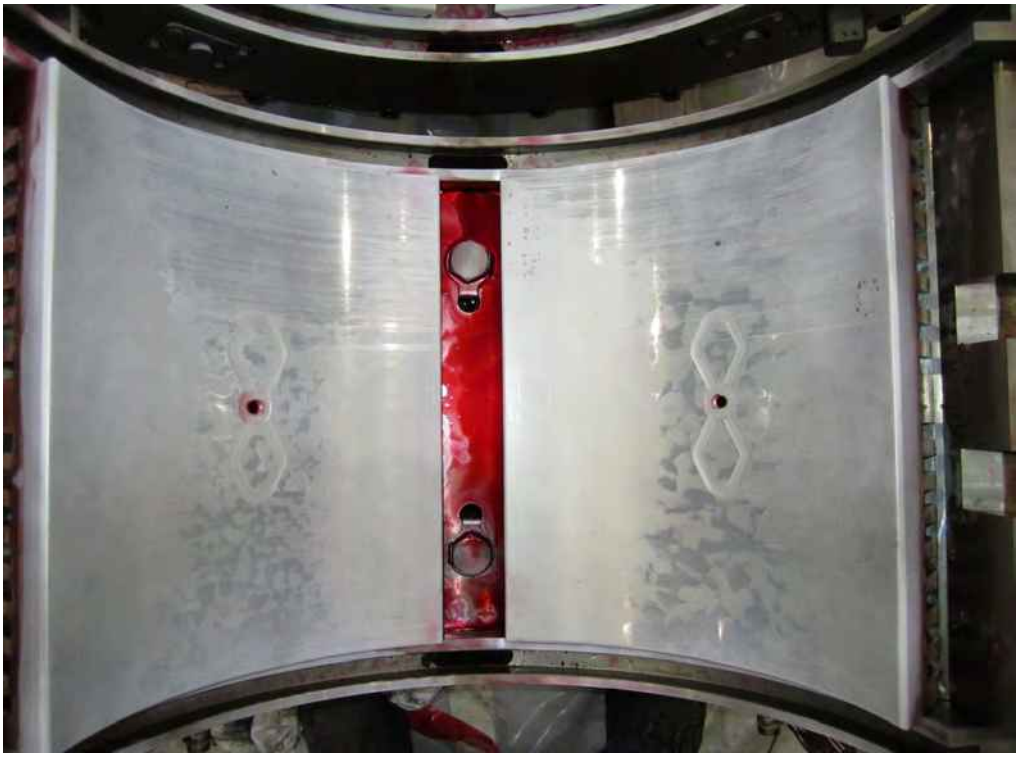
Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 204 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

Stage	Description
T4L	• 4.2% PT lack of bond • Porosity found on surface.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearings		

Stage	Description
T5U	• Pit on edge

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 206 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

Stage	Description
T5L	• 4.2% PT lack of bond • Porosity found on surface. • Scoring on babbitt face.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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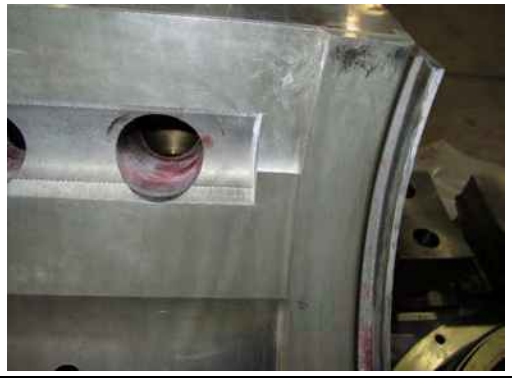
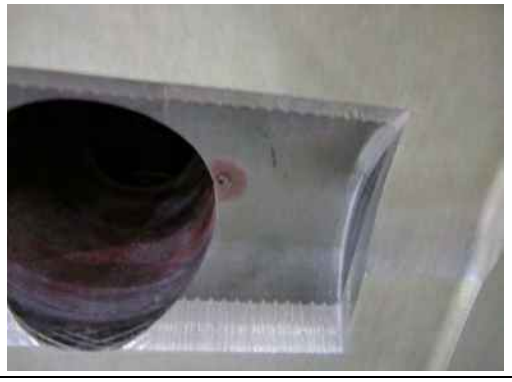
Project: CF-5862
Site: Comanche Generating Station
Date: 15-Feb-20 Page 207 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearings		

Stage	Description
T6U	• 4.3% PT lack of bond • Scoring on babbitt surface.





NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Site: Comanche Generating Station
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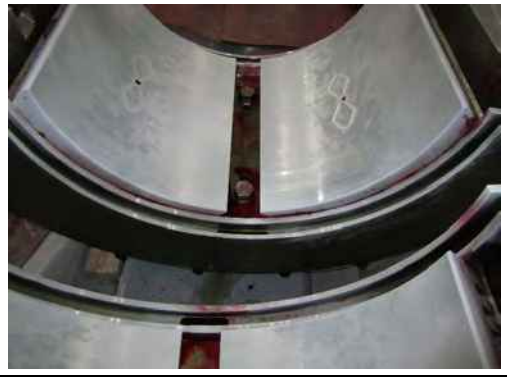
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:		Unit #3 Bearings	

Stage	Description
T6L	• 0.6% PT lack of bond • Scoring on babbitt surface.



NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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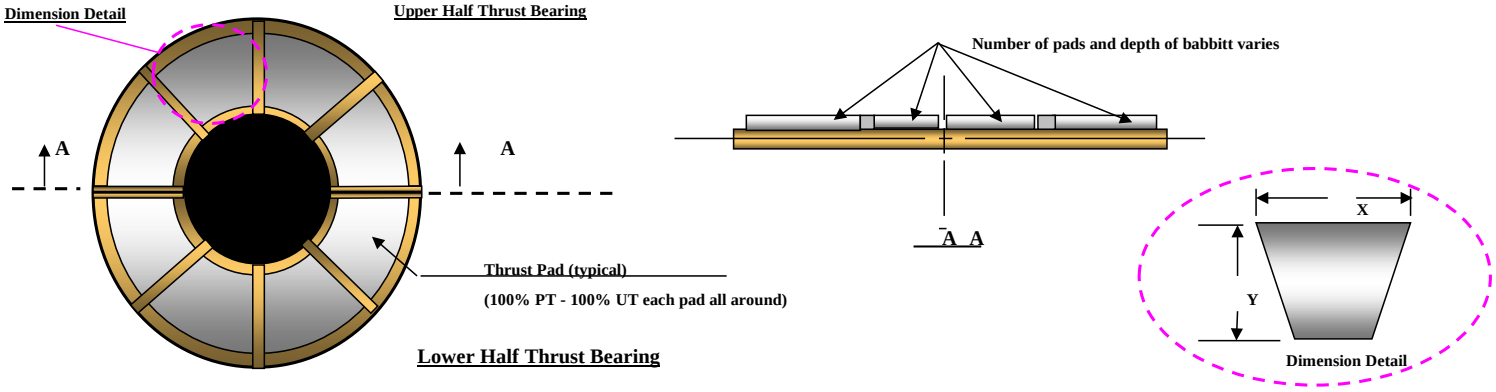

ULTRASONIC TESTING RESULTS							LIQUID PENETRANT TEST RESULTS				
Bearing	Pad #	X (in)	Y (in)	Area (in)	LOB (in)	LOB %	Bearing	Pad #	Area (in)	LOB (in)	% PT Lack of Bond
TE U	1	7.75	5.375	41.65625	0	0%	TE U	1	26.25	0	0%
	2	7.75	5.375	41.65625	0	0%		2	26.25	0	0%
	3	7.75	5.375	41.65625	0	0%		3	26.25	0	0%
	4	7.75	5.375	41.65625	0	0%		4	26.25	0	0%
	5	7.75	5.375	41.65625	0	0%		5	26.25	0	0%
	6	7.75	5.375	41.65625	0	0%		6	26.25	0	0%
	7	7.75	5.375	41.65625	0	0%		7	26.25	0	0%
	8	7.75	5.375	41.65625	0	0%		8	26.25	0	0%
TE L	1	7.75	5.375	41.65625	0	0%	TE L	1	26.25	0	0%
	2	7.75	5.375	41.65625	0	0%		2	26.25	0	0%
	3	7.75	5.375	41.65625	0	0%		3	26.25	0	0%
	4	7.75	5.375	41.65625	0	0%		4	26.25	0	0%
	5	7.75	5.375	41.65625	0	0%		5	26.25	0	0%
	6	7.75	5.375	41.65625	0	0%		6	26.25	0	0%
	7	7.75	5.375	41.65625	0	0%		7	26.25	0	0%
	8	7.75	5.375	41.65625	0	0%		8	26.25	0	0%

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Project: CF-5862
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Date: 18-Feb-20 Page 210 of 264

LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH: Magnaflux SKC-S / 19J01K
PENETRANT MFG / BATCH: Magnaflux SKL-SP2 / 18C02K
DEVELOPER MFG / BATCH: Magnaflux SKD-S2 / 19A08K
OTHER MATERIALS n/a
BLACKLIGHT METER: n/a
BLACKLIGHT: n/a READING: n/a µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Coast HX5_LC READING: 222.7 fc.
WHITELIGHT: n/a READING: n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

T3 T Upper: No reportable indications.
T3 T Lower: No reportable indications.
T3 G Upper: No reportable indications.
T3 G Lower: No reportable indications.
T4 T Upper: No reportable indications.
T4 T Lower: Reportable indication found. See following sheets for details.
T4 G Upper: No reportable indications.
T4 G Lower: No reportable indications.
T5 T Upper: No reportable indications.
T5 T Lower: No reportable indications.
T5 G Upper: No reportable indications.
T5 G Lower: Reportable indication found. See following sheets for details.
T6 T Upper: No reportable indications.
T6 T Lower: No reportable indications.
T6 G Upper: No reportable indications.
T6 G Lower: Reportable indication found. See following sheets for details.
T7 T Upper: No reportable indications.
T7 T Lower: Reportable indication found. See following sheets for details.
T7 G Upper: No reportable indications.
T7 G Lower: No reportable indications.
T8 T Upper: No reportable indications.
T8 T Lower: No reportable indications.
T8 G Upper: No reportable indications.
T8 G Lower: No reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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Site: Comanche Generating Station
Date: 18-Feb-20 Page 211 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings Findings		

Stage	Description
T4TL	• .25" indication on babbitt edge.

NDT Technician: Lawrence Craig MT/PT/VT II | n/a

n/a | n/a

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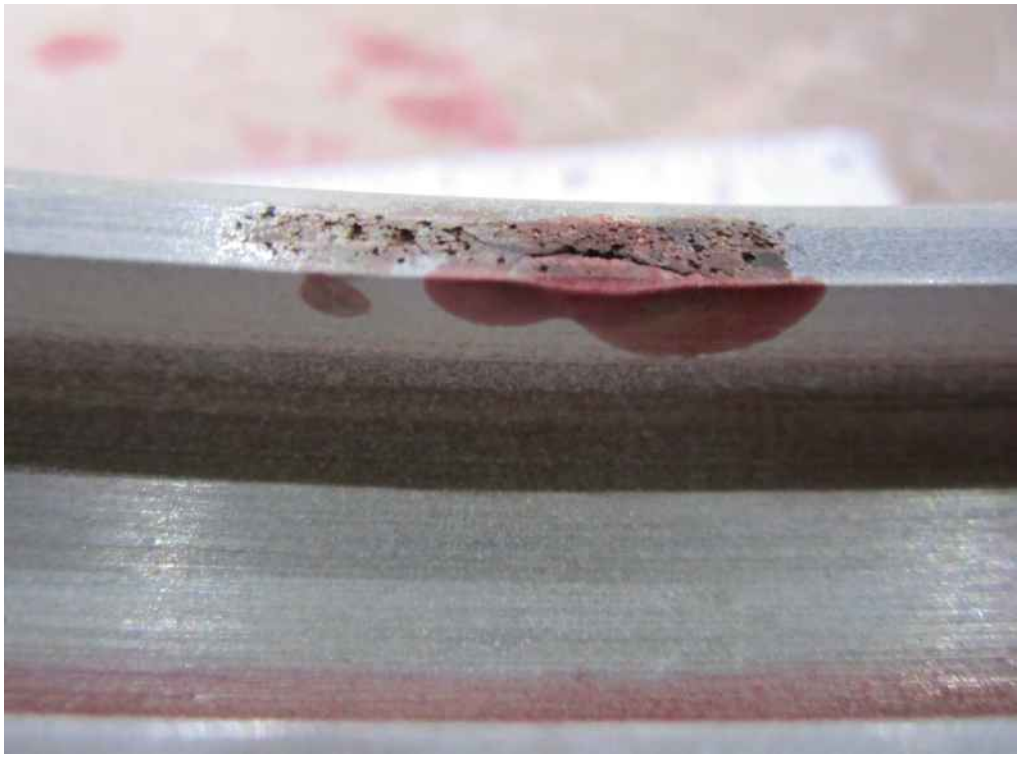
Site: Comanche Generating Station
Date: 18-Feb-20 Page 212 of 264

CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings Findings

Stage	Description
T5GL	• .75" indication on babbitt edge.



NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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Site: Comanche Generating Station
Date: 18-Feb-20 Page 213 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings Findings		

Stage	Description
T6GL	• 3/16" ding in babbitt edge.

NDT Technician: Lawrence Craig MT/PT/VT II | n/a

n/a | n/a

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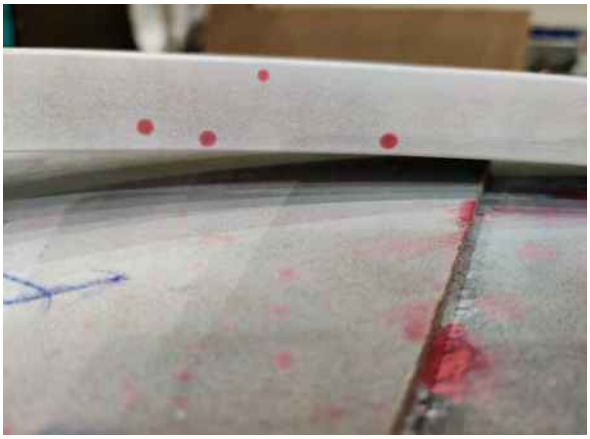
Site: Comanche Generating Station
Date: 18-Feb-20 Page 214 of 264

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings Findings		

Stage	Description
T7TL	• (9) spots of porosity found on ID babbitt face.



NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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Site: Comanche Generating Station
Date: 19-Feb-20 Page 215 of 264

ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Unit #3 Bearing Seal Rings		

MATERIALS / EQUIPMENT

UT SCOPE:				COUPLANT	
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21	SAE 30	
TRANSDUCER:	LONGITUDNAL				
MFG:	Sensor Networks .250" Round	Frequency: 10MHz.	S/N: 1161719	DELAY:	23.01
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	RF: E-UT-261	LINEARITY PERFORMED:	OK		

INSPECTION RESULTS

T3 T Upper: No reportable indications.
T3 T Lower: No reportable indications.
T3 G Upper: No reportable indications.
T3 G Lower: No reportable indications.
T4 T Upper: No reportable indications.
T4 T Lower: No reportable indications.
T4 G Upper: No reportable indications.
T4 G Lower: No reportable indications.
T5 T Upper: No reportable indications.
T5 T Lower: No reportable indications.
T5 G Upper: No reportable indications.
T5 G Lower: No reportable indications.
T6 T Upper: No reportable indications.
T6 T Lower: No reportable indications.
T6 G Upper: No reportable indications.
T6 G Lower: No reportable indications.
T7 T Upper: No reportable indications.
T7 T Lower: No reportable indications.
T7 G Upper: No reportable indications.
T7 G Lower: No reportable indications.
T8 T Upper: No reportable indications.
T8 T Lower: No reportable indications.
T8 G Upper: No reportable indications.
T8 G Lower: No reportable indications.

NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Valves Bolting, Pins and Stems		

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma .500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:	0.293
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:			OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
Governor 1, 2, 3, 4	50	56	48	18.615	2.5	28-Feb	No reportable indications.
Throttle R/S L/S	53.6	59.6	36	23.050	3	28-Feb	R/S 7 studs and L/S 7 studs no or loss of backwall
Reheat Stop R/S L/S	41	53	48	16.357	2	29-Feb	No reportable indications.
Bearing end cap studs R/S L/S	44.2	56.2	24	13.975	1.75	29-Feb	No reportable indications.
Intercept Control Valves R/S L/S Outboard Inboard	40	52	112	14.837	1.75	2-Mar	No reportable indications.
Intercept Valves Strainer bolts	42	48	32	5.786	0.75	4-Mar	No reportable indications.
Intercept Valves Plugs Pins	23	35	32	0.704	1.375	4-Mar	No reportable indications.
Throttle Valves Strainer Studs	36	48	16	7.579	1.5	4-Mar	No reportable indications.
Governor Stems 1, 2, 3, 4	46	58	4	39.095	~3	4-Mar	Best effort. No reportable indications.
Governor Valves Body Pins	46.6	58.6	16	2.251	0.625	5-Mar	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-1003 REV. 3.2	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Valves Bolting, Pins and Stems (cont.)		

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER:	LONGITUDNAL				
MFG:	GEIT Gamma .500" Round	Frequency: 2.25MHz.	S/N: 14A00081	DELAY:	1.292
TRANSDUCER:	SHEAR	WEDGE:			
MFG:	n/a			DELAY:	n/a
CAL BLOCK:	IIW: B06111	LINEARITY PERFORMED:			OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
Reheat Stop Valve Stem L/S	27.4	39.4	1	64.107	5.25	4-Mar	No reportable indications. R/S not tested as it will be replaced.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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Project: CF-5862
Site: Comanche Generating Station
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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Governor Valves R/S #2, 4 L/S #1, 3 Seats and Corners		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	271.9/240.6 fc.
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	485/356.4 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the seats and corners of the #1, 2, 3 and 4 Governor Valves resulted in the following:

- R/S #2 indications on the edge of the seat - see picture next page
- R/S #4 No reportable indications
- L/S #1 indication corner of the seat - see picture next page
- L/S #3 No reportable indications

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned
MATERIAL DESCRIPTION:	Governor Valves Seats and Corners

Description

- R/S #2 indication on the seat
- L/S #1 indication corner of the seat




NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Governor Valves Disks #1, 2, 3, 4 Seats		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	240.6 fc.
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	356.4 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Governor Valves Disks #1, 2, 3, 4 Seats resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Governor Valves Stems #1, 2, 3, 4		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: Magnaflux SKC-S / 19J01K
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 2996 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.4 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the Governor Valves Stems #1, 2, 3, 4 resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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Date: 4-Mar-20 Page 222 of 264

LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Governor Valves #1, 2, 3, 4 Body Inside Bushings and Back Grooves

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	260 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Governor Valves #1, 2, 3, 4 Body Inside Bushings and Back Grooves resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Governor Valves #1, 2, 3, 4 Body Pins Areas and Transitions		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a

MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: Magnaflux SKC-S / 19J01K

WATER CONDITIONER MFG. / BATCH: n/a

MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 3362 µW/cm2

BLACKLIGHT: n/a READING: n/a µW/cm2

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020

WHITELIGHT: At surface of part READING: 0.28 fc.

WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI

MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020

MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the Governor Valves #1, 2, 3, 4 Body Pins Areas and Transitions resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Throttle Valves R/S and L/S Seats, Seal Welds, Strainer Grooves and Swirl Dams		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	240.6 fc.
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	356.4 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the seats, seal welds, strainer grooves and swirl dams of the R/S and L/S Throttle Valves resulted in the following:

- R/S Seat: Cracklike indication through the seat - see pictures next page
- R/S Seal weld: No reportable indications
- R/S Strainer grooves: No reportable indications
- R/S Swirl Dam:: No reportable indications

- L/S Seat: No reportable indications
- L/S Seal weld: No reportable indications
- L/S Strainer grooves: No reportable indications
- L/S Swirl Dam:: No reportable indications

NDT Technician: Lawrence Craig MT/PT/VT II — n/a

n/a — n/a

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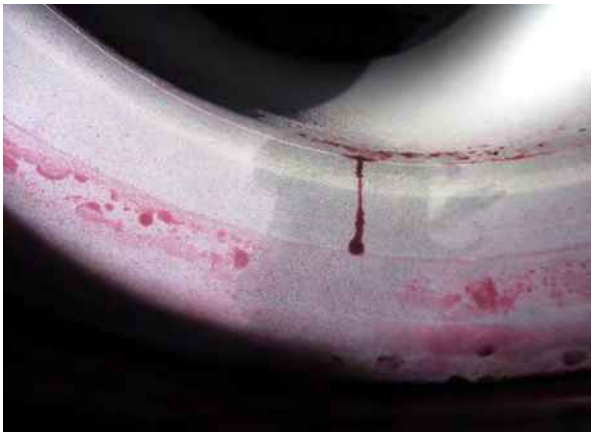
CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Throttle Valves R/S and L/S Seats, Seal Welds, Strainer Grooves and Swirl Dams

Description

- R/S Seat: Cracklike indication through the seat



NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Throttle Valves R/S and L/S Disk Seats and Back Seats		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	240.6 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Throttle Valves R/S and L/S Disk Seats and Back Seats resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II — n/a

n/a — n/a

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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Throttle Valves R/S L/S Strainers

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	408 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

Visual inspection of the Throttle Valves R/S L/S Strainers resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Throttle Valves R/S L/S Strainers Flange Transition Areas		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 2996 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.4 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the Throttle Valves R/S L/S Strainers Flange Transition Areas resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Throttle Valves R/S and L/S Body Back Seats and (1) Pilot Disk Seat

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH: Magnaflux SKC-S / 19J01K
PENETRANT MFG / BATCH: Magnaflux SKL-SP2 / 18C02K
DEVELOPER MFG / BATCH: Magnaflux SKD-S2 / 19A08K
OTHER MATERIALS: n/a
BLACKLIGHT METER: n/a
BLACKLIGHT: n/a READING: n/a µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Coast HX5_LC READING: 240.6 fc.
WHITELIGHT: n/a READING: n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Throttle Valves R/S and L/S Body Back Seats and (1) Pilot Disk Seat resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

3-Angles NDE Report 2020-CF-5862 …

3angles Inc.
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P: (518) 640-3000
F: (518) 218-0490

Project: CF-5862
Site: Comanche Generating Station
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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:		Throttle Valves Springs	

INSPECTION RESULTS

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Fenix UC35_JK READING: 485 fc.
WHITELIGHT: n/a READING: n/a fc.

Visual inspection of the Throttle Valves R/S L/S Springs (3 per Valve) resulted in the following:

- General corrosion on all springs

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Reheat Stop Valves R/S and L/S Seats and bushings		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	240.6/174/260 fc.
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	56.4/493.1/408 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the seats and bushings of the R/S and L/S Reheat Stop Valves resulted in the following:

- R/S Seat: No reportable indications
- R/S Bushing: Cracklike indication spiraling from seat into the bushing - see pictures next page
- L/S Seat: No reportable indications
- L/S Bushing: No reportable indications

NDT Technician: Lawrence Craig MT/PT/VT II — n/a

n/a — n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Throttle Valves R/S and L/S Seats, Seal Welds, Strainer Grooves and Swirl Dams

Description

- R/S Bushing: Cracklike indication spiraling from seat into the bushing

NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Reheat Stop Valves L/S Stem Keyways		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	485 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Reheat Stop Valves L/S Stem Keyways resulted in no reportable indications.

R/S Stem will be replaced and was not inspected.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Reheat Stop Valves R/S L/S Disk Arm Connections		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: Magnaflux SKC-S / 19J01K
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 2547 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.36 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the Reheat Stop Valves R/S L/S Disk Arm Connections resulted in the following:

- R/S Cracklike indications circular for 360 degrees - see pictures next page
- L/S Cracklike indications circular for 180 degrees - see pictures next page

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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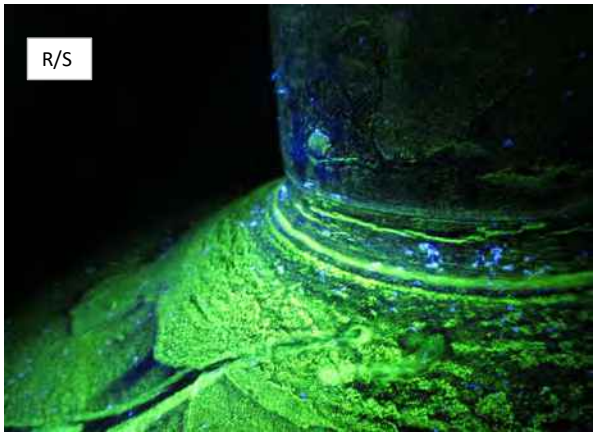
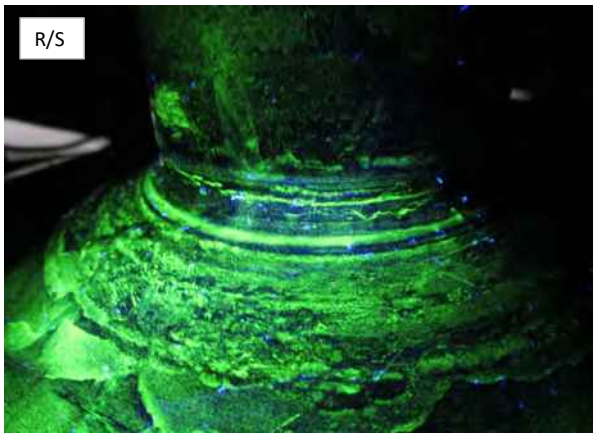
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned

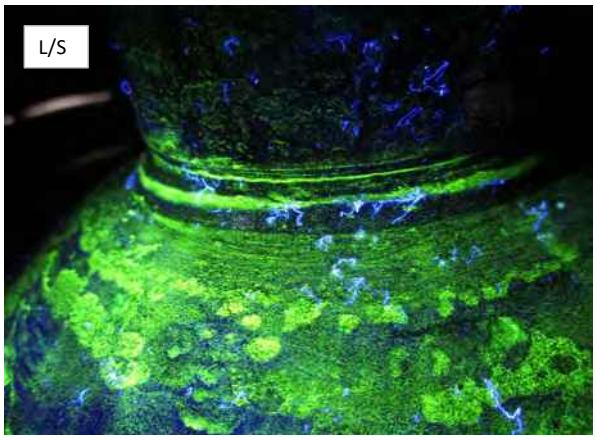
MATERIAL DESCRIPTION: Reheat Stop Valves R/S L/S Disk Arm Connections

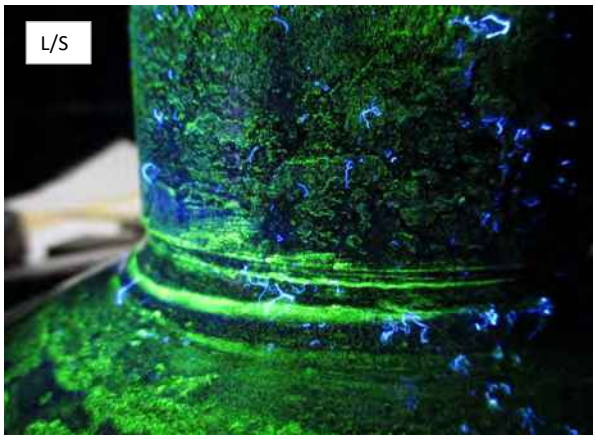
Description

- R/S Cracklike indications circular for 360 degrees
- L/S Cracklike indications circular for 180 degrees









NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II | n/a

n/a | n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Reheat Stop Valves Disk Yoke Keyways (4), Bushings, Nuts		

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	485 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Reheat Stop Valves Disk Yoke Keyways (4), Bushings, Nuts resulted in the following:

- Some bleadout in keyways and bushings - see example pictures

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH:	Magnaflux SKC-S / 19J01K		
PENETRANT MFG / BATCH:	Magnaflux SKL-SP2 / 18C02K		
DEVELOPER MFG / BATCH:	Magnaflux SKD-S2 / 19A08K		
OTHER MATERIALS	n/a		
BLACKLIGHT METER:	n/a		
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
BLACKLIGHT:	n/a	READING:	n/a µW/cm2
WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coast HX5_LC	READING:	381.3 fc.
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	410.8 fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [X] Solvent Removable [ ] Water Washable

INSPECTION RESULTS

Penetrant inspection of the Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves resulted in the following:

- R/S Outbound Seat: No reportable indications
- R/S Outbound Swirl Dam: some bleedout on the bottom - see pictures next pages
- R/S Outbound Strainer Groove: 8" linear indication under swirl dam and spots of porosity - see pictures next pages

- R/S Intbound Seat: porosity spots - see pictures next pages
- R/S Inbound Swirl Dam - bleedout on the bottom - see pictures next pages
- R/S Inbound Strainer Groove: linear indication covering ~270 degree of the circumference - see pictures next pages

- L/S Outbound Seat: ~8" groove in seat no bleed out - see pictures next pages
- L/S Outbound Swirl Dam: No reportable indications
- L/S Outbound Strainer Groove: No reportable indications

- L/S Intbound Seat: No reportable indications
- L/S Inbound Swirl Dam: No reportable indications
- L/S Inbound Strainer Groove: No reportable indications

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves

Description

- R/S Outbound Swirl Dam: some bleedout on the bottom
- R/S Outbound Strainer Groove: 8" linear indication under swirl dam and spots of porosity

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves

Description

- R/S Intbound Seat: porosity spots
- R/S Inbound Swirl Dam - bleedout on the bottom

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves

	Description
	• R/S Inbound Strainer Groove: linear indication covering ~270 degree of the circumference

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 5-Mar-20 Page 241 of 264

CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S and L/S Outbound and Inbound Seats, Swirl Dams, and Strainer Grooves

	Description
	• L/S Outbound Seat: ~8" groove in seat no bleed out

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II — Lawrence Craig MT/PT/VT II

n/a — n/a

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Project: CF-5862
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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Intercept Valves R/S L/S Outbound Inbound Strainers

INSPECTION RESULTS

WHITELIGHT METER:	Spectroline AccuMAX XRP-3000 S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Fenix UC35_JK	READING:	408 fc.
WHITELIGHT:	n/a	READING:	n/a fc.

Visual inspection of the Intercept Valves R/S L/S Outbound Inbound Strainers resulted in the following:

- L/S Outbound: Foreign object in one location; screen misaligned/dropped - see pictures next pages
- R/S Outbound: No reportable indications
- R/S Outbound Foreign object in 2 locations - see pictures next pages
- L/S Inbound: Screen eroded in one corner and foreign object in one location - see pictures next pages

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S L/S Outbound Inbound Strainers

Description

- L/S Outbound: Foreign object in one location; screen misaligned/dropped
- R/S Outbound Foreign object in 2 locations

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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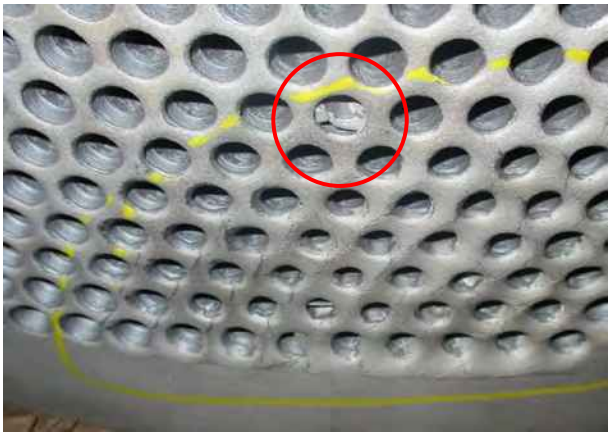
CUSTOMER:	FCSS
PO #: 4900073380	SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Intercept Valves R/S L/S Outbound Inbound Strainers

Description

- L/S Inbound: Screen eroded in one corner and foreign object in one location



NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Intercept Valves Plugs (4) Pins and ID transitions		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 2996 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.4 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Yoke	OUTPUT:	DC	Longitudinal Amps	n/a	[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		[ ] TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Parker DA-400 S/N: 25009 CAL. DUE: 06/06/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of the Intercept Valves Plugs Pins areas and ID transitions resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

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VISUAL INSPECTION REPORT

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Intercept Valves Plugs Washers

INSPECTION RESULTS

WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Fenix UC35_JK READING: 408 fc.
WHITELIGHT: n/a READING: n/a fc.

Visual inspection of the (4) Intercept Valves Plugs Washers (2 per plug) resulted in no reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 29-Feb-20 Page 247 of 264

ULTRASONIC INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	n/a	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:			

MATERIALS / EQUIPMENT

UT SCOPE:					COUPLANT
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21		SAE 30
TRANSDUCER: LONGITUDNAL					
MFG:	GEIT Gamma	.500" Round	Frequency: 5MHz.	S/N: 14A0010A	DELAY:
TRANSDUCER: SHEAR			WEDGE:		
MFG:		n/a			DELAY: 0.293
CAL BLOCK:	IIW: B06111		LINEARITY PERFORMED:		OK

INSPECTION RESULTS

COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
LPA Crossover Studs	29.4	41.4	27	13.637	2	29-Feb	No reportable indications. 17 missing/not inspected.
LPB Crossover Studs	29.4	41.4	40	13.637	2	29-Feb	No reportable indications. 4 not inspected mechanical damage.
HP-IP Crossover Studs	35.4	47.4	47	11.11	1.5	29-Feb	No reportable indications. 1 missing. 4 not inspected mech damage.
IP/LPA Crossover Studs	40	52	52	20.058	1.5	2-Mar	No reportable indications.
LPA/LPB Crossover Studs	40	52	44	18.5	1.5	2-Mar	No reportable indications.
R/S L/S Crossover Studs Main Steam Inlet	40.8	52.8	32	24.399	2	2-Mar	No reportable indications.
R/S L/S Crossover Studs Reheat Steam Inlet	43.6	55.6	38	19.308	2	2-Mar	No reportable indications.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II

3-Angles NDE Report 2020-CF-5862 …

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Project: CF-5862
Site: Comanche Generating Station
Date: 4-Mar-20 Page 248 of 264

LIQUID PENETRANT INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Findings

MATERIAL DESCRIPTION: Generator Blower Fan Blades Stationary in Shell

MATERIALS / EQUIPMENT

CLEANER/REMOVER MFG / BATCH: Magnaflux SKC-S / 19J01K
PENETRANT MFG / BATCH: Magnaflux SKL-WP2 / 18A044
DEVELOPER MFG / BATCH: Magnaflux SKD-S2 / 19A08K
OTHER MATERIALS: n/a
BLACKLIGHT METER: n/a
BLACKLIGHT: n/a READING: n/a µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: Flashlight: Coast HX5_LC READING: 260 fc.
WHITELIGHT: n/a READING: n/a fc.

PROCESS: [X] Color Contrast [ ] Fluorescent [ ] Solvent Removable [X] Water Washable

INSPECTION RESULTS

Penetrant inspection of (504) Generator Blower Fan Blades Stationary in Shell resulted in no reportable indications.

NDT Technician: Lawrence Craig MT/PT/VT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 6-Mar-20 Page 249 of 264

MAGNETIC PARTICLE INSPECTION

CUSTOMER:	FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTION:	Generator Blower Fan Blades Rotating		

MATERIALS / EQUIPMENT

PARTICLES: [X] WET [ ] DRY [X] FLUORESCENT [ ] COLOR: n/a
MFG. / BATCH: Magnaflux 14AM / 18K20K MFG. / BATCH: n/a
WATER CONDITIONER MFG. / BATCH: n/a
MAGNETIC PARTICLE BATH CONCENTRATION: n/a

BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 3149 µW/cm2
BLACKLIGHT: n/a READING: n/a µW/cm2
WHITELIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020
WHITELIGHT: At surface of part READING: 0.42 fc.
WHITELIGHT: n/a READING: n/a fc.

MAGNETIZATION:	Coil	OUTPUT:	HWDC	Longitudinal Amps	600	3 TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN
MAGNETIZATION:	n/a	OUTPUT:	n/a	n/a		TURN

FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI
MFG: Magnaflux M-500 s/n: 82127 Cal Due: 06/09/2020
MFG: n/a

INSPECTION RESULTS

Magnetic particle inspection of (683) Generator Blower Fan Blades Rotating resulted in no reportable indications.

Demagnetized +/- 3 Gauss.

NDT Technician: Joop Kraijesteijn MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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Project: CF-5862
Site: Comanche Generating Station
Date: 2/3/2020 Page 250 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	81%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/3/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3angles Inc.
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Project: CF-5862
Site: Comanche Generating Station
Date: 2/4/2020 Page 251 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/4/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 2/8/2020 Page 252 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/8/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 2/10/2020 Page 253 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/10/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3-Angles NDE Report 2020-CF-5862 …

3angles Inc.
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Project: CF-5862
Site: Comanche Generating Station
Date: 2/14/2020 Page 254 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/14/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3-Angles NDE Report 2020-CF-5862 …

3angles Inc.
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Project: CF-5862
Site: Comanche Generating Station
Date: 2/15/2020 Page 255 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/15/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	46%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	21%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3angles Inc.
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Project: CF-5862
Site: Comanche Generating Station
Date: 2/17/2020 Page 256 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/17/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3-Angles NDE Report 2020-CF-5862 …

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Project: CF-5862
Site: Comanche Generating Station
Date: 2/19/2020 Page 257 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/19/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Stephen Renkavinsky MT/PT/VT III, UT II n/a

n/a n/a

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3-Angles NDE Report 2020-CF-5862 …

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Project: CF-5862
Site: Comanche Generating Station
Date: 2/25/2020 Page 258 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	79%	64-96%
20%	+12db	81%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/25/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Ultrasonic Linearity Sheet

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3-Angles NDE Report 2020-CF-5862 …

3angles Inc.
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Project: CF-5862
Site: Comanche Generating Station
Date: 2/27/2020 Page 259 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	79%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/27/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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F: (518) 218-0490

Project: CF-5862
Site: Comanche Generating Station
Date: 2/28/2020 Page 260 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	79%	64-96%
20%	+12db	79%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/28/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

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Site: Comanche Generating Station
Date: 2/29/2020 Page 261 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 2/29/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 3/2/2020 Page 262 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 3/2/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
3	40% Sweep	38-42%	40%
4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 3/4/2020 Page 263 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 3/4/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
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2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
1	0% Sweep	-02-02%	0%
2	20% Sweep	N/A	20%
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4	60% Sweep	58-62%	60%
5	80% Sweep	N/A	80%
6	100% Sweep	98-102%	100%

Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Project: CF-5862
Site: Comanche Generating Station
Date: 3/5/2020 Page 264 of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD

UT SCOPE:

MFG: GEIT USMGO S/N: 11100358 CAL DUE: 01/06/21

TRANSDUCER:

MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A

CALIBRATION STANDARD:

IIW: B06111

AMPLITUDE CONTROL LINEARITY

ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE
80%	-6db	40%	32-48%
80%	-12db	20%	16-24%
40%	+6db	80%	64-96%
20%	+12db	80%	64-96%

Procedure No.: KT-NDE-1018 REV. 2.1

Date Linearity Was Performed 3/5/2020

Acceptable: X

Rejectable:

SCREEN HEIGHT LINEARITY

	UPPER SIGNAL	ACCEPTABLE RANGE	ACTUAL LOWER SIGNAL
1	100%	55-45%	50%
2	90%	50-40%	45%
3	80%	N/A	40%
4	70%	40-30%	35%
5	60%	35-25%	30%
6	50%	30-20%	25%
7	40%	25-15%	20%
8	30%	20-10%	15%
9	20%	15-5%	10%

SCREEN SWEEP LINEARITY

	SET POINTS	ACCEPTABLE RANGE	SIGNAL READING @50% FSH
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Comments:

Inspector(s): Joop Kraijesteijn MT/PT/VT III, UT II n/a

n/a n/a

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Com3 RR Shear Wave Report

FCSS
Attn. Mark Cain
4200 Wildwood Parkway
Atlanta, GA 04092

Date: April 1, 2020

Dear Mr. Cain:

FCSS, contracted 3angles (PO number 4900076288) to perform an inspection of the generator retaining rings of Xcel Energy Comanche Unit 3 generator.

The inspection was performed using the DEKRA Automated Inspection of Retaining Rings (KIRR) system and one DEKRA inspector supported 3angles during the execution of the work.

Please find attached the final report of the inspection with our findings and observations. Findings reported in the enclosed document are provided for informational purposes only. Any determinations, actions, recommendations or dispositions should be made by engineering representation or consultants deemed qualified to use the data and test results provided for such purposes.

I want to extend my appreciation for being given the opportunity to support the outage requirements and to work with you and your team.

Please do not hesitate to contact me if you have any questions.

Best regards,

Joop Kraijesteijn
ASNT Level III

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e-mail joop.kraijesteijn@3anglesndt.com

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MTI-2809875.52

Xcel Energy, Pueblo Colorado, United States.
Non-destructive inspection of the
generator retaining rings of Comanche unit #3

Arnhem, 1 April 2020
Author(s) B. Van de Poel
DEKRA Solutions B.V. – Material Testing and Inspection

By order of 3Angles NDT, USA.

author :	B. Van de Poel	reviewed :	C.J. Boxma
24 pages		approved :	J. Schouten

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SUMMARY

The generator rotor retaining rings of the generator unit #3 at Comanche power station in pueblo Colorado, have been inspected by DEKRA from February 28th till the 2nd of March 2020. The inspection has been performed while the rotor removed from the stator
An ultrasonic inspection (TRL angle beam and TOFD technique: Time of Flight Diffraction technique) and an eddy current inspection of the retaining rings have been performed using a KIRR 3 system ("KEMA" system for Inspection of Retaining Rings Mk 3). The inspection has been performed according DEKRA procedure MTI 2800805.12 rev 1.

The ultrasonic TRL inspection aims at flaw detection near the inner surface (back wall) of the rings, and is carried out for the complete rings. The ultrasonic TOFD inspection is used for detection of surface breaking and voluminous defects and has been performed additionally for the shrink fitted area. The eddy current inspection covers the complete outer surfaces of the rings with high sensitivity.

With the ultrasonic TRL, Reflection technique, and TOFD technique inspections, no flaw indications or irregularities above the detection threshold have been detected in the material of both rings.

Also with the eddy current inspection of the outer surfaces of both rings, no flaw indications exceeding the detection threshold have been observed.

Since no irregularities have been detected during this inspection, the standard inspection interval for retaining rings of 3 to 4 years can be applied, depending on the number of annual start / stop cycles.

Furthermore it is highly recommended to pay continued attention to the conditioning of the rings especially preserving them against moisture.

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1 INTRODUCTION

The generator rotor retaining rings of the generator unit #3 at Comanche power station in pueblo Colorado, have been inspected by DEKRA from February 28th till the 2nd of March 2020. The inspection has been performed while the rotor was removed from the stator.

An ultrasonic TRL angle beam and TOFD inspection (Transmit-Receive-Longitudinal and Time of Flight Diffraction technique) and an eddy current inspection of the retaining rings have been performed using a KIRR Mk3 system ("KEMA" system for Inspection of Retaining Rings Mk 3). The inspection has been performed according DEKRA procedure MTI 2800805.12 rev 1.

The ultrasonic TRL reflection technique inspection aims at flaw detection near the inner surface (back wall) of the rings, and is carried out for the complete rings. The ultrasonic TOFD inspection is used for detection of surface breaking and voluminous defects and has been performed additionally for the shrink fit area. The eddy current inspection covers the complete outer surfaces of the rings with high sensitivity.

2 GENERATOR SPECIFICATIONS

Generator

Location	:	Xcel Power station Pueblo, Colorado, United States
Unit	:	#3
Manufacturer	:	Mitsubishi Electric Corporation
Machine code	:	Unknon
Serial no.	:	05HBSE01
Power	:	1008,000 kVA
Year:	:	Circa2010
Cooling	:	Hydrogen-cooled

Retaining rings

Circumference	:	3960 mm
Diameter	:	1261 mm
Length	:	857 mm (TS) and 942 (ES)
Thickness	:	86 (maximum)
Ring geometry	:	See appendix H

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3 EQUIPMENT

Manipulator	:	KIRR 3 (“KEMA” System for Inspection of Retaining Rings Mk 3)
Motor control	:	2 channel motor control unit with remote control, DEKRA design
Ultrasonic device	:	Technology Design Pocket Scan, with software rev. 20.02
Ultrasonic couplant	:	transformer oil, delivered by client
Ultrasonic probes	:	0° TRL 5 MHz PE (for the wall thickness measurements) 65º TRL 2 MHz probe 65º TRL 2 MHz probes with 15º squint angle 45°-L-5 MHz HQS mirror image TOFD probes
Eddy current device	:	GE Phasec 3D
Eddy current probe	:	absolute surface probe, DEKRA design
Data	:	all ultrasonic measurement data has been recorded and will be stored in the DEKRA archives for at least 5 years. The eddy current data is observed on the (memory) screen, flaw indications are stored.

4 PERSONNEL

The inspection has been performed by ISO 9712 ultrasonic level II and eddy current level I qualified personnel. Evaluation of the PE and TOFD results is performed in accordance with an ultrasonic PE and TOFD ISO 9712 level III specialist at DEKRA.

5 CALIBRATION

The KIRR inspection and the accompanying calibrations have been performed in accordance with DEKRA procedure MTI 2800805.12 rev 1.

5.1 Wall thickness calibration

The calibration for the ultrasonic wall thickness measurement with the 0° TRL 5 MHz reflection probe has been performed on site on a portable calibration piece.

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5.2 Pulse echo 65º calibration

The ultrasonic TRL inspection with the 65º TRL 2 MHz probe aims at flaw detection near the inner surface (back wall) of the rings. The smallest detectable defect has a depth (from the inner surface) of 1 mm assuming it has a certain length of minimal 10 mm. For the calibration of the TRL inspection an austenitic calibration ring, MO-08-171-1 has been used to calibrate for axially as well as circumferentially orientated defects. This ring contains several axially and circumferentially orientated spark eroded slots with increasing depth; all slots are located at the inner surface. A full calibration was performed at the DEKRA lab before shipping the equipment. A portable calibration piece has been used to check the calibration on site.

The specifications of calibration ring MO-08-171-1 are given in a sketch in appendix A.

The scans of the TRL calibrations are given in appendix C.

5.3 TRL 65º with 15º squint angle calibration for the nose area

The ultrasonic TRL inspection for axially orientated defects in the nose area, performed with two 15º squint 65º TRL 2 MHz probes, aims at flaw detection near the inner surface (back wall) of the rings. The squint angle of the probes compensate for the slope of the nose area. There are two probes available: one probe is adjusted for looking in the clockwise (CW) direction and the other one for looking in the counter clockwise (CCW) direction. Portable calibration piece MO-12-013 has been used for the calibration of the squint TRL probes. This calibration piece contains several axially orientated spark eroded slots with increasing depth at the inner surface. The same calibration piece has been used to check the calibration on site.

The specifications of calibration piece, MO-12-013, are given in a sketch in appendix B.

The scan of the TRL calibration of the squint probes is given in appendix D.

5.4 TOFD technique calibration

The ultrasonic TOFD inspection with two 45°-L-5 MHz mirror image TOFD probes is used additionally for detection and sizing of surface breaking and voluminous defects. The smallest detectable defect has a height of minimal 1 mm with a surface of at least 15 mm^2. However, depending on the material properties and on the type of crack, some cracks will not be detected with TOFD technique. Although TOFD technique is not capable of detecting all types of cracks, it is always applied to improve the probability of detection (redundancy) in the shrink-fit area and to perform sizing of cracks – if applicable. For the calibration of the

TOFD inspection the same austenitic calibration ring, MO-08-171-I has been used. A portable calibration piece has been used to check the calibration on site.

The scan of the TOFD calibration is given in appendix E.

5.5 Eddy current calibration

The eddy current inspection with the absolute surface probe aims at flaw detection in the outer surface of the rings. The smallest detectable defect has a depth of 1 mm assuming it has a certain length of minimal 8 mm. The calibration for the eddy current inspection has been performed at spark eroded slots in the outer surface of another calibration ring; MO 95-002-II. This ring contains slots in both directions and the area around the slots has been coated to simulate the coating that is often present on retaining rings. A portable calibration piece has been used for the on-site calibration.

The eddy current calibration on the calibration ring and on the portable calibration piece with s/n 12125 are given in appendix F.

6 PROCEDURE AND EXECUTION

The inspection of the retaining rings has been performed with the manipulator (including the probes) moving in circumferential direction. An ultrasonic A-scan is sampled each circumferentially covered millimeter. After each circumferential scan, the probes are moved forward in axial direction with a specified step. The actual axial position of the probes is recorded for each scan. All scans have been performed alternately in counter-clockwise (CCW) and clockwise (CW) direction from a chosen 0-point. The 0-point for the TS ring was the centre of bolthole number 4. On the exciter side bolthole number 9 was chosen. Both boltholes are closest to the actual 12 o'clock position.

The inspections have been performed with emphasis on cracks near the wall thickness steps and even more importantly: the shrink fit areas.

Some pictures of the KIRR 3 manipulator mounted onto the retaining ring are presented in appendix G.

6.1 Wall thickness measurement

The geometry (wall thickness contour) has been determined with a straight (0°) ultrasonic TRL probe, before performing the pulse echo and TOFD technique inspection.

6.2 TRL inspection

Detection of axial defects
The inner surface of both rings has been inspected with TRL technique, looking in CW direction for axial cracking starting from the inner surface. Axial steps of 8 mm have been applied. For the shrink fit area, this inspection was repeated with the probe also looking in CCW direction.

Detection of axial defects in the nose area
The nose area has been tested with the 65º TRL 2 MHz PE probes with a 15º squint angle to compensate for the slope of the nose. Different probes were used for looking in the CW and CCW direction. Several scans with axial steps of 5 mm have been performed for each ring.

Detection of circumferential defects
Circumferential cracking predominantly starts in areas near the wall thickness steps and at the shrink-fitted areas. To detect circumferential cracking, several scans have been performed at these locations, with the 65º TRL probe's beam looking BW in axial direction (depending on the position of the wall thickness steps).

6.3 TOFD technique inspection – shrink fit area

Detection of axial defects
A TOFD technique inspection has been performed additionally on the shrink fit area, to detect axial orientated defects. Therefore the probe bundles are placed parallel to their movement: the bundles and the motion are both in circumferential direction. The probe separation distance (PSD) was calculated and set for the local wall thickness, axial steps of 5 mm have been applied.

6.4 Eddy current inspection

The eddy current inspection covers the complete outer surfaces of the retaining rings. The scan pattern of the eddy current probe is similar to that of the pulse echo probe and these measurements have been performed simultaneously.

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7 RESULTS

7.1 Wall thickness measurement

The wall thickness scan and the sketch of the cross section that was derived from this scan are shown in appendix H. The geometry of the rings is not identical. See appendix H for details.

7.2 TRL 65º inspection

For the TRL inspection approximately 200 scans in circumferential direction have been performed on both retaining rings.
None of the scans collected during the inspection of the exciter and turbine side ring show flaw indications above the detection threshold, indications which could point at cracks or possible crack initiation starting from the inner surface of the rings.

Some examples of TRL 65° scans are presented in appendix I.

7.3 TOFD technique inspection

For the TOFD technique inspection of the shrink fit area, approximately 20 scans have been performed for each ring. During the TOFD inspection no surface breaking or internal defects (above the detection threshold) have been detected in both rings.

Examples of TOFD scans are also presented in appendix I.

7.4 Eddy current inspection

With the eddy current inspection of the outer surfaces of the rings, no crack-like indications exceeding the detection threshold have been observed.

8 CONCLUSION AND RECOMMENDATIONS

With the ultrasonic TRL pulse echo and TOFD technique inspections, no flaw indications or irregularities above the detection threshold have been detected in the material of both rings.

Also with the eddy current inspection of the outer surfaces of both rings, no flaw indications exceeding the detection threshold have been observed.

Since no irregularities have been detected during this inspection, the standard inspection interval for retaining rings of 3 to 4 years can be applied, depending on the number of annual start / stop cycles.

Humid environments can reduce the inspection interval drastically. Therefore, it is highly recommended to pay continued attention to the conditioning of the rings especially preserving them against moisture.

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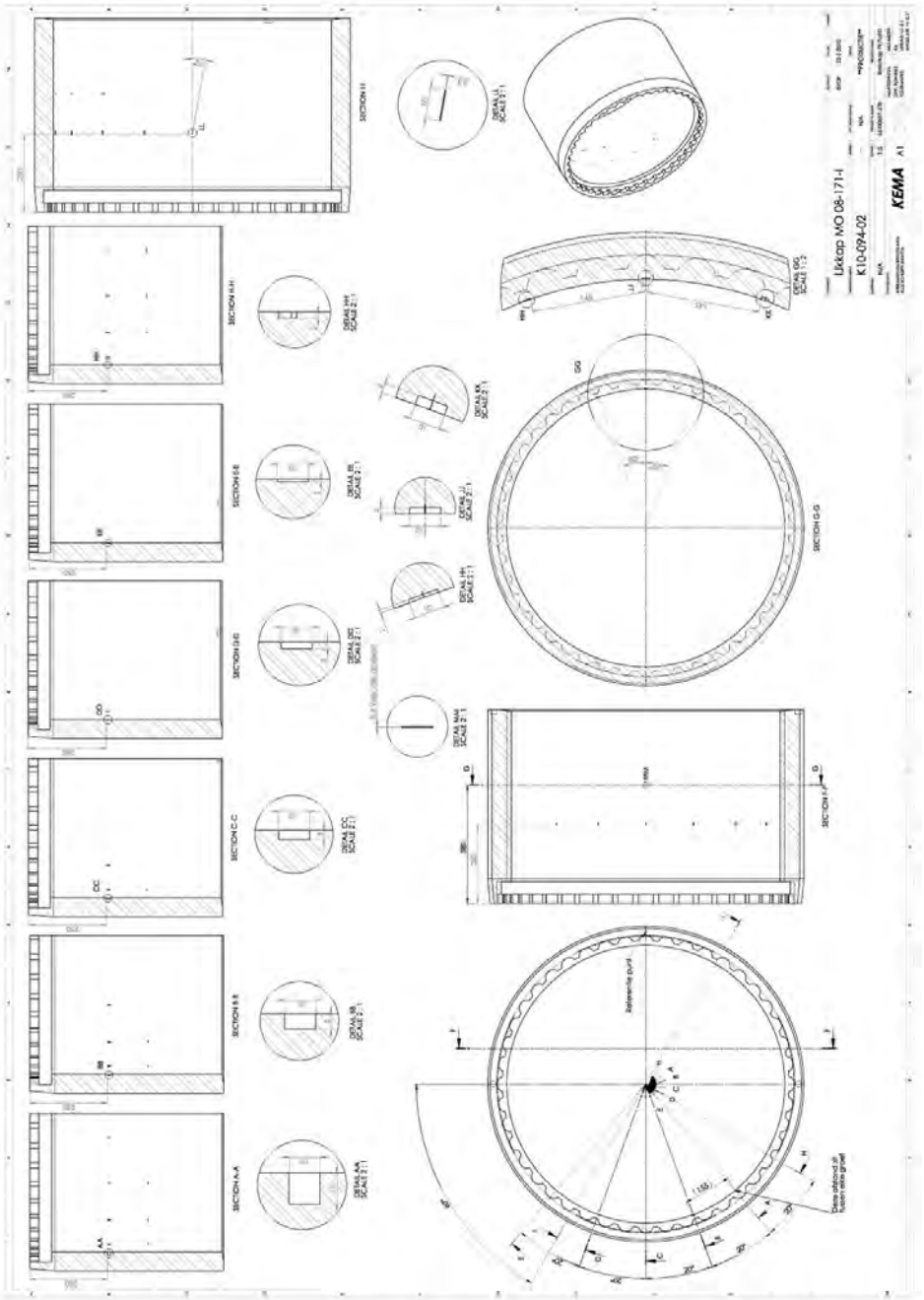
Appendix A - CALIBRATION RING



Sketch with the specifications of calibration ring MO-08-171-I.

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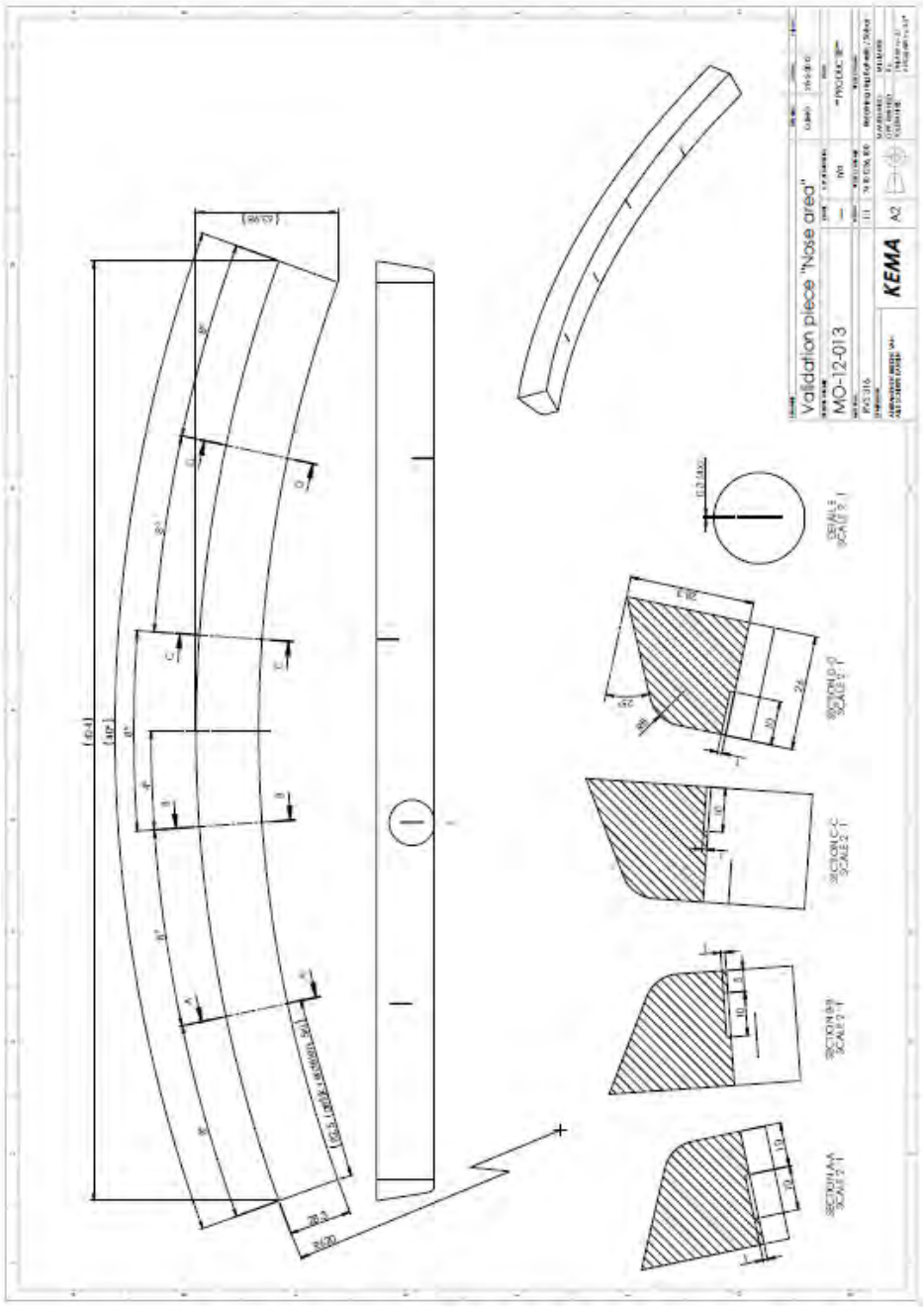
Appendix B - CALIBRATION PIECE FOR NOSE AREA



Sketch with the specifications of calibration piece MO-12-013.

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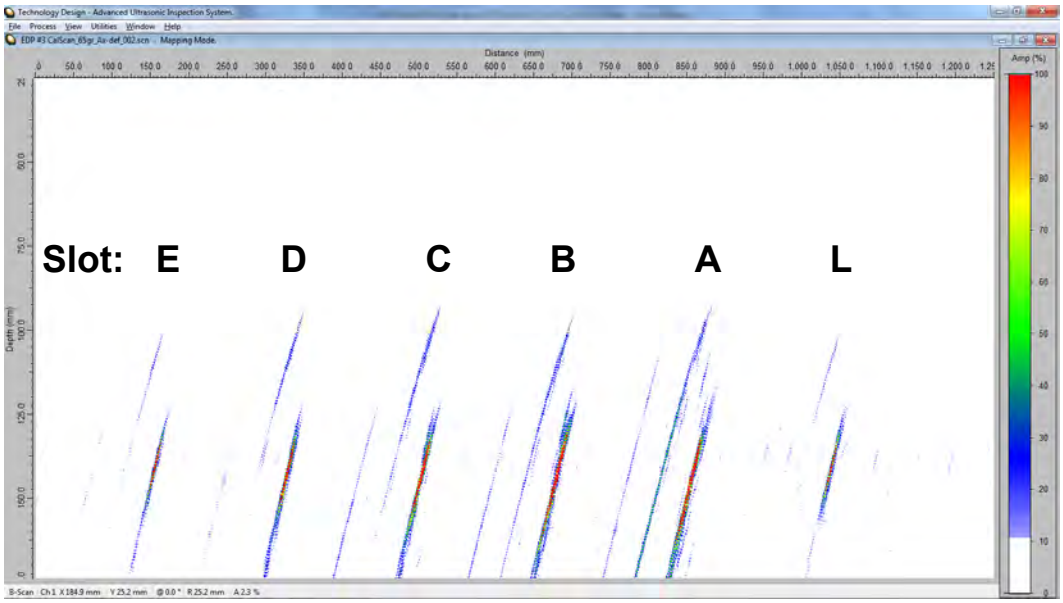
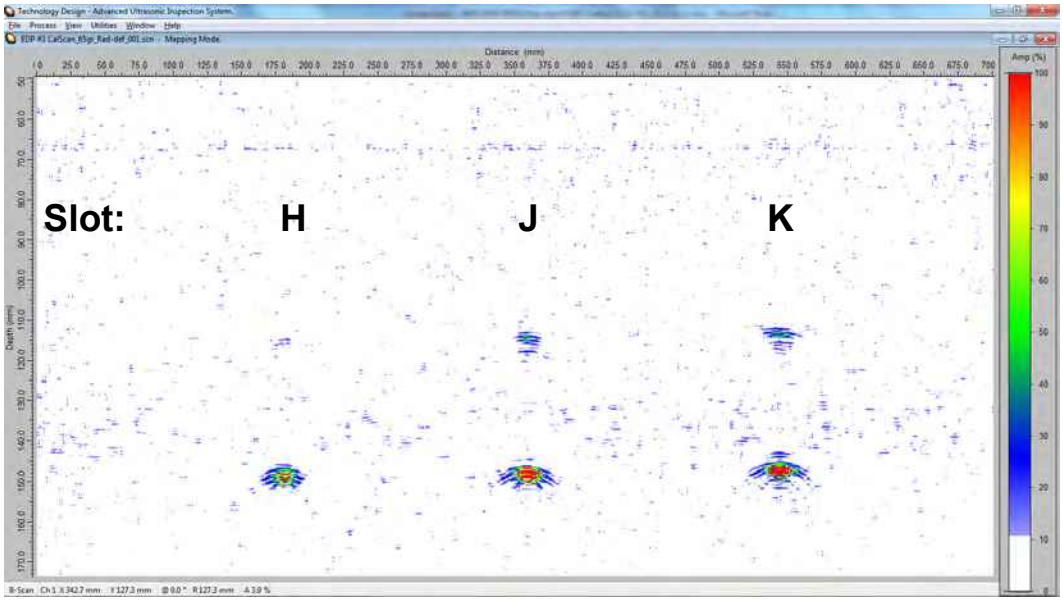
Appendix C - TRL CALIBRATION SCANS



Calibration with 65º TRL probe for axial orientated defects: slots E, D, C, B, A and L of calibration ring MO-08-171-I are visible.



Calibration with 65º TRL probe for circumferentially orientated defects: slots H, J, and K of calibration ring MO-08-171-I are visible.

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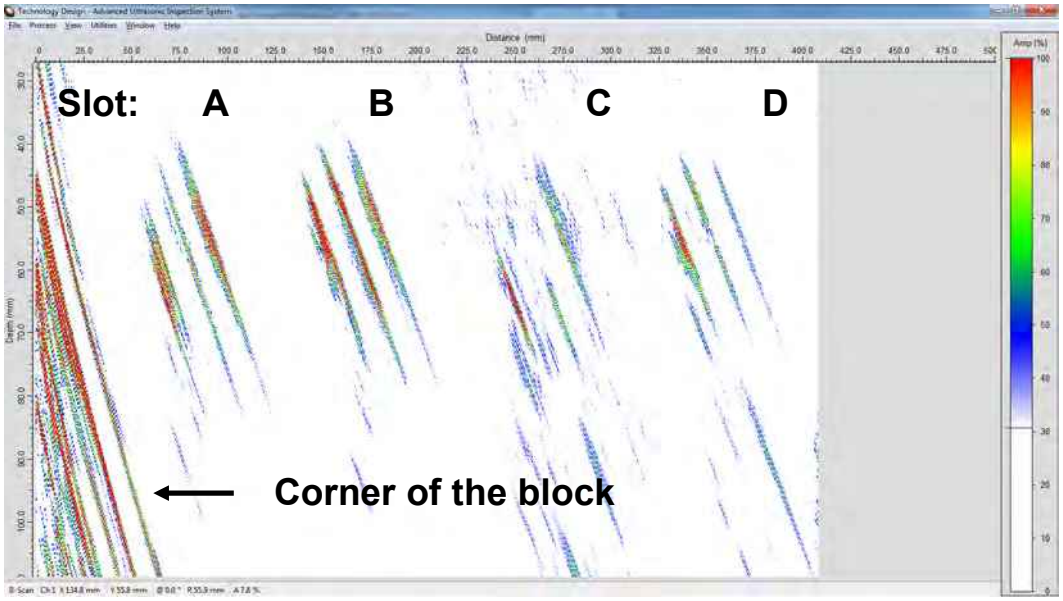
Appendix D - TRL CALIBRATION SCAN OF THE SQUINT PROBES



Calibration with 65º TRL 15º squint probe for axially orientated defects: slots A, B, C and D of calibration piece MO-12-013 are visible.

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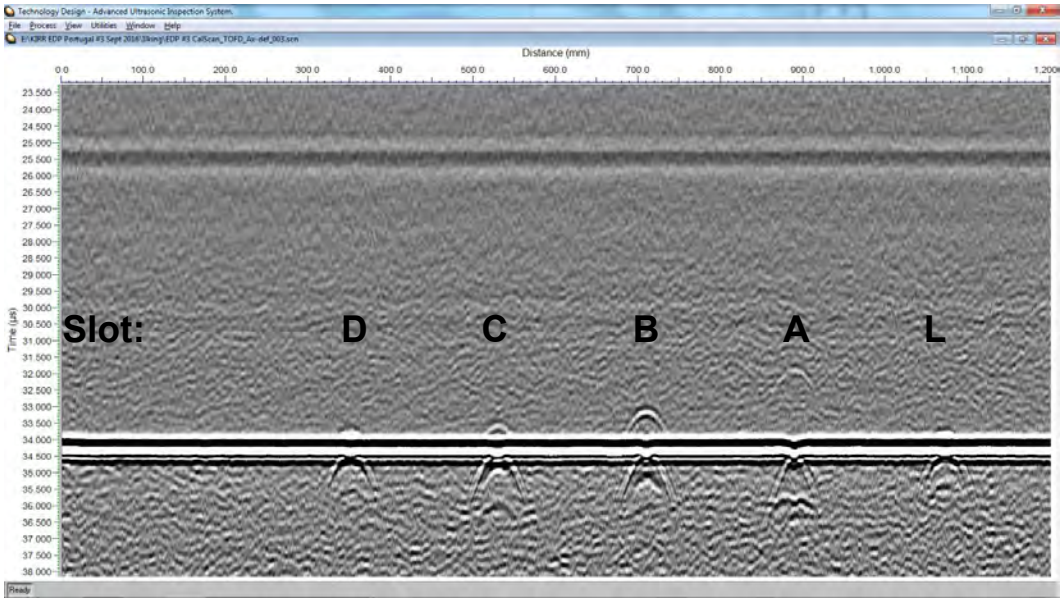
Appendix E - TOFD CALIBRATION SCAN



Linearized TOFD calibration scan; slots D, C, B, A and L of calibration ring MO-08-171-I are visible.

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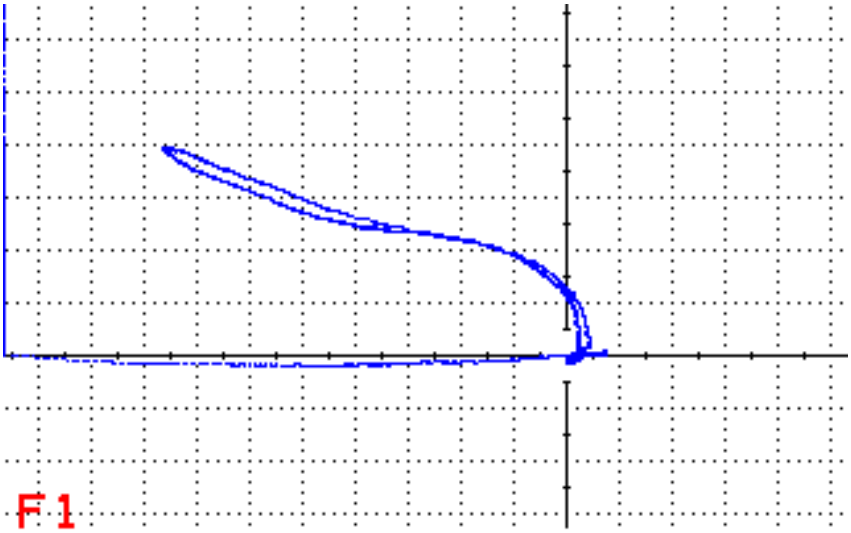
Appendix F - EDDY CURRENT CALIBRATION



Calibration for the eddy current inspection performed at calibration ring MO 95-002-II.

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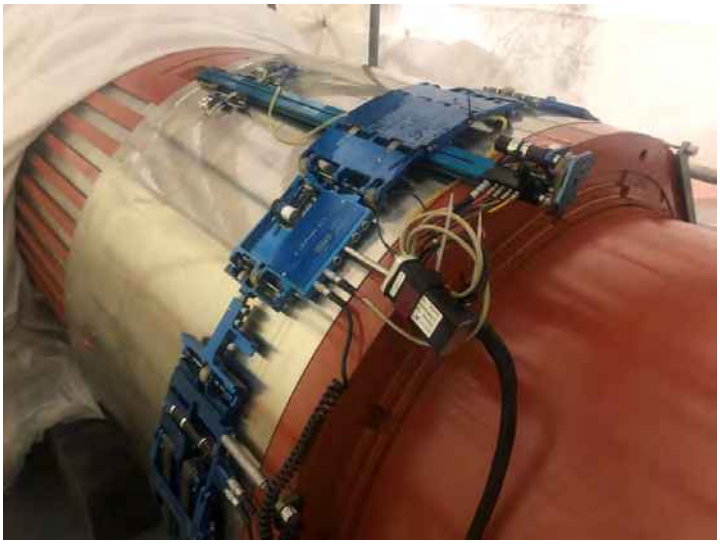
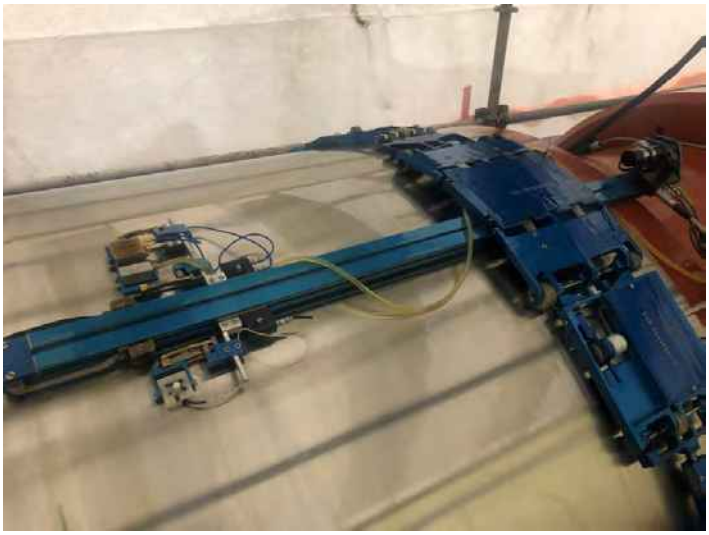
Appendix G - KIRR MK3 MANIPULATOR ON THE RETAINING RING



The KIRR 3 manipulator mounted on the turbine side retaining ring.



The KIRR 3 manipulator mounted on the turbine side retaining ring.

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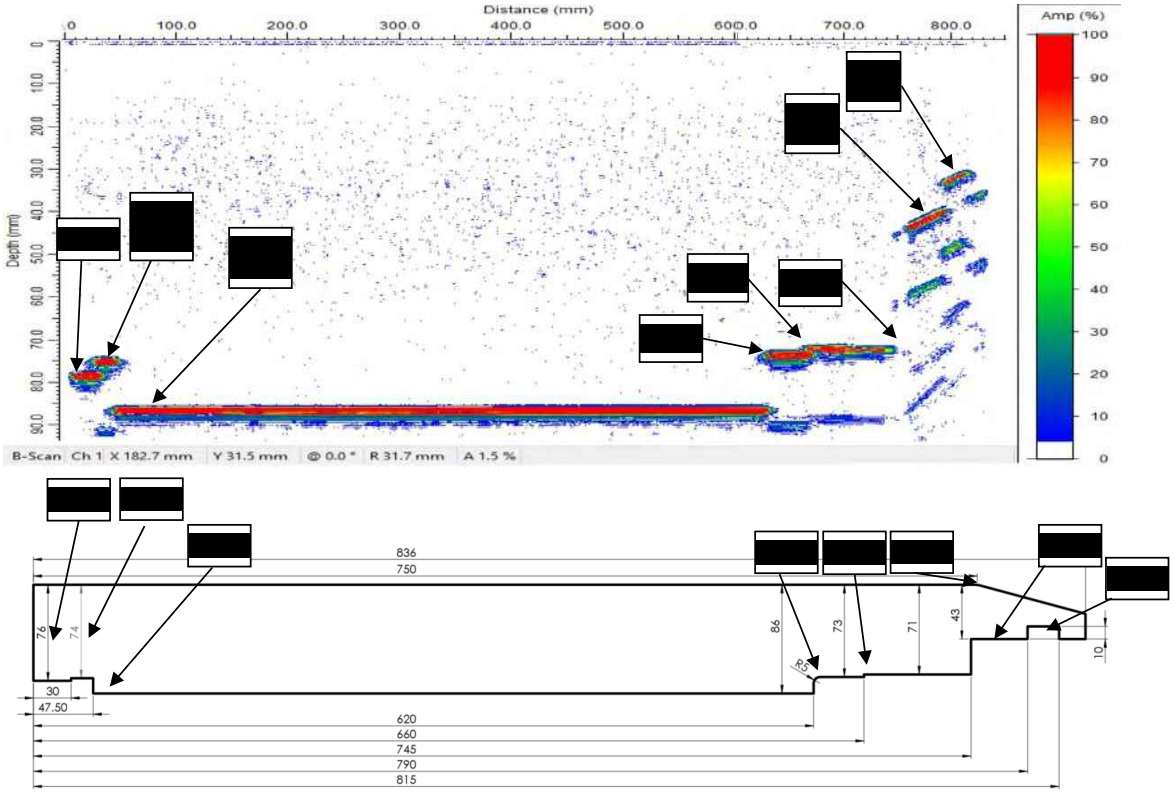
Appendix H - RETAINING RING GEOMETRY

Turbine side

Total length of the ring : 836 mm
Diameter of the rings : 1261 mm
Circumference : 3960 mm
Thickness : 86 mm (maximum)

Wall thickness scan from the Turbine side retaining ring:



Description of wall thickness steps as per drawing above, turbine side.

Section	Description	Thickness (mm)	Axial position (mm)
A	Start of retaining ring	76	0
B	Start of Groove	76-74	30
C	Wall thickness step	74-86	47,5
D	Wall thickness step	86-73	630
E	Wall thickness step	73-71	660
F	Start of sloping area	43	750
G	Wall thickness step	71-43 sloping	745
H	Groove	~10 (depth)	790 / 815

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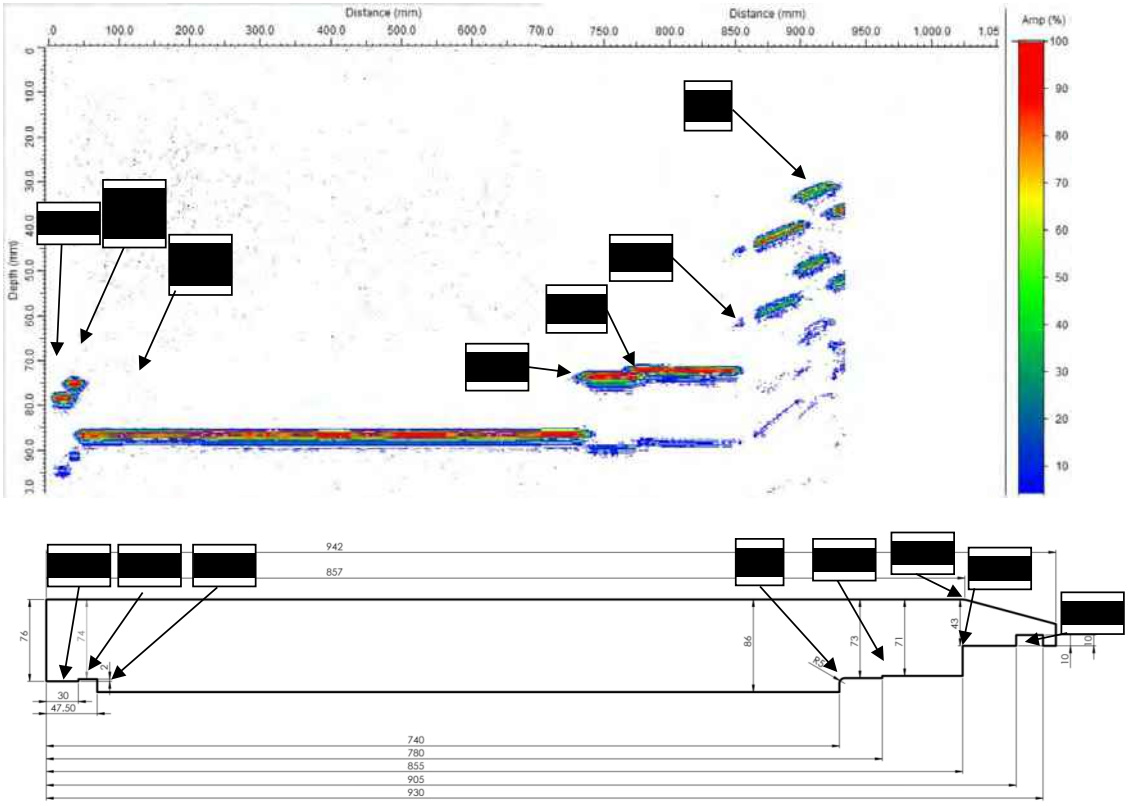
Exciter side

Total length of the rings	:	942 mm
Diameter of the rings	:	1261 mm
Circumference	:	3960 mm
Thickness	:	86 mm (maximum)

Wall thickness scan from the exciter side retaining ring:



Description of wall thickness steps as per drawing above, exciter side.

Section	Description	Thickness (mm)	Axial position (mm)
A	Start of retaining ring	76	0
B	Start of Groove	76-74	30
C	Wall thickness step	74-86	47,5
D	Wall thickness step	86-73	740
E	Wall thickness step	73-71	780
F	Start of sloping area	43	857
G	Wall thickness step	71-43 sloping	
H	Groove	~10 (depth)	806 - 830

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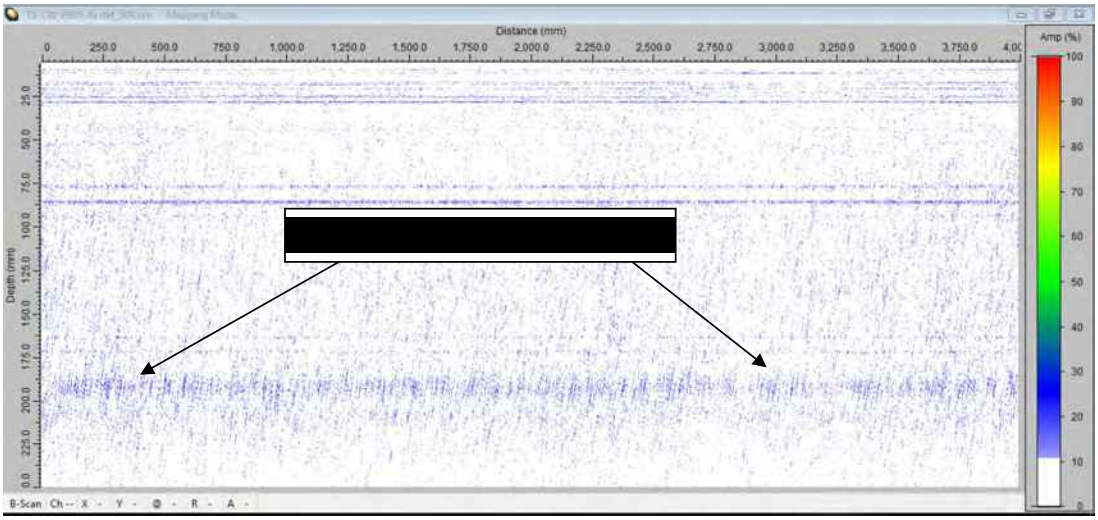
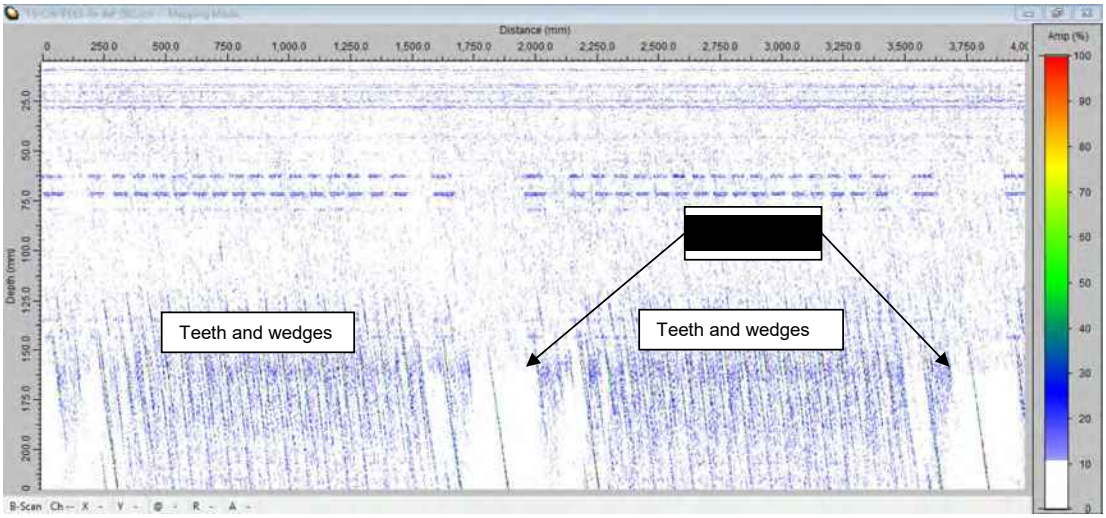
Appendix I - EXAMPLE OF ULTRASONIC SCANS



TRL 65° scan on the TS retaining ring for detection of axial defects in the straight area.



TRL 65° scan on the TS retaining ring for detection of axial defects in the shrink fit area (sloped part), regular pattern of geometrical echoes from the teeth and the wedges is visible.

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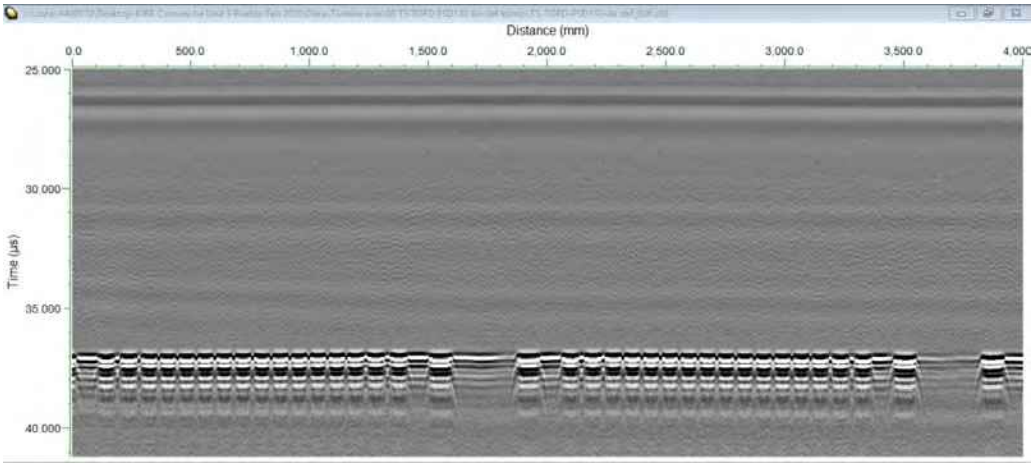
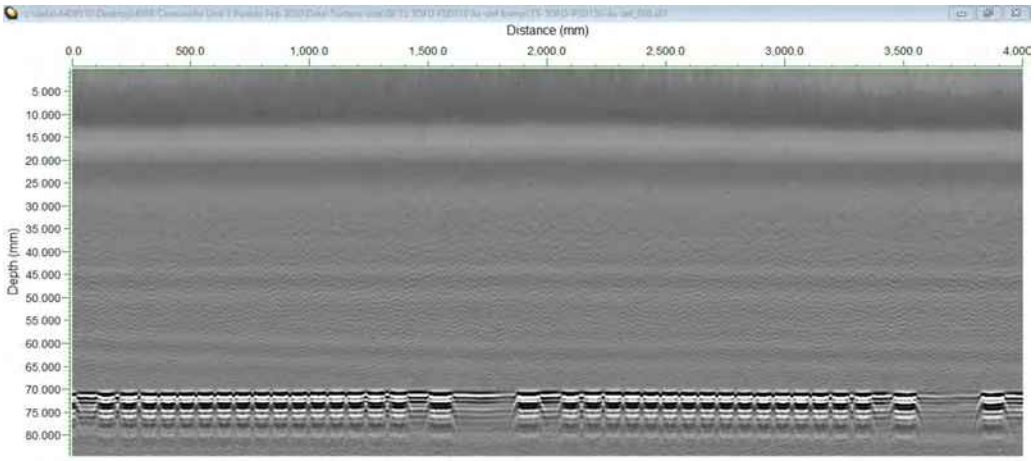


Non- Linearized TOFD scan in the shrink fit area of the TS retaining ring (sloped area), regular pattern of geometrical echoes from the teeth and the wedges is visible.



Linearized TOFD scan in the start of the shrink fit area of the TS retaining ring, echo of back-wall F is visible.

Com3 RR Shear Wave Report

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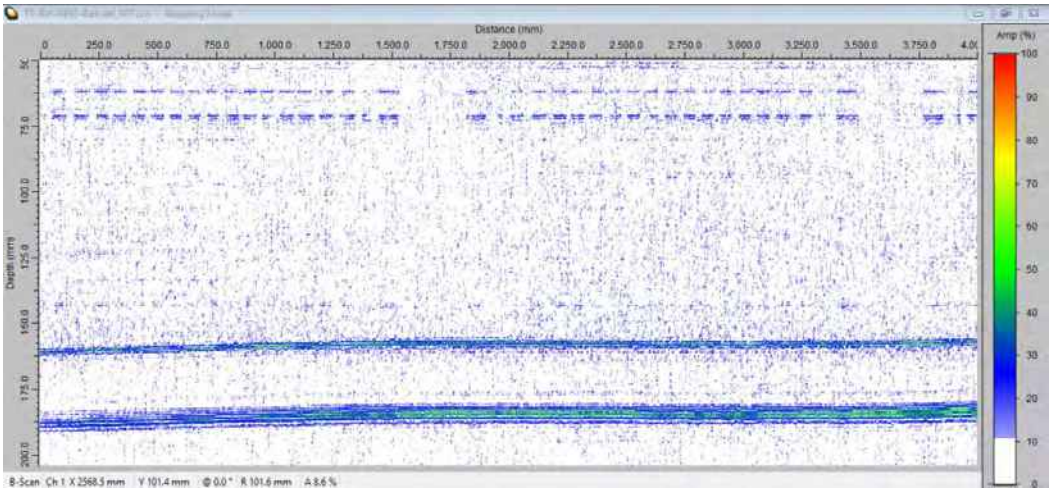
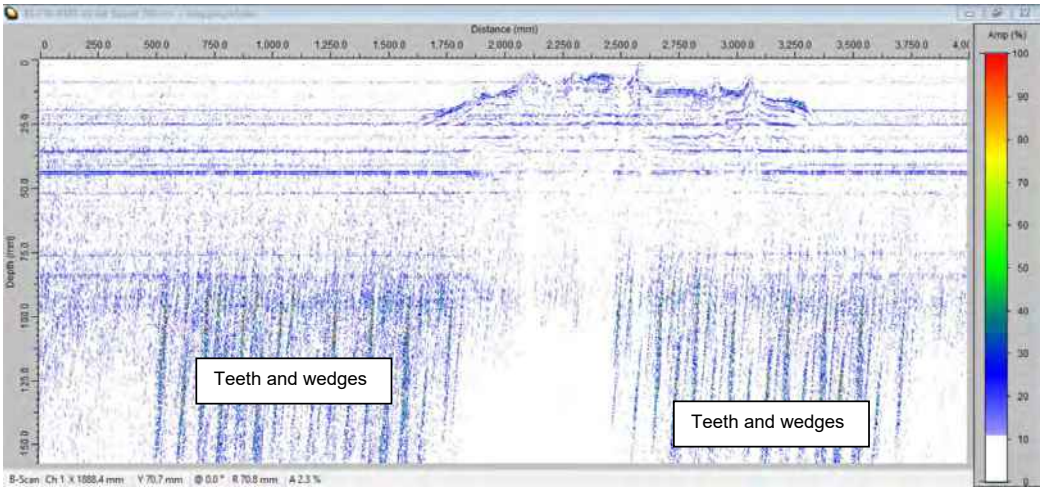


TRL 65° scan on the TS retaining ring for detection of circumferential defects.



Same as the shrink fit scan (of page 20, but measured on the sloped part with the 15°squint probe.

Comanche 3 Opening Alignment Report

To: Mark Cain, Fieldcore — March 11, 2020

Dave Johnson, Fieldcore

From: Scott Doughty, TLA
Cell: (724) 312-9682
richardsdoughty@yahoo.com

Subject: Comanche 3 Opening Alignment Report –HP-IP, LPA and LPB Turbine Sections

This report documents the alignment work done during the first Turbine Laser Alignment, LLC (TLA) site visit from March 2 through March 11, 2020. Initial alignment recommendations are included for bearings 1 through 6 and all components in the HP-IP, LPA and LPB turbine sections. A summary of the alignment work done during the first TLA site visit is also included.

ALIGNMENT RECOMMENDATIONS

1. Make HP-IP, LPA and LPB component moves shown in Tables 3, 8 and 13.

2. Make the bearing moves called for in the Rotor Alignment Section.

3. Weld blade ring centerline pin holes as shown in Tables 4, 9 and 14. Centerline repair data sheets have been provided at the bottom of this report starting on page 23.

4. New hi-lo tooth packing in the HP-IP section should have a radial clearance of .025" minimum with the exception of the following components:

   - IP #2 Blade Ring: Interstage packing should have a radial clearance of .045” minimum

   - HP #1 Blade Ring: Interstage packing should have a radial clearance of .035” minimum

5. **Bolted shroud diameters will need to be measured on ALL HP and IP blade rings before seal clearances and machining set points can be calculated. A data sheet is provided on page 35.**

6. HP-IP Internal Alignment

   - The IP #3 Blade Ring Interstage Packing bore vertical diameters are .056”-.102” ***larger*** than the horizontal diameters with the halves separated while the seal bore vertical diameters are .042”-.058” ***smaller*** than the horizontal diameters with the halves separated. This needs to be taken into consideration if the seals are replaced.

   - The IP #2 Blade Ring vertical diameters are .028”-.064” ***smaller*** than the horizontal diameters with the halves separated. In addition, the 11th stage interstage packing bore upper half horizontal diameter is .019” ***smaller*** than the lower half horizontal diameter. This needs to be taken into consideration if the seals are replaced.

   - The IP #1 Blade Ring seal bore vertical diameter is .152” ***smaller*** than the horizontal diameters with the halves separated. This needs to be taken into consideration if the seals are replaced.

   - The Nozzle seal bore vertical diameter is .056” ***smaller*** than the horizontal diameter with the halves separated. This needs to be taken into consideration if the seals are replaced.

- The HP #1 Blade Ring vertical diameter is .016"-.086" ***smaller*** than the horizontal diameter with the halves separated. This needs to be taken into consideration if the seals are replaced.

- The HP #2 Blade Ring vertical diameter is .012"-.024" ***smaller*** than the horizontal diameter with the halves separated. This needs to be taken into consideration if the seals are replaced.

- The HP #3 Blade Ring vertical diameter is .012"-.024" ***smaller*** than the horizontal diameter with the halves separated. This needs to be taken into consideration if the seals are replaced.

- The HP #3 Blade Ring Interstage Packing bore vertical diameters are .086"-.094" ***larger*** than the horizontal diameters with the halves separated while the seal bore vertical diameters are round with the halves separated. This needs to be taken into consideration if the seals are replaced.

7. LPA Internal Alignment

   - The N4 Gland casing is out of alignment, prep for closing alignment moves.

   - The N5 Gland casing is out of alignment, prep for closing alignment moves.

8. LPB Internal Alignment

   - The N6 Gland casing is out of alignment, prep for closing alignment moves

ROTOR ALIGNMENT

C As Found

TE Rim		Face			C Ideal TE Rim	C Ideal Face
High	9.0	Top Open	0.50	**Vert**	Fair	Fair
Left	1.0	Left Open	1.00	**Horz**	Fair	Fair

B As Found

TE Rim		Face			B Ideal TE Rim	B Ideal Face
Low	3.0	Top Open	3.00	**Vert**	Fair	Fair
Fair		Right Open	3.00	**Horz**	Fair	Fair

A As Found

TE Rim		Face			A Ideal TE Rim	A Ideal Face
Low	14.0	Top Open	3.70	**Vert**	Fair	Fair
Right	0.5	Right Open	1.30	**Horz**	Fair	Fair

Opening coupling checks were taken at the A, B, and C couplings. The A coupling rim showed the HP-IP low 14 mils and right .5 mils, the face was open 3.7 mils on the top and 1.3 mils on the right; ideal is fair rim and face. The B coupling was not read by indicator but measured by straight edge. The check showed that the LPA rim was low 3 mils and the face was open 3 mils on the top, 3 mils on the right; ideal is fair rim and face. The C coupling check showed the LPB high 9 mils and left 1 mil, the face was open .5 mil on top and 1 mil on the right; ideal is fair rim and face.

Comanche 3 Opening Alignment Report

Bearing moves were calculated to limit the moves through all turbine sections, especially the HP-IP section. An up move on the generator will be necessary; the following turbine bearing moves are required:

T1	T2	T3	T4	T5	T6
U10	U3	D11	D5	D6	U6
L0	R1	R1	L3	L4	R0

NOTE: Bearing repairs will affect the vertical moves. If repairs are made, TLA can compensate the bearing moves for the repairs.

The ideal, as found and expected closing coupling alignments are shown in Table 1. The as found and expected closing rotor positions are shown in Table 2.

TURBINE STANDARDS AND FOUNDATION

At a request by the customer, the turbine bearing standard elevations were measured to determine if the opening coupling alignment readings suggested that there may have been movement in the turbine foundations. Using a laser, a level plane was set up at the T5 and T6 bearing pedestals, the following table shows the relative positions to that plane at the T1-T4 bearing pedestal locations.

Location at standards	Left	Right
T6 Bearing Centerline	0.000”	0.000”
T5 Bearing Centerline	0.000”	0.000”
T4 Bearing Centerline	+0.022”	+0.016”
T3 Bearing Centerline	+0.158”	+0.151
T2 Bearing Centerline	+0.204”	+0.199”
T1 Bearing Centerline	+0.417”	+0.415”

No previous relative standard elevations were made available for comparison. These positions were compared to the ideal bearing elevations shown in Drawing #N26-R10-8784. In the bearing elevation drawing, T5 and T6 bearings are set to a level line, T4 is to be set high .019”, T3 high .175”, T2 high .240”, and T1 high .481”. Though not directly comparable, the measured standard elevations show that the front and mid standards are lower than the ideal bearing line. Also noteworthy, the relative standard elevations show that most are lower on the right side than on the left. This could possibly indicate the standards have shifted down on the right side.

Long lines were taken through the turbine sections. These were used to show the relative bearing elevations at disassembly. The following table shows the average of three long lines measured at the oil deflector bores using the T5 and T6 oil bores as set points.

Oil Bore Location	Average of Long Lines	Ideal Bearing Elevations
T6 TE Oil Bore	0	0
T5 GE Oil Bore	0	0
T4 TE Oil Bore	Left .005”, High .036”	High .019”
T3 GE Oil Bore	Right .003”, High .097”	High .175”
T2 TE Oil Bore	Right .004”, High .163”	High .240”
T1 GE Oil Bore	Right .003”, High .352”	High .481”

HP-IP COMPONENT ALIGNMENT RECOMMENDATIONS

The as found and proposed alignments are shown in Table 5. The initial HP-IP component moves are shown in Table 3. The initial HP-IP moves are based on the following information:

1. The HP-IP rotor being located at the expected closing rotor positions calculated in the rotor alignment section.
2. The Ideal HP-IP Line shown in Table 6. This line includes unbolted to hot bolted component movements calculated by Tops-on/Tops-off method, as found bore roundness, and rotor deflection.
3. The as found positions of the HP-IP internal components measured with the laser line.

The component centerline pin clearances were measured by Fieldcore/APM. As found centerline clearances and recommended repairs are shown in Table 4. The as found HP-IP component roundness is shown in Table 7.

LPA COMPONENT ALIGNMENT RECOMMENDATIONS

The as found and proposed alignments are shown in Table 10. The initial LPA component moves are shown in Table 8. The initial LPA moves are based on the following information:

1. The LPA rotor being located at the expected closing rotor positions calculated in the rotor alignment section.
2. The Ideal LPA Line shown in Table 11. This line includes unbolted to hot bolted component movements calculated by Tops-on/Tops-off method, as found bore roundness, and rotor deflection.
3. The as found positions of the LPA internal components measured with the laser line.

The component centerline pin clearances were measured by Fieldcore/APM. As found centerline clearances and recommended repairs are shown in Table 9. The as found LPA component roundness is shown in Table 12.

LPB COMPONENT ALIGNMENT RECOMMENDATIONS

The as found and proposed alignments are shown in Table 15. The initial LPB component moves are shown in Table 13. The initial LPB moves are based on the following information:

1. The LPB rotor being located at the expected closing rotor positions calculated in the rotor alignment section.
2. The Ideal LPB Line shown in Table 16. This line includes unbolted to hot bolted component movements calculated by Tops-on/Tops-off method, as found bore roundness, and rotor deflection.
3. The as found positions of the LPB internal components measured with the laser line.

The component centerline pin clearances were measured by Fieldcore/APM. As found centerline clearances and recommended repairs are shown in Table 14. The as found LPB component roundness is shown in Table 17.

Comanche 3 Opening Alignment Report

ALIGNMENT WORK SUMMARY

The following work was done during the initial TLA site visit from March 2 through March 11, 2020.

1. TLA measured the as found positions of the HP-IP, LPA and LPB internal components to a laser line.
2. TLA took tops-on measurements to all HP-IP, LPA and LPB internal components, compared the tops-off and tops-on reading and calculated shell movements at each component location.
3. TLA measured the loose bolt roundness on the HP-IP, LPA and LPB stationary components.
4. TLA measured the positions of the T1 through T6 oil bores to long laser lines.
5. TLA measured the bearing standard elevations relative to a plane at the T5 and T6 bearing bores.

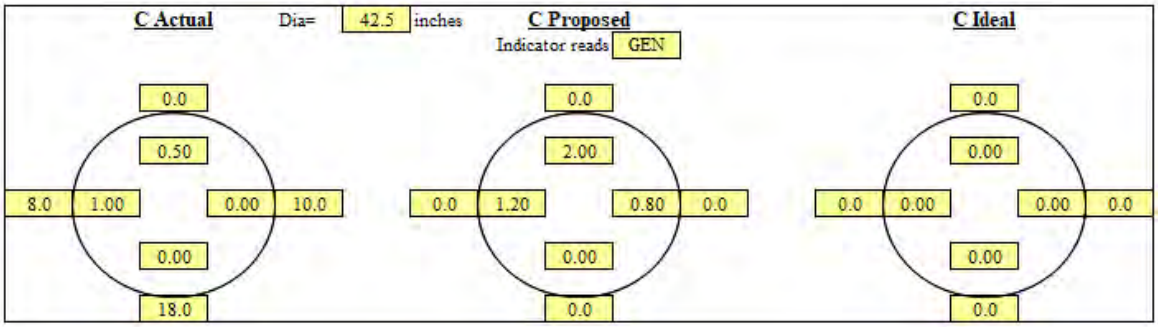
Fieldcore/APM did the following alignment work prior to and during the TLA distortion analysis alignment engineer's site visit:

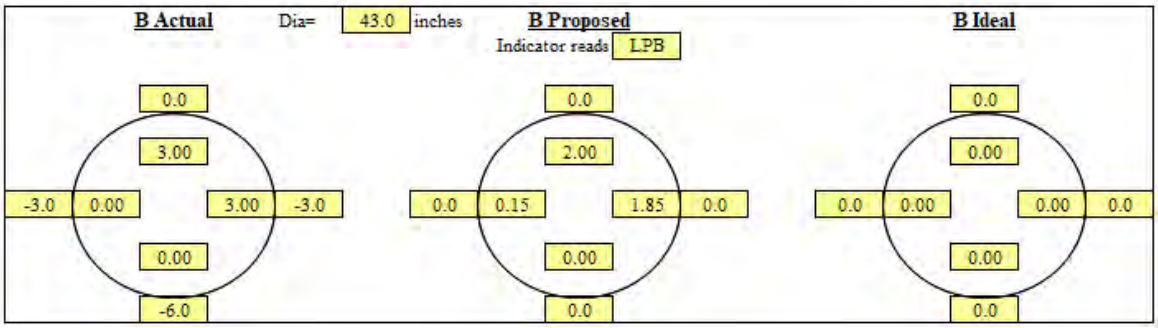
1. Disassembly rotor positions were taken at T1 through T6 oil bores and the N1 through N7 packing casings.
2. Horizontal joint feeler checks were taken on the HP-IP, LPA and LPB outer and inner cylinders..
3. 16 point coupling checks were made at the A, B, and C couplings.
4. The HP-IP, LPA and LPB Inner and Outer Cylinders were installed and bolted down for Tops-On alignment measurements.

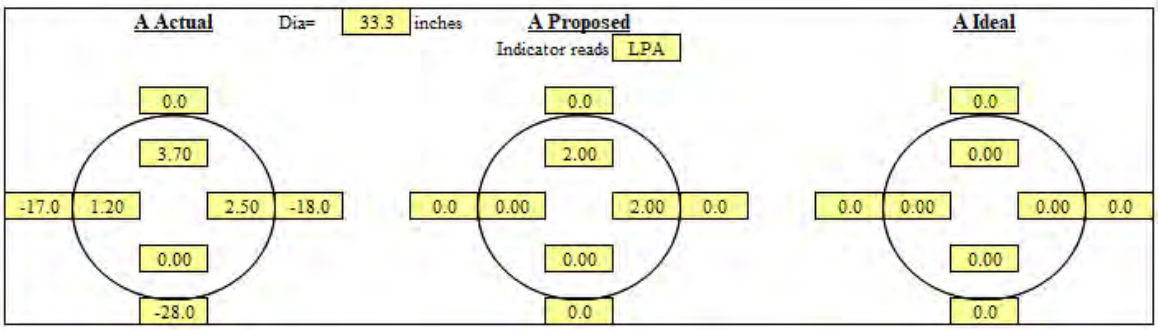
Comanche 3 Opening Alignment Report

TABLE 1

COUPLING ALIGNMENTS







Comanche 3 Opening Alignment Report

TABLE 2

ROTOR POSITIONS

Location	As Found			Expected Closing		
	Left	Bottom	Right	Left	Bottom	Right
T6 TE OB	0		+3	0		+3
		+8	Te+6.5		+14	Te+12.5
T5 GE OB	0		+33	0		+41
		+10	Te-6.5		+9	Te-11.5
T4 TE OB	0		+15	0		+21
		+15	Te+7.5		+13	Te+2.5
T3 GE OB	0		+30	0		+28
		+26	Te+11.0		+14	Te 0.0
T2 TE OB	0		+74	0		+72
		+63	Te+26.0		+65	Te+29.0
T1 GE OB	0		+1	0		+1
		-3	Te-3.5		+7	Te+6.5

TABLE 3

HP-IP INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical
N3 Outer Gland	Left 2, Down 4	No Change	
N3 Inner Gland	Right 10, Down 13	See centerline repair sheet on page 23.	Add .013” shim to the left and right support keys **where they bolt to the gland.**
IP #3 Blade Ring	Right 5, Down 36	No change.	Remove .036” from left and right support keys
IP #2 Blade Ring	Left 7, Down 6	See centerline repair sheet on page 24.	No change.
IP #1 Blade Ring (10th stage)	Not Installed	Prep for closing alignment.	
N2 Inner Casing	Right 2, Up 4	See centerline repair sheet on page 25.	No Change
Nozzle	Right 3, Up 25	No change	Raise .025” or offset machine new seals.
HP #1 Blade Ring	Right 7, Up 5	See centerline repair sheet on page 26.	Add .005” to left and right support keys.
HP #2 Blade Ring	Right 3, Up 23	No change.	Add .023” to left and right support keys.
HP #3 Blade Ring	Right 10, Down 7	See centerline repair sheet on page 27.	Remove .007” from left and right support keys.
Dummy Gland	Right 6, Up 10	See centerline repair sheet on page 28.	Add .010” to left and right support keys.
N1 Inner Gland	Right 3, Down 1	No change.	
N1 Outer Gland	Right 9, Up 9	No change	

TABLE 4

HP-IP AS FOUND CENTERLINE PIN CLEARANCES AND REPAIRS

Component	Centerline Pin Clearance by Side Slip	Repair to the centerline hole or pin **(See data sheets at end of report)**
N3 Inner Gland	.011”	See centerline repair sheet on page 23.
IP #3 Blade Ring	.003”	No Change.
IP #2 Blade Ring	.002”	See centerline repair sheet on page 24.
IP #1 Blade Ring	.029”	Not read, prep for closing alignment.
N2/Nozzle Inner Casing	.015”	See centerline repair sheet on page 25.
HP #1 Blade Ring	.006”	See centerline repair sheet on page 26.
HP #2 Blade Ring	.003”	No Change.
HP #3 Blade Ring	.004”	See centerline repair sheet on page 27.
Dummy Gland	.005”	See centerline repair sheet on page 28.
N1 Inner Gland	.001”	No Change.

TABLE 5
HP-IP AS FOUND AND PROPOSED ALIGNMENT

Component	Ideal Line			As Found Alignment							Proposed Alignment						
				As Found Line at As Found Rotor Positions			Moves Required to Align Components to Ideal Line				Proposed Line at ***New Rotor Positions***			Moves Required to Align Components to Ideal Line			
	L	B	R	L	B	R	H		V		L	B	R	H		V	
T2 OB (set point)				0	63	74					0	65	72	R	1	U	3
N3 G4 GE	0	-6	0	0	-9	7	L	3	D	7	0	-7	5	L	2	D	4
N3 G1/2	0	2	0	18	-6	0	R	9	D	16	19	-2	0	R	10	D	13
15 Disch GE	0	-19	0	10	-1	0	R	5	U	12	11	3	0	R	6	U	16
15	0	61	0	12	28	0	R	6	D	39	14	33	0	R	7	D	35
14	0	63	0	4	20	0	R	2	D	45	6	25	0	R	3	D	41
13 Disch TE	0	-5	0	23	10	0	R	11	U	4	24	15	0	R	12	U	8
13	0	44	0	11	12	0	R	5	D	38	12	17	0	R	6	D	33
12 Disch GE	0	-10	0	0	-11	17	L	9	D	9	0	-7	16	L	8	D	5
12	0	1	0	0	-2	15	L	7	D	11	0	2	14	L	7	D	6
11 Disch TE	0	2	0	0	4	16	L	8	D	6	0	8	14	L	7	D	0
11	0	12	0	0	8	15	L	7	D	12	0	13	13	L	7	D	6
10	0	-47	0	Not installed							Prep for closing alignment.						
N2 G5 GE	0	17	0	1	12	0	R	0	D	6	2	18	0	R	1	U	0
N2 G4 GE	0	18	0	2	18	0	R	1	D	1	3	24	0	R	1	U	6
N2 G1 TE	0	30	0	3	30	0	R	1	D	1	4	37	0	R	2	U	6
Nozzle Seal Bore	0	-25	0	5	-4	0	R	2	U	18	6	3	0	R	3	U	25
2	0	-6	0	13	-7	0	R	6	D	7	13	1	0	R	7	U	0
2 Disch GE	0	-16	0	12	-5	0	R	6	U	4	13	3	0	R	6	U	12
3	0	-14	0	12	-6	0	R	6	U	2	13	2	0	R	6	U	10
3 Disch TE	0	-40	0	12	-13	0	R	6	U	20	13	-5	0	R	6	U	28
4	0	-9	0	5	11	0	R	2	U	18	6	19	0	R	3	U	26
4 Disch GE	0	-13	0	4	10	0	R	2	U	21	5	18	0	R	2	U	28
5	0	-6	0	6	10	0	R	3	U	13	7	18	0	R	3	U	20
6	0	-9	0	5	8	0	R	3	U	14	6	16	0	R	3	U	22
6 Disch TE	0	-9	0	7	8	0	R	3	U	14	7	16	0	R	4	U	22
7	0	42	0	21	32	0	R	11	D	20	22	41	0	R	11	D	12
7 Disch GE	0	-6	0	17	14	0	R	9	U	11	18	23	0	R	9	U	20
8	0	39	0	19	35	0	R	10	D	13	20	44	0	R	10	D	5
9	0	40	0	19	37	0	R	10	D	13	20	45	0	R	10	D	5
9 Disch TE	0	-2	0	18	20	0	R	9	U	13	18	29	0	R	9	U	22
Dummy G3 GE	0	-1	0	12	6	0	R	6	U	0	12	15	0	R	6	U	9
Dummy G1 TE	0	-2	0	12	5	0	R	6	U	1	13	15	0	R	6	U	10
N1 G3/4	0	4	0	5	-4	0	R	2	D	10	5	6	0	R	3	D	1
N1 G1 TE	0	3	0	18	10	0	R	9	D	1	18	20	0	R	9	U	9
T1 OB (set point)				0	-3	1					0	7	1	R	10	D	0

TABLE 6

HP-IP IDEAL LINE

Location	Shell Movement				Round-ness	Rotor Sag	Ther-mal		Ideal Line		
	L	B	R						L	B	R
N3 G4 GE	0	-5	0		-5	-1	5		0	-6	0
N3 G1/2	0	-11	0		7	1	5		0	2	0
15 Disch GE	0	3	0		-29	2	5		0	-19	0
15	0	3	0		51	2	5		0	61	0
14	0	4	0		52	2	5		0	63	0
13 Disch TE	0	8	0		-21	3	5		0	-5	0
13	0	8	0		28	3	5		0	44	0
12 Disch GE	0	13	0		-32	4	5		0	-10	0
12	0	13	0		-21	4	5		0	1	0
11 Disch TE	0	17	0		-24	4	5		0	2	0
11	0	17	0		-14	4	5		0	12	0
10	0	20	0		-76	4	5		0	-47	0
N2 G5 GE	0	-9	0		16	5	5		0	17	0
N2 G4 GE	0	-6	0		14	5	5		0	18	0
N2 G1 TE	0	0	0		20	5	5		0	30	0
Nozzle Seal Bore GE	0	-7	0		-28	5	5		0	-25	0
2	0	-8	0		-8	5	5		0	-6	0
2 Disch GE	0	-8	0		-18	5	5		0	-16	0
3	0	-7	0		-17	5	5		0	-14	0
3 Disch TE	0	-7	0		-43	5	5		0	-40	0
4	0	-10	0		-9	5	5		0	-9	0
4 Disch GE	0	-10	0		-12	4	5		0	-13	0
5	0	-11	0		-4	4	5		0	-6	0
6	0	-12	0		-6	4	5		0	-9	0
6 Disch TE	0	-12	0		-6	4	5		0	-9	0
7	0	-14	0		47	4	5		0	42	0
7 Disch GE	0	-14	0		-1	4	5		0	-6	0
8	0	-12	0		43	3	5		0	39	0
9	0	-10	0		43	2	5		0	40	0
9 Disch TE	0	-10	0		1	2	5		0	-2	0
Dummy G3 GE	0	-9	0		2	1	5		0	-1	0
Dummy G1 TE	0	-8	0		0	1	5		0	-2	0
N1 G3/4	0	-8	0		7	0	5		0	4	0
N1 G1 TE	0	-6	0		5	-1	5		0	3	0

TABLE 7

HP-IP COMPONENT ROUNDNESS

Location	LH Horizontal Diameter	LH Vertical Radius	UH Horizontal Diameter	UH Vertical Radius	Vertical Diameter	Bore Roundness Correction (V-H)/2
N3 G4 GE	21.114	10.550	21.110	10.555	21.105	-0.005
N3 G1/2	22.514	11.263	22.516	11.264	22.527	0.007
15 Disch GE	65.416	32.684	65.434	32.675	65.359	-0.029
15	39.491	19.787	39.499	19.807	39.594	0.051
14	38.707	19.403	38.716	19.407	38.810	0.052
13 Disch TE	60.145	30.059	60.162	30.043	60.102	-0.021
13	38.116	19.077	38.130	19.095	38.172	0.028
12 Disch GE	58.879	29.409	58.888	29.405	58.814	-0.032
12	38.377	19.167	38.367	19.169	38.336	-0.021
11 Disch TE	56.716	28.332	56.703	28.335	56.667	-0.024
11	38.765	19.369	38.746	19.369	38.738	-0.014
10 DischTE	55.570	27.711	55.601	27.708	55.419	-0.076
N2 G5 GE	48.460	24.246	48.456	24.246	48.492	0.016
N2 G4 GE	40.301	20.165	40.294	20.163	40.328	0.014
N2 G1 TE	40.297	20.172	40.291	20.164	40.336	0.020
Nozzle Seal Bore GE	44.327	22.135	44.319	22.136	44.271	-0.028
2	34.105	17.044	34.092	17.044	34.088	-0.008
2 Disch GE	44.507	22.235	44.495	22.237	44.472	-0.018
3	33.973	16.974	33.963	16.965	33.939	-0.017
3 Disch TE	44.964	22.444	44.953	22.435	44.879	-0.043
4	33.951	16.966	33.948	16.966	33.932	-0.009
4 Disch GE	45.325	22.649	45.325	22.653	45.302	-0.012
5	34.106	17.049	34.104	17.049	34.098	-0.004
6	33.987	16.986	33.985	16.990	33.976	-0.006
6 Disch TE	46.601	23.295	46.608	23.294	46.589	-0.006
7	32.209	16.149	32.215	16.154	32.303	0.047
7 Disch GE	47.210	23.606	47.228	23.602	47.208	-0.001
8	32.005	16.044	32.019	16.047	32.091	0.043
9	31.695	15.888	31.709	15.893	31.781	0.043
9 Disch TE	48.841	24.425	48.857	24.418	48.843	0.001
Dummy G2/3	48.462	24.236	48.468	24.231	48.467	0.002
Dummy G1 TE	48.465	24.233	48.467	24.233	48.466	0.000
N1 G3/4	32.633	16.324	32.644	16.323	32.647	0.007
N1 G1 TE	20.505	10.257	20.510	10.257	20.514	0.005

TABLE 8

LPA INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical
N5 Gland	Left 12, Down 19	Packing case must be moved. Unbolt and prep for alignment to laser at closing.	
6 GE	Left 4, Down 1	No change	
5 GE	Left 5, Up 3	No change	
4th-2nd Dual Flow BR	Left 4, Up 9	No change	Add .009” to all 4 support keys.
1st stage Center Flow	Left 9, Up 9	See centerline repair sheet on page 29.	No change (move will be made with Dual Flow BR)
5 TE	Left 2, Down 5	No change	
6 TE	Right 4, Down 5	See centerline repair sheet on page 30.	No change
N4 Gland	Left 8, Down 20	Packing case must be moved. Unbolt and prep for alignment to laser at closing.	

TABLE 9

LPA AS FOUND CENTERLINE PIN CLEARANCES AND REPAIRS

Component	Centerline Pin Clearance by Side Slip	Repair to the centerline hole or pin **(See data sheets at end of report)**
6 GE	.001”	No change
5 GE	.001”	No change
4th-2nd Dual Flow BR	.002”	No Change.
1st stage Center Flow	.006”	See centerline repair sheet on page 29.
5 TE	.001”	No change
6 TE	.012”	See centerline repair sheet on page 30.

TABLE 10

LPA AS FOUND AND PROPOSED ALIGNMENT

Component	Ideal Line			As Found Alignment							Proposed Alignment						
				As Found Line at As Found Rotor Positions			Moves Required to Align Components to Ideal Line				Proposed Line at ***New Rotor Positions***			Moves Required to Align Components to Ideal Line			
	L	B	R	L	B	R	H		V		L	B	R	H		V	
T4 OB (set point)				0	15	15					0	13	21	L	3	D	5
No 5 Gln Gr 5GE	0	9	0	0	4	24	L	12	D	17	0	2	30	L	15	D	22
No 5 Gln Gr 1TE	0	18	0	0	14	13	L	6	D	10	0	11	18	L	9	D	16
6 GE	0	68	0	0	76	4	L	2	U	6	0	71	7	L	4	D	1
5 GE	0	81	0	0	95	8	L	4	U	11	0	90	11	L	5	U	3
4 GE	0	63	0	15	97	0	R	8	U	26	13	88	0	R	6	U	19
3 GE	0	84	0	12	108	0	R	6	U	19	9	99	0	R	5	U	11
2 GE	0	88	0	8	104	0	R	4	U	12	6	95	0	R	3	U	4
1 GE	0	57	0	0	81	12	L	6	U	18	0	74	14	L	7	U	10
1 TE	0	56	0	0	81	20	L	10	U	15	0	73	21	L	11	U	7
2 TE	0	62	0	0	84	18	L	9	U	13	0	77	20	L	10	U	4
3 TE	0	48	0	0	76	14	L	7	U	20	0	68	16	L	8	U	12
4 TE	0	53	0	0	79	25	L	12	U	14	0	71	26	L	13	U	6
5 TE	0	45	0	0	50	3	L	1	U	4	0	42	4	L	2	D	5
6 TE	0	31	0	8	39	0	R	4	U	4	8	29	0	R	4	D	6
No 4 Gln Gr 5GE	0	16	0	0	12	14	L	7	D	10	0	1	12	L	6	D	21
No 4 Gln Gr 1TE	0	6	0	0	8	19	L	10	D	7	0	-3	18	L	9	D	18
T3 OB (set point)				0	26	30					0	14	28	R	1	D	11

TABLE 11

LPA IDEAL LINE

Location	Shell Movement				Round-ness	Rotor Sag		Ideal Line		
	L	B	R					L	B	R
No 5 Gln Gr 5GE	0	0	0		6	3		0	9	0
No 5 Gln Gr 1TE	0	0	0		11	7		0	18	0
6 GE	0	58	0		-5	15		0	68	0
5 GE	0	61	0		4	16		0	81	0
4 GE	0	51	0		-5	17		0	63	0
3 GE	0	50	0		17	17		0	84	0
2 GE	0	48	0		23	17		0	88	0
1 GE	0	41	0		-1	17		0	57	0
1 TE	0	37	0		2	17		0	56	0
2 TE	0	39	0		6	17		0	62	0
3 TE	0	28	0		3	17		0	48	0
4 TE	0	33	0		3	17		0	53	0
5 TE	0	27	0		2	16		0	45	0
6 TE	0	15	0		1	15		0	31	0
No 4 Gln Gr 5GE	0	0	0		9	7		0	16	0
No 4 Gln Gr 1TE	0	0	0		3	3		0	6	0

TABLE 12

LPA COMPONENT ROUNDNESS

Location	LH Horizontal Diameter	LH Vertical Radius	UH Horizontal Diameter	UH Vertical Radius	Vertical Diameter	Bore Roundness Correction (V-H)/2
No 5 Gln Gr 5GE	30.865	15.433	30.857	15.444	30.877	0.006
No 5 Gln Gr 1TE	30.854	15.438	30.857	15.438	30.876	0.011
6 GE	27.484	27.475	27.485	0.000	27.475	-0.005
5 GE	31.811	31.819	31.812	0.000	31.819	0.004
4 GE	59.545	29.769	59.560	29.766	59.535	-0.005
3 GE	60.309	30.169	60.342	30.173	60.342	0.017
2 GE	60.306	30.175	60.325	30.177	60.352	0.023
1 GE	58.277	58.275	58.280	0.000	58.275	-0.001
1 TE	58.276	58.280	58.270	0.000	58.280	0.002
2 TE	60.339	30.173	60.325	30.179	60.352	0.006
3 TE	60.331	30.172	60.321	30.166	60.338	0.003
4 TE	59.541	29.767	59.543	29.779	59.546	0.003
5 TE	31.812	31.815	31.816	0.000	31.815	0.002
6 TE	27.479	27.481	27.485	0.000	27.481	0.001
No 4 Gln Gr 5GE	30.852	15.437	30.857	15.433	30.870	0.009
No 4 Gln Gr 1TE	30.864	15.436	30.856	15.434	30.870	0.003

TABLE 13

LPB INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical
N7 Gland	Left 12, Up 4	If packing is not replaced, no move is required.	
6 GE	Left 5, Up 13	Repair Pin, prep for closing alignment.	Add .013” to left and right support keys.
5 GE	Left 11, Up 11	See centerline repair sheet on page 31.	Add .011” to left and right support keys.
4th-2nd Dual Flow BR	Left 20, Down 4	See centerline repair sheet on page 32.	No change
1st stage Center Flow	Left 24, Down 1	No change	No change
5 TE	Left 9, Up 3	See centerline repair sheet on page 33.	No change
6 TE	Left 4, Down 16	See centerline repair sheet on page 34.	Remove .016” from left and right support keys.
N6 Gland	Left 15, Down 25	Packing case must be moved. Unbolt and prep for alignment to laser at closing.	

TABLE 14

LPB AS FOUND CENTERLINE PIN CLEARANCES AND REPAIRS

Component	Centerline Pin Clearance by Side Slip	Repair to the centerline hole or pin **(See data sheets at end of report)**
6 GE	.020”	Repair pin and prep for closing alignment.
5 GE	.005”	See centerline repair sheet on page 31.
4th-2nd Dual Flow BR	.008”	See centerline repair sheet on page 32.
1st stage Center Flow	.006”	No change
5 TE	.004”	See centerline repair sheet on page 33.
6 TE	.007”	See centerline repair sheet on page 34.

TABLE 15

LPB AS FOUND AND PROPOSED ALIGNMENT

Component	Ideal Line			As Found Alignment							Proposed Alignment						
				As Found Line at As Found Rotor Positions			Moves Required to Align Components to Ideal Line				Proposed Line at ***New Rotor Positions***			Moves Required to Align Components to Ideal Line			
	L	B	R	L	B	R	H		V		L	B	R	H		V	
T6 OB (set point)				0	8	3					0	14	3	L	0	U	6
No 7 Gln Gr 5GE	0	13	0	0	20	26	L	13	D	6	0	25	26	L	13	D	1
No 7 Gln Gr 1TE	0	18	0	0	34	19	L	10	U	6	0	39	20	L	10	U	10
6 GE	0	68	0	0	82	7	L	4	U	10	0	86	10	L	5	U	13
5 GE	0	78	0	0	97	19	L	10	U	9	0	100	22	L	11	U	11
4 GE	0	109	0	0	102	34	L	17	D	23	0	106	37	L	19	D	22
3 GE	0	108	0	0	121	37	L	19	D	5	0	124	41	L	20	D	4
2 GE	0	106	0	0	125	37	L	19	U	1	0	128	41	L	20	U	2
1 GE	0	91	0	0	109	43	L	21	D	3	0	112	46	L	23	D	2
1 TE	0	87	0	0	110	44	L	22	U	1	0	112	48	L	24	U	1
2 TE	0	114	0	0	125	31	L	15	D	5	0	127	35	L	17	D	5
3 TE	0	91	0	0	113	32	L	16	U	6	0	115	36	L	18	U	6
4 TE	0	91	0	0	107	31	L	16	U	0	0	109	36	L	18	D	1
5 TE	0	74	0	0	84	13	L	7	U	4	0	86	18	L	9	U	3
6 TE	0	72	0	0	59	2	L	1	D	14	0	60	8	L	4	D	16
No 6 Gln Gr 5GE	0	16	0	0	7	26	L	13	D	21	0	7	33	L	16	D	25
No 6 Gln Gr 1TE	0	5	0	0	-5	20	L	10	D	21	0	-6	28	L	14	D	25
T5 OB (set point)				0	10	33					0	9	41	L	4	D	5

TABLE 16

LPB IDEAL LINE

Location	Shell Movement				Round-ness	Rotor Sag		Ideal Line		
	L	B	R					L	B	R
No 7 Gln Gr 5GE	0	0	0		10	3		0	13	0
No 7 Gln Gr 1TE	0	0	0		11	7		0	18	0
6 GE	0	50	0		3	15		0	68	0
5 GE	0	65	0		-3	16		0	78	0
4 GE	0	68	0		24	17		0	109	0
3 GE	0	72	0		18	17		0	108	0
2 GE	0	75	0		14	17		0	106	0
1 GE	0	74	0		0	17		0	91	0
1 TE	0	74	0		-4	17		0	87	0
2 TE	0	74	0		23	17		0	114	0
3 TE	0	70	0		4	17		0	91	0
4 TE	0	64	0		10	17		0	91	0
5 TE	0	60	0		-2	16		0	74	0
6 TE	0	55	0		2	15		0	72	0
No 6 Gln Gr 5GE	0	0	0		9	7		0	16	0
No 6 Gln Gr 1TE	0	0	0		2	3		0	5	0

TABLE 17

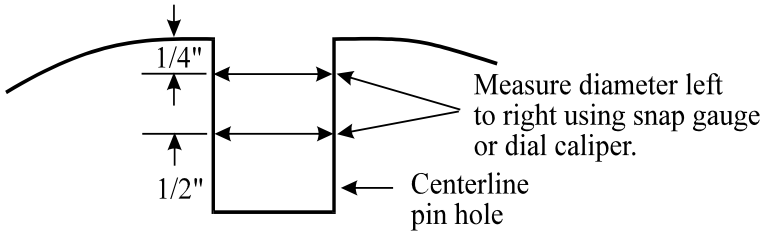
LPB COMPONENT ROUNDNESS

Location	LH Horizontal Diameter	LH Vertical Radius	UH Horizontal Diameter	UH Vertical Radius	Vertical Diameter	Bore Roundness Correction (V-H)/2
No 7 Gln Gr 5GE	30.854	15.437	30.854	15.437	30.874	0.010
No 7 Gln Gr 1TE	30.846	15.438	30.857	15.431	30.869	0.011
6 GE	27.484	27.491	27.484	0.000	27.491	0.003
5 GE	31.816	31.810	31.807	0.000	31.810	-0.003
4 GE	59.538	29.751	59.541	29.835	59.586	0.024
3 GE	60.304	30.161	60.308	30.180	60.341	0.018
2 GE	60.299	30.155	60.291	30.172	60.327	0.014
1 GE	58.265	29.133	58.277	29.132	58.265	0.000
1 TE	58.268	29.134	58.272	29.126	58.260	-0.004
2 TE	60.298	30.170	60.301	30.175	60.345	0.023
3 TE	60.305	30.143	60.304	30.170	60.313	0.004
4 TE	59.542	29.773	59.558	29.789	59.562	0.010
5 TE	31.814	31.810	31.818	0.000	31.810	-0.002
6 TE	27.484	27.489	27.483	0.000	27.489	0.002
No 6 Gln Gr 5GE	30.853	15.437	30.859	15.434	30.871	0.009
No 6 Gln Gr 1TE	30.866	15.434	30.856	15.437	30.871	0.002

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: N3 Inner Gland	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: No Hole **RIGHT SIDE: No Hole**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

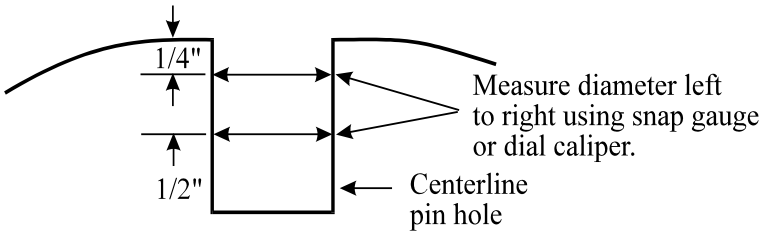
Repair Work Required
LEFT SIDE: Remove 0.010” **RIGHT SIDE: Add 0.018”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: IP #2 Blade Ring	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Add 0.004” **RIGHT SIDE: Remove 0.011”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

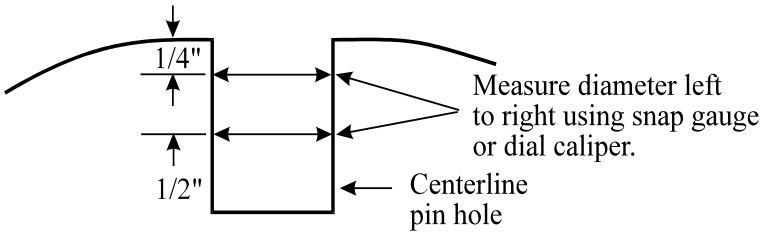
Repair Work Required
LEFT SIDE: Add 0.007” **RIGHT SIDE: Remove 0.008”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: N2 Inner Gland	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Remove 0.003” **RIGHT SIDE: Add 0.007”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

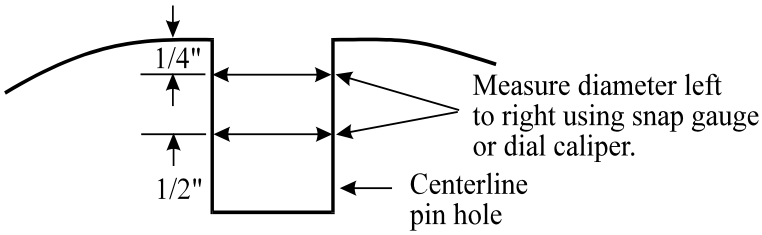
Repair Work Required
LEFT SIDE: No change **RIGHT SIDE: Add 0.010”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: HP #1 Blade Ring	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Remove 0.010” **RIGHT SIDE: Add 0.007”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

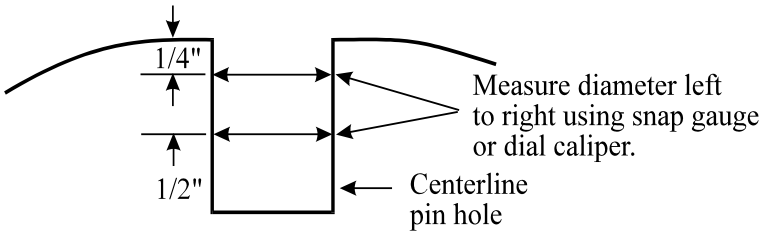
Repair Work Required
LEFT SIDE: Remove 0.007” **RIGHT SIDE: Add 0.010”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: HP #3 Blade Ring	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Remove 0.013” **RIGHT SIDE: Add 0.008”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

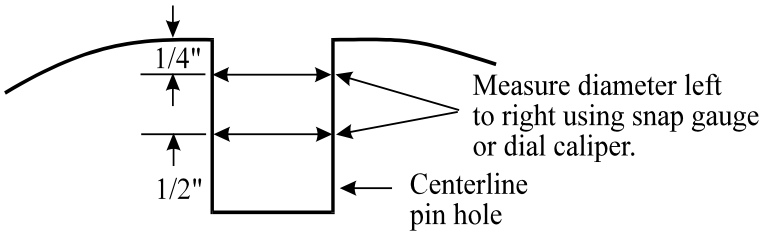
Repair Work Required
LEFT SIDE: Remove 0.010” **RIGHT SIDE: Add 0.011”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: Dummy Gland	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Remove 0.009” **RIGHT SIDE: Add 0.005”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

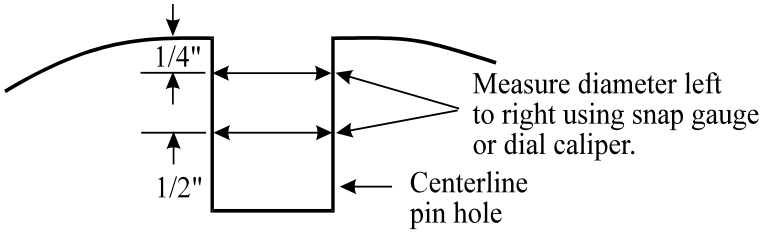
Repair Work Required
LEFT SIDE: Remove 0.006” **RIGHT SIDE: Add 0.008”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPA 1st Stage Center Flow	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Add 0.006”
RIGHT SIDE: Remove 0.009”

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

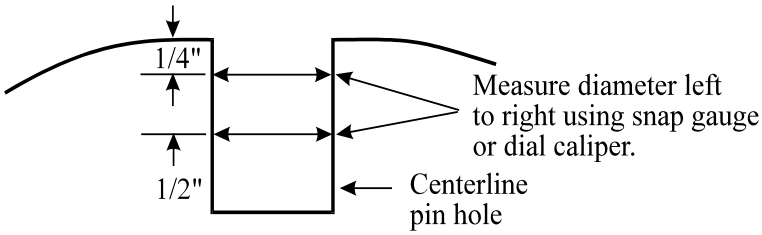
Repair Work Required
LEFT SIDE: Add 0.009”
RIGHT SIDE: Remove 0.006”

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPA 6 TE	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Remove 0.007” **RIGHT SIDE: Add 0.010”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

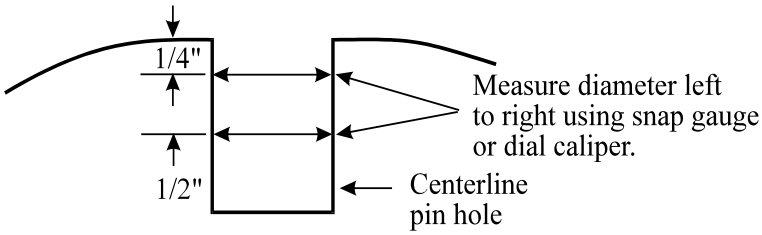
Repair Work Required
LEFT SIDE: Remove 0.004” **RIGHT SIDE: Add 0.013”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPB 5 GE	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Add 0.008” **RIGHT SIDE: Remove 0.012”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

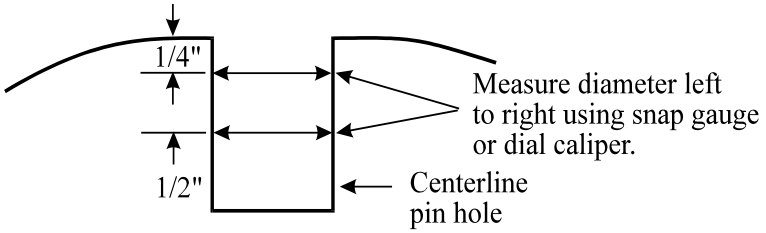
Repair Work Required
LEFT SIDE: Add 0.011” **RIGHT SIDE: Remove 0.009”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPB 4th-2nd Double Flow Blade Ring	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Add 0.017" (TE and GE) RIGHT SIDE: Remove 0.018" (TE and GE)

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

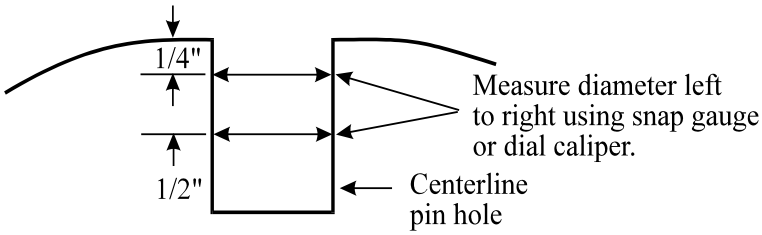
Repair Work Required
LEFT SIDE: Add 0.020" (TE and GE) RIGHT SIDE: Remove 0.015" (TE and GE)

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPB 5 TE	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: Add 0.006” **RIGHT SIDE: Remove 0.011”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

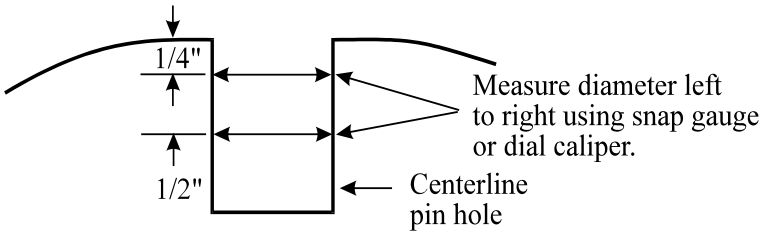
Repair Work Required
LEFT SIDE: Add 0.009” **RIGHT SIDE: Remove 0.008”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE:	COMPONENT: LPB 6 TE	WORK DONE BY:
COMMENTS:		



Note:
1. Measure centerline hole diameter left to right before starting repairs
2. Weld up and grind one side to decrease hole size as called for in "Repair Work Required". Welded area should be about 3/8" wide and 5/8" deep.
3. Grind second side to increase hole diameter as called for in "Repair Work Required"

UPPER CENTERLINE HOLE DIAMETER LEFT to RIGHT

Repair Work Required
LEFT SIDE: No change. **RIGHT SIDE: Remove 0.009”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

LOWER CENTERLINE HOLE DIAMETER LEFT to RIGHT

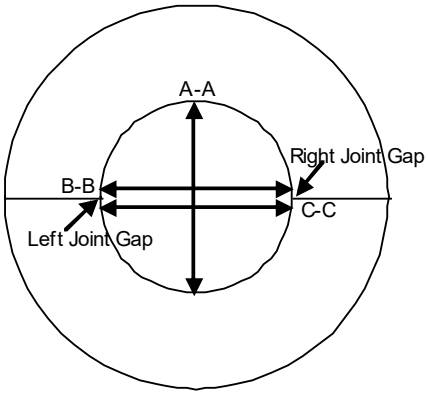
Repair Work Required
LEFT SIDE: Add 0.004” **RIGHT SIDE: Remove 0.006”**

Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Confidential

Comanche 3 2020 Opening Alignment…

TLA LOOSE BOLT - TIGHT BOLT BORE ROUNDNESS



Viewed Looking Downstream

Date _____

Prepared By _____

Unit _____

Component _____

Comments _____

Bolting Condition	Read Point	A-A (vertical)	B-B (upper horizontal)	C-C (lower horizontal)	Left Joint Gap	Right Joint Gap

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

May 1, 2020

To: Mark Cain
Fieldcore

From: R. Scott Doughty
Turbine Laser Alignment, LLC
Cell: (724) 312-9682

Subject: Comanche Unit 3 HP-IP LPA and LPB Closing Component Positions

The as found and expected closing rotor positions are shown in Table 1.

I. HP-IP ALIGNMENT

The HP-IP final component positions are shown Table 2. These positions are relative to the expected final rotor positions at the oil bores as shown in Table 1. The final rotor positions should be within +/-.003" of expected to maintain internal alignment

II. LPA ALIGNMENT

The LPA final component positions are shown Table 3. These positions are relative to the expected final rotor positions at the oil bores as shown in Table 1. The final rotor positions should be within +/-.006" of expected to maintain internal alignment.

III. LPB ALIGNMENT

The LPB final component positions are shown Table 4. These positions are relative to the expected final rotor positions at the oil bores as shown in Table 1. The final rotor positions should be within +/-.006" of expected to maintain internal alignment.

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

TABLE 1
ROTOR POSITIONS

Location	As Found			Expected Closing Uncoupled			Actual Closing		
	Left	Bottom	Right	Left	Bottom	Right	Left	Bottom	Right
T6 OB TE	0	+8	+3 Te+6.5	0	+12	+4 Te+10.0			
T5 OB GE	0	+10	+33 Te-6.5	0	+3	+43 Te-18.5			
T4 OB TE	0	+15	+15 Te+7.5	0	+13	+27 Te-0.5			
T3 OB GE	0	+26	+30 Te+11.0	0	+25	+35 Te+7.5			
T2 OB TE	0	+63	+74 Te+26.0	0	+67	+83 Te+25.5			
T1 OB GE	0	-3	+1 Te-3.5	0	+7	+3 Te+5.5			

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

TABLE 2
HP-IP FINAL COMPONENT POSITIONS COMPARED TO IDEAL

Location	Ideal Laser Line			As Left Laser Line			Position Compared to Ideal	
	Left	Bot	Right	Left	Bot	Right	Horz	Vert
T2 OB TE (set point)	0	67	83	0	67	83		
N3 G4 GE	0	-6	0	0	-8	13	R 6	Hi 9
N3 G1/2	0	2	0	1	-3	0	L 1	Hi 5
15	0	61	0	0	65	1	R 1	Lo 3
14	0	63	0	0	61	5	R 3	Hi 4
13	0	44	0	3	45	0	L 1	Hi 0
12	0	1	0	14	13	0	L 7	Lo 4
11	0	12	0	12	16	0	L 6	Hi 3
10	0	-47	0	4	-41	0	L 2	Lo 4
N2 G5 GE	0	17	0	0	19	13	R 7	Hi 5
N2 G4 GE	0	18	0	0	23	12	R 6	Hi 1
N2 G1 TE	0	30	0	0	32	10	R 5	Hi 3
2	0	-6	0	0	-4	15	R 7	Hi 5
3	0	-14	0	0	-6	16	R 8	Lo 0
4	0	-9	0	0	-2	10	R 5	Lo 3
5	0	-6	0	0	-7	4	R 2	Hi 3
6	0	-9	0	0	-10	0	L 0	Hi 1
7	0	42	0	0	38	3	R 1	Hi 5
8	0	39	0	0	43	4	R 2	Lo 2
9	0	40	0	0	43	4	R 2	Lo 1
Dummy G3 GE	0	-1	0	0	0	5	R 2	Hi 2
Dummy G1 TE	0	-2	0	0	-1	3	R 2	Hi 1
N1 G3/4	0	4	0	2	1	0	L 1	Hi 4
N1 G1 TE	0	3	0	14	18	0	L 7	Lo 8
T1 OB GE (set point)	0	7	3	0	7	3		

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

TABLE 3
LPA FINAL COMPONENT POSITIONS COMPARED TO IDEAL

Location	Ideal Laser Line			As Left Laser Line			Position Compared to Ideal	
	Left	Bot	Right	Left	Bot	Right	Horz	Vert
T4 OB TE (set point)	0	13	27	0	13	27		
No 5 Gland Gr 5GE	0	9	0	9	24	0	L 4	Lo 11
No 5 Gland Gr 1TE	0	18	0	22	36	0	L 11	Lo 7
6 GE	0	68	0	0	68	6	R 3	Hi 4
5 GE	0	81	0	0	93	17	R 8	Lo 4
4 GE	0	63	0	15	79	0	L 7	Lo 9
3 GE	0	84	0	13	90	0	L 7	Lo 0
2 GE	0	88	0	11	84	0	L 6	Hi 9
1 GE	0	57	0	13	70	0	L 6	Lo 6
1 TE	0	56	0	5	60	0	L 3	Lo 1
2 TE	0	62	0	0	63	8	R 4	Hi 4
3 TE	0	48	0	0	67	13	R 7	Lo 12
4 TE	0	53	0	0	57	15	R 8	Hi 3
5 TE	0	45	0	0	52	7	R 3	Lo 5
6 TE	0	31	0	0	46	10	R 5	Lo 10
No 4 Gland Gr 5GE	0	16	0	0	14	18	R 9	Hi 11
No 4 Gland Gr 1TE	0	6	0	0	11	24	R 12	Hi 7
T3 OB GE (set point)	0	25	35	0	25	35		

Comanche 3 2020 closing component …

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

TABLE 4
LPB FINAL COMPONENT POSITIONS COMPARED TO IDEAL

Location	Ideal Laser Line			As Left Laser Line			Position Compared to Ideal	
	Left	Bot	Right	Left	Bot	Right	Horz	Vert
T6 OB TE (set point)	0	12	4	0	12	4		
No 7 Gland Gr 5GE	0	13	0	0	24	25	R 13	Hi 2
No 7 Gland Gr 1TE	0	18	0	0	35	19	R 10	Lo 7
6 GE	0	68	0	6	70	0	L 3	Hi 1
5 GE	0	78	0	0	89	13	R 6	Lo 4
4 GE	0	109	0	0	99	5	R 2	Hi 13
3 GE	0	108	0	0	114	10	R 5	Lo 2
2 GE	0	106	0	0	111	2	R 1	Lo 4
1 GE	0	91	0	0	107	14	R 7	Lo 8
1 TE	0	87	0	0	105	16	R 8	Lo 10
2 TE	0	114	0	0	115	3	R 1	Hi 1
3 TE	0	91	0	0	106	5	R 3	Lo 13
4 TE	0	91	0	0	100	5	R 2	Lo 6
5 TE	0	74	0	8	70	0	L 4	Hi 8
6 TE	0	72	0	12	88	0	L 6	Lo 9
No 6 Gland Gr 5GE	0	16	0	0	29	20	R 10	Lo 2
No 6 Gland Gr 1TE	0	5	0	0	18	17	R 9	Lo 4
T5 OB GE (set point)	0	3	43	0	3	43		