Exhibit G-2

GE Power Power Service Infidential

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



GE Power Power Service Infidential

5 Quality Checkpoint (QCP)

5.1 Attachments

See content below.



Acel Energy		Turbine Se	Turbine Type: Steam Turbine Serial Number: Name Out	65	50# #08	
Note 1. Edd Common Push Commodute and size Alf a posted point or not distributed during a size of posted		0.	QCP Revision: Rev 4 3/17/2020	7/2020		
set a Click from to actify collect well-bollow methods and set, optimized Quality Control Point		GE Field Enginger	XCEL WITNESS (if	Reference	Commente	Hold point/
Tosk	Verification Method	Initial Date	Initial Date	Documents		witness point
Misubish Turpine						
	Document Review				Open packings, check quantities, and paperwork	I
Tool container on site	Visual Inspection					
All Special tools on site Verify setup of laydown area	Visual Inspection			Laydown Plan	Team review by all parties	**
Verify agreement on FME plan	Document Review			FME plan	parties (GE, subcontractors and customer) - establish a list of authorized persons	I
Walkdown and verify LOTO (Verify application of Safety grounds on Generator line side.) Browner All applicable Field Provedues & referred marken for unit and outcope scape specifies.	Document Review			OneGE Safety Plan	GS	ı
Permit released - Customer handover	Document Review				SE to perform training /	=
Establish dean conditions (FME) - Zone 2	Visual Inspection			FME plan	induction to authorized	x
Demobilization/ Maye off sits	Visual Inspertion			OneGE Safety Plan		
Check packing of Tool container	Visual Inspection					W
All Rented Material returned	Visual Inspection					**
Verify Site & Equipment Are Orderly	Visual Inspection					H
HIP Disassembly		1100				
Tight-Joint gap readings prior to HP outer cylinder removal	Review/Validate data sheets Review/Validate data sheets			TC4F-36-001		
Tight- Joint gap readings prior to HP inner cylinder cover removal	Review/Validate data sheets	3/4/20		TC4F-36-002		
Loose- Joint gap readings prior to HP inner cylinder cover removal	Review/Volidate data sheets	3/4/20		TC4F-36-002		
Loose- Joint gap readings prior to IP inner cylinder cover removal	Review/Validate data sheets	3/5/20 10		TC4F-36-003		
Tight- Joint gap readings prior to N2 Packing Casing cover removal	Review/Volidate data sheets	15/10 TH		TC4F-36-004		
Loose- Joint gap readings prior to HP inner cylinder cover removal	Review/Volidate data sheets	3/3/20		TC4F-36-005		
As Found differential runout of the HIP turbine to LPA coupling halves	Review/Volidate data sheets			D306307		
Opening HP/LP Coupling Alignment	Review/Volidate data sheets	56		0306301		W
Opening HP rotor "Thrust Bump" - SEM, L & k	Review/Validate data sheets	2/3/20		TC4F-36-005		W
Measure thrust bearing locating mechanism position and screw heights	Review/Validate data sheets	A 07/1-1/2		IR2WH2030		
Check thrust bearing squarness	Review/Validate data sheets	Not bonde Diensen by		IR2WH2032	3004	W
As found blode ring drop checks	Review/Validate data sheets	7/15/20 M				
Install Lower Half Turbine Casing FME Bladders	Witness Completion of Task	7/(120 W				
Evaluate conditions of existing diaphragm centering pins and correct as necessary. Coupling both holes and boths shall be dimensionally analyzed	Review/Validate data sheets	A 02/11/2		0306305		
The T-1 and T-2 journal bearings will be ultrasonic checked for babbit band. The T-1 and T-2 journal bearings classrooms will be deported.	Review/Validate data sheets	2/12/20		R2WH2033		
Inspect and determine the condition and clearances of T1 and T2 oil deflectors. The oil deflector should be retrocthed; the measured plagrance secents 1-1/2 times the design clearance.	Review/Validate data sheets	That's		0309301		
Record HPIP rotor journal dimensions.	Review/Validate data sheets			D306103		
Measure thrust bearing stack and compare to bump check clearance	Review/Validate data sheets	orhith 12		20260£0		
Inspect stage and shart packing to determine physical condition and clearances. Perform tops on/tops off diaphraam alianment. Final desired settings to be provided by laser.	Visual veritication	STATE OF		0300040		
alignment specialist.	Review/vollogle data sheets	311/20 W		200000		
Measure internal component drops and radial positions prior to moving components	Review/Validate data sheets	3/12/10		100000000000000000000000000000000000000		

	Quality Control Point		GE Field Engineer	XCEL WITNESS (if	Reference	Comments	Hold point/
	osk Doganisti.	Verification Method	Initial Date	itial	Documents		witness poi
March Visual verification Visual verif	MFT Clandinacs Natification Print to MP Inner Cylinder Base Installation	Visual Verification	Octobs Mi	5/12/2			BNLIM 15.3X
March Visual Intelligation Was Julian	MEJ Cleanliness Vertication Prior to CARDET HALF TPTALET COSINA TASTALISTS	Visual Verification	S 557.3	ナングイン			XCEL WITNE
### Visual Intelligencian Vi	ME/ Cleaniness Verfication Prior to Lower Fluid 12 Faceking Cost New York	Visual Verification	W Shalo	5/11/2			XCEL WITNE
Visual Verification	ME/ Cleanliness Verification Prior to Lower Half Blade Ring, Dummy Ring, and Gland Install.	Visual Verification	Da 5/1420	5/12			XCEL WITNE
	erify Packing Orientation Prior to Final HP Rator Installation	Visual Verification	NA NA	NA			XCEL WITH
Recinos/Validates data albeets	ME/ Cleanliness Verification Prior to Rotar Installation	Visual Verification	W Staylor	5/23			XCEL WITNE
Recincul Volidates data sheets 130 1	pray rotor with developer in seal areas and rotate to check for contact	Visual Ventication	CM SILIZO		2001		
Receive/Middlett data sheets Receiv	at all disobrane don chacks	Review/volidate data sheets	College Mc		0207202		
### Review/Noticited data sheets 1,20,12,2,2,3,3,4,2,2,3,4,2,3,4,4,4,4,4,4,4,4,	erify Support Key Clearance Data Sheet is Complete Prior to U/H Installation	Review/Validate data sheets	S/16/20		IR2WH0525, 0526		
State Stat	losing HP rator float check determine limiting component forward and aft	the Control of Late and American	Callass M		IR2WH1528		
Secretary Secr	ME/ Cleonliness Verification Prior to Upper Half Inner Blade Ring, Dummy Ring, and Gland	neview// volidate dam stress	The State	1/2	TENSUATE		
Brid Check 100	staliation	AIRDOL KELLICOURT	Store M	5/6			XCECANIIA
### Review/Validate data sheets 120/20 12/4 1	P Inner Cylinder horizontal joint boiting tightened per OEM instruction	Ring check	02/02/5	2/25	Dwg IWE-N26-10M-776	2	XCEL WITN
### Part	2 Packing Cosing horizontal joint bolting tightened per OEM instruction	Ring check	ozigiće //	5/24	Dwg IWE-N26-10M-776	12	XCEL WITH
### STALL ### STALL ### STALL #### STALL ###################################	able hole beginned Joint Bound Lightened per Cern instruction	King check	State /	27/5	TOVE 3E ONS the LOW	K	XCEL WIN
## Sinc check ##	ME/ Cleanliness Verification Prior to Upper Half Outer Cylinder Cover Installation	Visual Verification	2/28/20	5/28	100 000 000 000 000 000 000 000 000 000		XCEL WITH
Sinc check CAM Signar	ME/ Cleanliness Verification of Steam Inlet Piping Prior to HP Outer Cylinder Cover Installation	Visual Verification	n .				XCEL WITH
Biria check Cr Silatus Silat	Iter Cylinder harizontal joint boiling tightened per OFM instruction	Ring chack	5/29	20/20	Dwg IWE-N26-10M-776	2	XTE WITH
Review/Volidate data sheets	ain Steam Inlet Piping flange bolting tightened per OEM instruction	Ring check	5/30	200	Dwg 05310-1001		XCEL WITH
Review/Volidate data sheets	heat Inlet Piping flange bolting tightened per OEM instruction	Ring check	4	5/6	Dwg 05320-1001		XCEL WITN
Review/Volidate data sheets	It bolt gop check of Steam injet Flanges - Gasket Compression	Review/Volidate data sheets	0075		IRZWH6008		
Review/Volidate data sheets	form twist/fill check of begrings to journals	Review/Volidate data sheets	8/25		D309102	THE THE BALL	Det roce
Review/Volidate data sheets 1/3/120 1/3/	sing HP/LP Coupling Alignment	Review/Validate data sheets	(1) - W		D306301	Come of the come	XCEL WITA
Review/Volidate data sheets	sing HP Turbine Oil & Gland Bores	Review/Validate data sheets	Z/kz/g		0306105		
Review/Volidate data sheets	Internation proof of the HIP turbing to LPA complian beloas	Ring check	2/04/2		0306307		1
Review/Volidate data sheets	sing Axial Reference Readings Obtained Once Couplings are Assembled	Review/Validate data sheets	5/25/20		TC4F-36-005		
Review/Volidate data sheets	form pinch check on T1 & T2 bearings	Review/Validate data sheets	5/28/20		D309101		
Review/Validate data sheets 1/3/120	Disassembly						
Review/Volidate data sheets 1/30/L0 3/4/20 1/47-36-006	er Casing Tight- Joint gap readings	Review/Validate data sheets	1/30/20 1/1		TC4F-36-006		
Review/Volidate data sheets 1/3/120 3/4/	er Casing Loose-Joint gap readings	Review/Validate data sheets	S STORY		TCAE-36-006		
Review/Volidate data sheets 130/10 1 2006307 1 2007301 2 2 2 2 2 2 2 2 2	of Flow Blade Ring Loose-Joint gop readings		2/4/2		TC4F-36-007		1
Review/Volidate data sheets 130/10	ening LP axial rator reference readings prior to thrust bearing/ coupling disassembly	Review/Volidate data sheets	2/3/20 30		3	Reference Dimension	
Review/Validate data sheets 130/10	Found differential runout of the coupling halves	Review/Validate data sheets	1/20/20 64			Not measured	
Review/Volidate data sheets	ering LPA/LP8 Coupling Alignment	Review/Validate data sheets	1/30/20		0306301		
Review/Volidate data sheets	ening Croveries (or Cooping Anglines),	Review/Validate data sheets	13010		D306105		
Witness complete tosk	pening LP blade path clearances	Review/Validate data sheets	WHALLS ON		00, 3001 &	12	
ing. Review/Volidate data sheets ALIAZO ANIZO MINIZO MI	itall Lower Half Turbine Casing FME Planking/ Bladders	Witness complete tosk	1/30/10 7/				XCel With
Review/Volidate data sheets Review/Volidate data sheets Review/Volidate data sheets Visual Verification Review/Volidate data sheets 4/11/2* Review/Volidate data sheets	phrogm fits, and a visual inspection completed. Evidence of steam cutting, erosion, pitting,	Witness complete task					
Review/Volidate data sheets A/11/10 Review/Volidate data sheets Visual Verification Review/Volidate data sheets A/16/20 Review/Volidate data sheets Review/Volidate data sheets Review/Volidate data sheets A/16/20 A/16/20	Found inner component drop checks	Review/Validate data sheets	2/4/20		D307202		1
Review/Volidate data streets Visual Verification Review/Volidate data streets A/15/20 Visual Verification	aluate conditions of existing diaphragm centering pins and correct as necessary.	Review/Validate data sheets	2/12/20 24		D307210		
Review/Volidate data sheets 4/18/20 7/	upling balt holes and bolts shall be dimensionally analyzed	Review/Validate data sheets	2/11/20		D306305		
Rector Review/Volidate data sheets 2/16/20 3/ Review/Volidate data sheets 3/15/20 3/ Review/Volidate data sheets 3/15/20 3/ Visual Verification Tiser Review/Volidate data sheets 3/15/20 3/ Review/Volidate data she	14,15,16 journal bearings will be utagsonic checked for paper, pond.	Review/Violidate data sheets	+		0309101		1
Review/Volladate data sheets A/19/20 7/ Review/Volladate data sheets A/19/20 7/ Review/Volladate data sheets A/19/20 7/ Ster Review/Volladate data sheets A/19/20 7/ Ster Review/Volladate data sheets A/19/20 7/ Ster Review/Volladate data sheets A/19/20 7/	spect and determine the condition and clearances of T3-6 & TG oil deflectors. The oil deflector	Posicion Molidate Apra choose	-		10200201		
Review/Volidate data sheets ALIAZO X Review/Volidate data sheets ALIAZO X Visual Verification ALIAZO X Seer Review/Volidate data sheets ALIAZO X Opiniow/Volidate data sheets ALIAZO X	ould be retoothed if the measured clearance exceeds 1-1/2 times the design clearance.	Monte and a company of court of the court of	-		Codesor		
Review/Volladute data sheets 3/15/25 \$7	easure clearances and NDE oil seal rings	Review/Volidate data sheets	M. GOLLIN		D309104		
Review/Volidate data sheets 3/M/20 3/	spect diaphrarm and shaft packing to determine physical condition and clearances.	Visual Verification	3/17/2		D305343		
	rform tops on/tops off diaphragm alignment. Final desired settings to be provided by laser	Review/Volidate data sheets	3/1/20				
	Montria internal component drops and radial positions prior to appear components	Social Molidate data shoots	1/2/3C		95055020		

Quality Control Point		GE Field Engineer	ngineer +	ACEL WITNESS (If	Reference	Comments	Hold point/
Tosk	Verification Method	Initial	Date	Initial Date	Documents		witness point
LP Reassembly							
As Built inner component drop checks	Review/Validate data sheets	W	H128120		0307202		
Visually Inspect New L-1's and Loshing Lugs	Visual Verification	NP	N. P.	NA			Take IMI Ass
Spray rotors with developer in seal areas and rotate to check for contact	Visual Verification	ZZ	02/2/3			TAIL OF CAMPAIN	Carlo Calming and Anna
FME/ Cleanliness Verification- LPA Lower Half Prior to LP Rotor Installation	Visual Verification	1	5/5/20	5/8			XCEL WITNESS
FME/ Cleanliness Verification- LPB Lower Half Prior to LP Rator Installation	Visual Verification	K	5/1/20	3/10	-		XCEL WITNESS
As Left inner component drop chartes	Review/Validate data sheets		01/8/10		0307202 0307202	2012	
As left elevation support block degrances	Review/Validate data sheets	17.	5/4/20		0001206		
Closing LP rotor float check - note component limiting travel in either direction	Review/Validate data sheets	A.	\$/2/20		IR2WH1526		
Closing LPA/LPB & LPB/Generator Coupling Alignment	Review/Validate data sheets	N	5/16/20	Į,	0306301		
Closing LP Turbine Oil Bores	Review/Validate data sheets	Z	5/6/20				
Closing Axial Reference Readings Obtained Once Couplings are Assembled	Review/Validate data sheets	N. A.	5/28/20				Consider to
As Left differential runout of the HIP/LPA, LPA/LPB & LPB/Generator coupling halves.	Review/Validate data sheets	N. C.	5/26/2			LEB/LPB at masswed turn	week tus
LPA FME/ Cleanliness Ventication- Prior to Upper Halt Components Installation	Visual Vertication	14	22/01/9	5/11	LPA		XCEL WITNESS
LPB FME/ Cleaniness vernication- Prior to Upper Hair Components installation	VISUAL VERNICOTION	M	0/10/10	KITA	OUR BAN OF		XCEL WILNESS
LEAFTHE Cleaniness vertication. Prior to boiling Access Cover installation	Visual Vernicotion	*	Solo	10014	7/000 CPA		XCEL WILNESS
LPA FME/ Cleanliness Verification- Condenser- Prior to LP Outer Cylinder Cover Installation	Visual Verification	AIA		6110	LPA	Charled by Charles	TOTAL WITNESS
LPB FME/ Cleanliness Verification- Condenser- Prior to LP Outer Cylinder Cover Installation	Visual Verification	Z)	2		LPB.	Checked by Cushin XCEL WITNESS	XCEL WITNESS
LP-A Blode chacks							
Visual Inspection Completed	Visual inspection	A	E/6/20				
L-IGE							
Visual Inspection Completed	Visual Inspection	B	6/5/20				
LP-8 Blade checks	等 名 一 即 必 是 一 一 一 作						
Visual Inspection Completed	Visual Inspertion	200	20113				
1-1 & 1-06E	* Social Speciols	11	N. W. C.				
Visual Inspection Completed	Visual Inspection	Ø	5/6/20				
Front Standard Checks							
Install FME Blodder in open holes	Visual Inspection	1/30/20	B				
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	E.	3/28/2	3/18	3		XCEL WITNESS
Measure #1 bearing pinch to strongback	Review/Validate data sheets	14	5//28//20		D309101		
Remove FME Bladders from open holes	Visual Inspection	3	Of harles				
Drior	Witness completion of task	CM	3/29/20	ST17/6	169		XCELWITNESS
#2 Bearing Pedestal							
Install FME Bladder in open holes	Visual Inspection	1/26/20	W				
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual inspection	C.M.	3/20/20	3/2/			XCEL WITNESS
Measure #2 bearing pinch/dearance to pedestol cover	Review/Volidate data sheets	W.			0309101		
FME / Cleanliness - Just prior to cover installation	Witness completion of task	1	5/20120	6/29			XCEL WITNESS
#3 Bearing Pedestal	The read contribution of the	-		160			A Physical Physical Property of
Install FME Blodder in open holes	Visual inspection	02/84	M				
Measure #3 bearing alphorit pag contact - 100% on injet 75% over entire surface	Review/Volidate data sheets	2000	K / 20/2	216	0309101		XCEL WILVESS
Remove FME Blodder from open holes	Visual Inspection	200	7/29/20				
FME / Cleanliness - Just prior to cover installation	Witness completion of task	M	,	52/3	^		XCEL WITNESS
#4 Bearing Pedestal				/-			
Install FME Bladder in open holes	Visual Inspection	1/27/20	V	2			
Measure #A beging degrange to pedestal cover entire surface	Visual Inspection	313630	30	200			XCEL WIINESS
Remove FME Blodder from ones hales	Weview/Volidate data sheets	2	2/21/20		1016050		
FME / Cleanliness - Just prior to cover installation	Witness completion of task	4	3/2/16	25/7			XCEL WITNESS
The Contract of the Contract o	A CONTRACTOR CONTRACTOR CONTRACTOR	1114	21636	310			

Quality Control Point		Of See Field Engineer	Engineer	XCEL WITNESS applicable)	WITNESS (if plicable)	Reference	Comments	Hold point/
Task	Verification Method	Initial	Date	initial	Dote	Comments		Mind ceaning
#5 Bearing Pedestal								
Install FME Bladder in open holes	Visual Inspection	122/20	V					
Check bearing support pad contact - 100% oil inlet 75% over entire surface	Visual Inspection	147.	8/24/20		3/200			XCEL WITNESS
Measure #5 bearing clearance to pedestal cover	Review/Validate data sheets	7	5/24/25		1	0309101		
Remove FME Bladder from open hales	Visual Inspection	W	5/24/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	W	5/24/20		200	HH-Additi	NOT OUS THE - Additional Sign-off NA XCEL WIT	XCEL WITNESS
#6 Bearing Pedestal						The second second		
Install FME Bladder in open hales	Visual Inspection	1/22/20	N/					
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	27	5/28/20		The second second	D309101		
Remove FME Bladder from open holes	Visual Inspection	X	5/28/20					
FME / Cleanliness - Just prior to cover installation	Witness completion of task	M	5/28/20					XCEL WITNESS
EHC tank cleanliness		K	5/6/20		5/6/29			
Lube Oil Tank Cleanliness		K	5/1/20		5/11/2		,	
		-						

Quality Control Point		Or Field Engineer	opplicable)	Veneration	Comments	The point
Tosk	Verification Method	Initial Date	Initial Date	Documents		witness point
Disassembly- Exciter						
Remove protection covers, Install FME and DOCUMENT (FME Log)	Visual Inspection	A 02/32/1				
Take clearances and remove air deflectors Take clearances and remove brush ripaina	Review/Validate data sheets Visual Inspection	12/20		AL93815		
Measure steady rest bearing preload	Review/Validate data sheets	1/2/20		0306107	Inboard/outboard	
Disassembly- CE & TE		-			peoring intout	
Disconnect bearing instrumentation	Visual Inspection	1/2 0x/0E/1				-2
Record opening oil deflectors diapriment. Record Rotor Position (Dil Bore) As Found	Review/Validate data sheets	(A) 0210E)		0309302		
Measure bearing bracket vertical step at outer oil deflector face	Review/Volidate data sheets	2/12/20 80		TC4F-36-00		
Measure top bearing shell alegrance (to top post) Verify H2 seal ring freedom of mayement	Witness complete took	A. 30/2/12		D309(01		
Check top bearing clearances to rotar journal with lead wire	Review/Volidate data sheets	cipi m XX		101100		
Establish clean conditions (install FME & record) - Zone 1	Visual Inspection	20 OCHIT				
Remove U/H bearing bracket and associated hardware (install FME & DOCUMENT)	Visual Inspection	2/14/20		COEOUE		
Remove upper hydrogen seal brackets and measure hydrogen seal squareness to rotar	Review/Validate data sheets	2//5/20 0		TC4F-36-007		
Remove hydrogen seals.	Visual Inspection	2/15/20 7				
Measure gas gap bottle degrances and remove gas gap battles - CE only Measure blade to clearances - TE ank	Review/Validate data sheets	A COLLEGE		TC4F-36-010	CE only	
Remove blower shroud segments and rotating blower blodes.	Visual - Confirm part marking or tagging	2/18/10		101 00000	ir with	
Clean and Inspect- CE & TE	Vicual Inspertion	No Alleria				
Clean & Visually inspect fan blades and bolts - NDE	Visual Inspection	And And			TEonly	
Check gland sed ring flatness, thickness, diameter, hydrogen sed bracket groove parallelism	Visual Inspection	3/11/20 77		TC4F-36-008		
Measure H2 seal bracket inner oil deflector clearances	Review/Validate data sheets	2/28/20		D309301		
Clean & visually inspect retaining rings - NDE	Visual Inspection	A milk			3-Angles Phosed Array	May
Verify cleanliness of generator installing Field	Visual Inspection	TICK W	3/13/20		May May	XCEL WITNESS
nstall and measure gas gop baffle clearances.	Review/Validate data sheets	of the		TC4F-36-010		
Verify that all blower blade locks are secured.	Visual Verification	SAME OF		1047-35-009		ACE WIT
Record H2 Seal bracket inner oil deflector clearances (Alignment to rotar)	Review/Validate data sheets	4/4/20		D309302		SCONING TOWN
Re-install U/H Bearing & Record Clearances	Review/Validate data sheets	dulizits //			Lead wire to Journal	
install lower half hydrogen seal brackets and verify that gasket is not damaged install hydrogen seal rings and measure squareness to the rotor	Visual Verification	Odhla M				
nstall upper half hydrogen seal brocket and verify that gasket is not damaged	Visual Verification	W 41.170				
Perform classout inspection of states frome prior to installation of CE upper begring procket	Visual Vertication	100	27/2			XCEL WITNESS
Record Rotor Positions (Oil Bore) As Left	Visual Inspection	September 198	mit	D306lo5		MCCL WIT
Record closing endshileld vertical offset at outer oil deflector face	Review/Validate data sheets	Mr dishie		C4F-X-022		
Perform a 500-volt one minute insulation test on the hydrogen seal casing	Megger check	SKIN IN		The second		XCEL APPROVAL
Perform a 500 volt one minute insulation test on T-8 Bearing periodically during assembly	Medger check	41 4/3/20				XCEL APPROVA
Perform a 500 volt one minute insulation test on T-9 Bearing periodically during assembly	Megger check	100 5/25/20	50.17			XCEL APPROVA
Record closing oil deflectors alignment	Review/Validate data sheets	other the		7.05.1050		
Pump seolant lend-shield U/H)	Visual Inspection	1/8/20				
Reassembly- Exciter	Victor II Incomplian	W 12 1				
install and validate clearances for air deflectors	Review/Validate data sheets	5/20/20		AL93815		
Measure steady rest bearing preload	Review/Validate data sheets	The Shade		D306107	Inboard/outboard	
Install and adjust brush rigging and Record	Visual Inspection	AN AN	2.5	AL93815	Tocales on Customer	Congo
Reassembly- General				THE REAL PROPERTY.		
Remove oil supply blanks (FME Covers and Barriers DOCUMENT)	Visual Inspection			TOTAL STORY		
Verify electrical re-connections (flexible links, etc.)	Visual Inspection	200 Mg	AN	10-16-30-011	TOTAL OF THE CHARLES THE SECOND	XLEL APPROVA
Vocin that skip one contract is intert	Vis. I	The whole				
	T TOWN					

Quality Control Point Task Throttle Valve checks	Verification Method	Of Superior Engineer Initial Date	Date Initial Dote	Reference Documents	Comments
Throttle Volve - Left Side					
Measure and record bonnet gaps Install FME line Bladder	Review/Validate data sheets Visual Inspection	14	24/10	TC4F-36-014	
Valve Stem Inspection- TIR, diameters	Review/Validate data sheets	20 21	25/20	TC4F-36-013	
Measure and record valve travels and pilot valve lift	Review/Validate data sheets	N. S.	(8/2)	TC4F-36-012	200
Pilot Valve to Disk Contact Checks (100%)	Photographs Photographs	*	5/5	IK2WH35Z/	WALC VOOLGEN
Stem to Main Valve Nut Backseat Contact (100%)	Photographs	3	5/20		-
Main Plug Nut to Bushing Bock Seat Contact Check (100%)	Photographs	S M	20		
Crosshead to Upper Bushing Seat Contact Check (100%)	Photographs	W 3	6/20		
41	Photographs	7	112	0	Ī
Remove FME inc Bindder	Complete inspection/cneckist iorm	25	13/10		
FME / Cleanliness - Just prior to valve installation	Witness completion of tosk	The same	1/20		
Measure and record bonnet gaps-Gosket compression	Review/Validate data sheets	13	170	TC4F-36-014	
verify that leakoff line flanges are square	Review/Validate data sheets	4	5/17/20	TC4F-36-021	
Throttle Valve - Right Side		,			
Medsure and record bonnet gaps	Review/Validate data sheets	ž 71	X/3/20	TC4F-36-014	
Valve Stem Inspection. TIR diameters	Visual Inspection	1 1 1	02/0	TC4F-36-013	
Measure and record valve travels and pilot valve lift	Review/Volidate data sheets	4 4	(8)20	TC4F-36-012	
Measure and record valve stem bushing clearance	Review/Validate data sheets	70 72	126/20		Replaced
Pilot Valve to Disk Contact Checks (100%)	Photographs	a A	16/20		
Main Plan Nat to Bushing Back Sept Contact Check (100%)	Photographs	3	A CONTRACTOR OF THE PARTY OF TH		
Crosshead to Upper Bushing Seat Contact Check (100%)	Photographs	200	7,5	1	
Main Disk to Seat Contact Check	Photographs	N. Y.	1/4	42/	
Remove FME ine Blodder	Visual Inspection	The same of	11/20		
FME / Cleanliness - Just prior to valve installation	Witness completion of task	200	5/1		
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	W S	7/10	TC4F-36-014	
Governor Volves (GV) checks	Review/yoliogte goto sneets	, C	5/44/20	TC4F-3B-9ZL	
Governor Valve #1			to the		
Measure and record bonnet gaps	Review/Volidate data sheets	No.	3/10	TC4F-36-014	
Valve Stem Inspection-TIR, diameters	Review/Validate data sheets	***************************************	1200 1200 1200 1200 1200 1200 1200 1200	TC4F-36-015	
Measure and record pilot valve lift	Review/Validate data sheets	77 21	32/80	IR2WH3540	
ishing clearance	Review/Validate data sheets	74 2	16/20	IR2WH3540	
Blue Check Bonnet to Steam Check (100%)	Complete Inspection/checklist form	K Alv	02/3		112000
Stem Nut to Bushing bock Seat Contact Check (100%)	Photographs	CM 3	3/2	5/2025	Contracts Services
Main Disk to Seat Check (100%)	Photographs	[M]		7	
FME / Cleonliness - Just prior to valve installation	Witness completion of task	70		26	
Measure and record booner conservation management of the displacement of the displacem	Review/Volktote data sheets	- W	200	TC4F-36-014	
Verify that leakoff line flanges are square	Review/Validate data sheets	W 5	5/17/60	TC4F-36-021	
Governor Volve #2					
Measure and record bonnet gaps	Review/Validate data sheets	No.	13/20	TC4F-36-014	
Value Stern Inspection. TIP diameters	Paviou/A/didata data shoats	X 2		TCAF-36-015	İ
Measure and record pilot valve lift	Review/Validate data sheets	22	118921	IR2WH3540	
Measure and record valve stem bushing clearance	Review/Validate data sheets	7/1 2	(FS) 720	IR2WH3540	
NDE inspection per F1.1 Completed X XCC NDE Matrix	Complete Inspection/checklist form	(A)	15/20		
	Photographs	NA			Joint is assily
Stem Nut to Bushing back Seat Contact Check (100%)	Photographs	3	20120	00	
Main Disk to Seat Check (100%)	Photographs	CM	1.4		
FME / Cleanliness - Just prior to valve installation	Witness completion of task	11 51		20	
	Visual Inspection	JM 5/	2/20	400 35 3434	
Remove FME line Blodder	Review/Volidate data sheets		5/20	TC4F-36-014	Ī

Quality Control Point	Verification Method	of Super or other		plicable	Reference	Comments	witness point
Governor Valve #3	Act inchicon Lieuroo	iii da		THE COME			
Measure and record bannet gaps	Review/Validate data sheets	7	OZE!		TC4F-36-014		
Install FME line Blodder	Visual Inspection	T T	(A)				
Measure and record allot valve lift	Review/Validate data sheets	12	1000		IR2WH3540		
Measure and record valve stem bushing clearance	Review/Validate data sheets	N N	18/20		IR2WH3540		
NDE inspection per Fit Completed W X CE! NDE NATIX	Complete Inspection/checklist form	70 3	15/20				XCEL WITNESS
	Photographs	VN.	C	Z		العائماكمو در المراحل	XCEL WITNESS
Stem Nut to Bushing back Seat Contact Check (100%)	Photographs	C 25	20/40	2/00/20			XCEL WITNESS
valve installation * Need to class before	HP TK installwitness completion of task	الم	12/20	80,00			XCEL WITNESS
Remove FME line Bladder	Visual Inspection	S. A.	12/20	P. Me			
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	100	2120		TC4F-36-014		
Covernor Unive #4	Review/Validate data sheets	N 21	02/11/5		TC4F-36-021		T
Measure and record bonnet gaps	Review/Validate data sheets	7 2	74/20		TC4F-36-014		
Install FME line Blodder	Visual Inspection	29 2	(H/Z)				
Valve Stem Inspection-TIR diameters	Review/Validate data sheets	7	(AZD)		TC4F-36-015		
Measure and record pilot valve litt	Review/Volidate data sheets	1	18/20		IR2WH3540		
NDE inspection per recompleted X & NDE Matrix	Complete inspection/checklist form	3	15/20				XCEL WITNESS
Blue Check Bonnet to Steam Chest (100%)	Photographs	B	N N	NA		Joint is asserted	XCEL WITNESS
Main Disk to Seat Check (100%)	Photographs	100	AC AC	1000			ACEL WITNESS
valve installation * Need to clean before HPTC	nsal Witness completion of task	13 M	2/20	06/21/2			XCEL WITNESS
Remove FME line Blodder	Visual Inspection		2/10	COLUM	100 25 2525		
Verify that leakoff line flanges are square	Review/Validate data sheets	W 2/10	5/17/20		TC4F-36-021		
Rehart Stop Valve Checks							
Measure and record cover gops	Review/Validate data sheets	200	3/20		TC4F-36-014		
Measure axial clearance between the yoke and shoulder ring	Review/Validate data sheets	200	22/20		TC4F-36-016		
Valve Shoft Inspection- TIR, diameters	Review/Volidate data sheets	1	115/20		TC4F-36-017		
Main Disk to Seat Contact Check (100%)	Photographs	Same In	26/20	7/4			XCEL WITNESS
clude its	Review/Validate data sheets	2		1	1		
NDE inspection per FLT Completed X:21 NOTE TOTOX	Complete Inspection/checklist form	N. N.	136		100000		XCEL WITNESS
	Review/Validate data sheets	2 2	13/10	1	TC4F-36-016		
ME / Cleanliness - Just prior to volve installation components.	Witness completion of task	The same	100/20	2/16	1025 35 343		XCEL WITNESS
RHSV - Right Side	Keview/Validate data sheets	17 21	Collette		IC4F-36-014		
Measure and record bannet gaps	Review/Validate data sheets	700 2	02/20		TC4F-36-014		
Measure axial clearance between the yoke and shoulder ring	Review/Validate data sheets	20 2	112/20		TC4F-36-016		
Valve Short Inspection - Lik, diameters	Review/Validate data sheets	1	25/25	11/20	TC4F-36-017		500
Main Disk to Seat Contact Check (100%) Ne 7 100%	Photographs	The same of the sa	200	2.47			ACEL WITNESS
y inspect the stem/shoft to in	Review/Validate data sheets	"	4/4/2				
NDE inspection per in the Completed W. X. NDE NOTE	Complete Inspection/checklist form	3	72/20		The contract of the contract o		XCEL WITNESS
1	Review/Validate data sheets	W 5/	15/20		TC4F-36-016		
FME / Cleanliness - Just prior to volve installation components.	Witness completion of task	S. C.	(lefze)	5/11/2	100 25 25 24		XCEL WITNESS
Medsure and record bonnet gaps-Gasket compression	Review/Validate data sheets	77	(425)		1041-36-014		Ī

Quality Control Point		Or Superior Production	ACEL WITNESS (if opplicable)	Reference	Comments	Hold point
Tosk	Verification Method	Initial Date		Documents		witness point
IV - Left Side Outboard						
Measure and record bonnet gaps	Review/Validate data sheets	2/2/20		TC4F-36-014		
Measure and record pilot valve lift and balance chamber clearances	Review/Validate data sheets	100		TC4F-36-018		
Measure and record valve stem bushing clearance	Review/Validate data sheets	OCHIN CITY		TC4F-36-019		
	Review/Validate data sheets	OUTTHE THE		TC4F-36-020	Replaced Sten	
NDE inspection per introducted of XCRI NDE INSTITUTE	Complete Inspection/checklist form	31,7/20				XCEL WITNESS
Remove FME line Blodder	Visual Inspection	akin 1				
Stem Backseat Contact Check (100%)	Photographs	W 4/10/20	שולש			SSENTIM IECK
Disk to Seat Contact Check (100%) - Not 100%	Photographs	W 5/1/20	21/5			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation	Witness completion of task	21/3/120	2/11/24			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	A Silvino				
Verify that leakoff line flanges are square	Review/Validate data sheets	ozkile in		TC4F-36-021		
Measure and record bonnet agos	Review/Validate data sheets	Callett ACL		TC45-36-014		
Measure and record pilot valve lift and balance chamber degrances	Review/Validate data sheets	1/21/20	-	TC4F-36-018		
Measure and record valve stem bushing clearance	Review/Validate data sheets	V 2/2/20		TC4F-36-019		
	Review/Validate data sheets	52 Mills 100		TC4F-36-020		
NDE inspection per F11 Completed ** XCO NDE CATOX	Complete Inspection/checklist form	17/6 /2				
	Visual Inspection	SWITH THE				
Clam Brokent to Nut Contact Charle (100%)	Photographs	orienta 17.	2/20			מושדונון ופושי
Disk to Seat Contact Check (100%)	Photographs	100 M	1200			NOEL WITNESS
FME / Cleanliness - Just prior to valve installation	Witness completion of task	VA 5/13/20	K/M(2			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets	5/Ye/20	A	TC4F-36-014		
Verify that leakoff line flanges are square	Review/Validate data sheets	ONEIIS W.		TC4F-36-021		
Weastife and record bonnel cons	Portional Inflato data choose	7/2/20		VIO 32 34 31		1
Measure and record pilot value lift and halance chamber clearances	Review/validate data sheets	The second		TCAF-26-019		
Measure and record value stem bushing clearance	Review/Validate data sheets	112/6 4/2	-	TC45-36-019		
Dimensionally inspect stem-runout	Review/Validate data sheets	1921/2		TC4F-36-020		
NDE inspection per F1.1 Completed W Xce NDE Matrix	Complete Inspection/checklist form	07H18 1/0				XCEL WITNESS
	Visual Inspection	Selft X				
Stam Bookeast to Next Contact Charl (1008)	Protection	OKT W	23			COCK INCIDENCE
Disk to Seat Contact Check (100%)	Photographs	200	13			ACEL WITNESS
0	Witness completion of task		OC/14/12			XCEL WITNESS
Measure and record bannet gaps-Gasket compression	Review/Validate data sheets	Slisten Strate				
verify that leakaff line flanges are square	Review/Validate data sheets	2/ Slist20		TC4F-36-021		
Measure and record bonnet gaps	Review/Validate data sheets	00 2/3/20		TC4F-36-014		
Measure and record pilot volve lift and balance chamber clearances	Review/Validate data sheets	04812 M		TC4F-36-018		
Measure and record valve stem bushing clearance	Review/Validate data sheets	2/27/2		TC4F-36-019		
	Review/Validate data sheets	2/26/2		TC4F-36-020		
NDE inspection per thi completed " XCE NDE MATTIX	Complete Inspection/checklist form	2017/6				XCEL WITNESS
Remove EME line Rindder	Visual inspection	SERVE AND				
Stem Backsed to Nut Contact Check (100%)	Photographs	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	14/12			WITH WITH
Disk to Seat Contact Check (100%)	Photographs	Sept 100	N. J.			XCEL WITNESS
FME / Cleanliness - Just prior to valve installation	Witness completion of task	VI 3/15/120	6/14/20			XCEL WITNESS
Measure and record bonnet gaps-Gasket compression	Review/Validate data sheets					
verify that leakon line hanges are square	Review/Volidate data sheets	2/4/15		TC4F-36-021		

Task Now Return Valve Inspections Now Return Valve Inspections Owner-EV-3011-01 Contact check Contact check Contact Clearliness - Just prior to valve installation FMET-FV-3098-02 Dimension Inspections Contact check Contact Clearliness - Just prior to valve installation FMET-FV-3098-02 Dimension Inspections Contact check	Verification Method Review/Validate data sheets Paper Check Visual Verification Witness completion of task Review/Validate data sheets Paper Check	Date of the control o	XCEL WITNESS applicable) Initial	Reference
Contact check Operates Freely disconnected from the actuator Operates Freely disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Visual Verification Witness completion of task		C 1111	
Dimension inspections Contact check	Review/Validate data sheets Paper Check		<u>ac</u>)(1)	
Operates Freely disconnected from the actuator FME. Cleanliness - Just prior to valve installation	Visual Verification Witness completion of task	CA 4/16/30		
Dimension Inspections	Review/Validate data sheets			
Onlact check	Paper Check Visual Verification	CM 4/7/20	SIE.	
Operates Freely disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Witness completion of task	CM HILLS		
PWET-FV-3122-01 Dimension Inspections	Review/Validate data sheets	4/2	B	
Contact check	Paper Check		00/L/h	
Operates Freety disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Wilness completion of task	H	1/33/2	ă
PWET-FV-3107-01 Dimension inspections	Review/Validate data sheets	CM 4/2/20		
Contact check	Paper Check		616	
Operates Freely disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Witness completion of task	7/7 4/23/20	4/25	
Dimension inspections	Review/Validate data sheets	11		
Contact check Operates Freely disconnected from the actuator	Paper Check Visual Verification	0	OF1(1)-	
FME / Cleanliness - Just prior to valve installation	Witness completion of task	CM 4/10/20		
MPCR-FV-3023-01 Dimension Inspections	Review/Validate data sheets	Ш		
Contact check	Paper Check			
Operates Freely disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Witness completion of task	an allow	deforth	
Dimension inspections	Review/Validate data sheets	Ш		
Confact check	Paper Check Visual Verification	00/e/h wa	4/1/20	
Operatives in early disconnected month the acquaitor FME / Cleanliness - Just prior to valve installation	Witness completion of task		10	
Dimension inspections	Review/Validate data sheets	5W 412/10		
Contact Check	Paper Check Visual Verification	16/17 MD	30	
Operates Freely disconnected from the actuator FME / Cleanliness - Just prior to valve installation	Witness completion of task	CM 47/18	2	
FWET-FV-3119-01				
Dimension Inspections	Review/Validate data sheets	CM 4/2/20		
Contact check Cherates Freely disconnected from the actuator	Visual Verification	(c/h 4/2)	001117	
FME / Cleanliness - Just prior to valve installation	Witness completion of task	ľ		8
FWET-FV-3102-02	Review/Validate data sheets	OM 4/2	87	
Contact check	Paper Check	14	2	9
Operates Freely disconnected from the aduator	Visual Verification	10/1 1/2/	1/4.	1

GE Power Power ServiceSnfidential

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



GE Power Power Service Infidential

7 Appendix

7.1 Attachments

See content below.



	ALL MT IS WFMT EXCEPT WHERE DRY IS SPECIFICALLY ALLOWED	EPT WHER	E DRY IS S	PECIFICALL	Y ALLOV	VED	
			Contractor Initial(s)	Initial(s)		Xce	
COMPONENT			METHOD	QO		Witness	Comments
		TM	ΡΤ	₽	5		
A 1 0	Dorform Dotor Head Shot						D000
A-t.P lurbine notor							
	Measure & record any blade						
						,	
	Polish upstream and downstream	_					
	perform WEMT with an AC Yoke on						
	the Turbine end per ASTMI-16001-	>					
	O		South				
	Inspect Turbine End Blading L-5T	_					Sec.
	to L-0T			1			, V
	Inspect Turbine End Shrouds using	7					
	an AC Yoke / Covでいずい	13 100					1 C C C C C C C C C C C C C C C C C C C
	Inspect Turbine and stellite strips			•		-	
	on L-0 per ASTMI-16001-C and			\ \ \			0000
	inspect stellite strips and ISB for		۲				
	erosion per MSTB-009						
	Evaluate Turbine end blade leading						
	edge and ISB erosion per SIP-						N. S. W.
	CCL0-1 and MSTB-009						
	Polish upstream and downstream	,					
-	blade root and wheel faces and						
	perform WFMT with an AC Yoke on	***************************************					しろろの
	the Generator end per ASTMI-	//		<u> </u>			
	16001-C						
	Inspect LP Generator End Blading	7		<u></u>			\$ 20C
	L-5G to L-0G			1			
	Inspect Generator End Shrouds	1					2000
	using an AC Yoke	//		\ \ \ \ \			
	Inspect Generator end stellite strips		,	-			
	on E-0 per AS I MI-1000 I-0 and		>	<u>`</u>			シーランデー ランデー
	erosion per MSTB-009						

LP STEAM TURBINE NDE REQUIREMENTS

A PART

		1	[i.i.i.]		
COMPONENT	S U L	NE	METHOD	Xcel	Comments
		MT PT	VT UT	Witness	
	Evaluate Generator end blade leading edge and ISB erosion per SIP-CCL0-1. and MSTB-009				Dont
	Inspect Journal between L-5's				J COST
	Inspect Turbine End Journal				Con C
	Inspect Generator End Journal				pone
	Inspect Turbine End Coupling				DOUG.
	Inspect Generator End Coupling				Sont
A I D Statistical	Inspect A-LP no. 1 lower blade ring				
Blades	turbine and generator Blades, Shrouds, Studs and Hor. Joints		7		Both MT and UT on studs
	Inspect A-LP no. 1 upper blade ring				-
					Den E
	Shrouds, Studs and Hor. Joints				
	Inspect A-LP nos. 2, 3, 4 lower				(
	stationary generator and turbine				F28-
O	end Blades, Shrouds, Studs and	>	7		abits as III bas IM stade
	TOT. JOHNIS				Don't wil and O' on stads
	Inspect A-LP nos. 2, 3, 4 upper				
	end Blades Shrouds Studs and	7	<u> </u>	4.14	
	Hor. Joints				
	Inspect A-LP generator end no. 5				
ð	lower stationary blades, Shrouds, Studs and Hor. Joints				Both MT and UT on studs
	Inspect A-LP generator end no. 5				V.
	upper stationary Blades, Shrouds	/			SONT
	and nor. Joints				,
	Inspect A-LP turbine end no. 5		· · · · · · · · · · · · · · · · · · ·		DO0
0	Studs and Hor. Joints	<u> </u>			Both MT and UT on studs
	Inspect A-LP turbine end no. 5				
					DOME
		,			

			Contractor Initial(s)	Initial(s)		Xcel	
COMPONENT	TEM		METHOD	go		Witness	Comments
		MT	PT	Υ	Ţ	2001111	
0	Inspect A-LP generator end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints						$\sum O \cap \mathcal{C}$ Both MT and UT on studs
	Inspect A-LP generator end no. 6 upper stationary Blades, Shrouds and Hor. Joints			7			Dont
0	Inspect A-LP turbine end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints	\nearrow					$\mathcal{D}_{\mathcal{OH}}$ \mathcal{C} Both MT and UT on studs
	Inspect A-LP turbine end no. 6 upper stationary Blades, Shrouds and Hor. Joints	1					DONE

3

		Ö	Contractor Initial(s)	Initial(s)	, .		
COMPONENT			METHOD	OD	Witness	Ų	Comments
		MT/	PT	VT / TV			
B-LP Turbine Rotor	Perform Rotor Head Shot			7			2000
	Measure & record any blade					57	
	Polish upstream and downstream						
	plade root and wheel races and perform WFMT with an AC Yoke on						MA
	the Turbine end per ASTMI-16001- C			<u> </u>		,	
	Inspect Turbine End Blading L-5T to L-0T					·>)	2000
	Inspect Turbine End Shrouds using						DONE
	Inspect Turbine end stellite strips				107		
	inspect stellite strips and ISB for		>	1			グクク
	erosion per MSTB-009						
	Evaluate Turbine end blade leading					_	7 7 2
	edge and ISB erosion per SIP- CCL0-1 and MSTB-009					 	
	Polish upstream and downstream						
	blade root and wheel faces and					_	
	the Generator end per ASTMI-)	
	16001-C						
	Inspect LP Generator End Blading II -5G to I -0G						2000
	Inspect Generator End Shrouds						2000
	Inspect Generator end stellite strips						,
	on L-0 per ASTMI-16001-C and					<u></u>	700
	inspect stellite strips and ISB for erosion per MSTB-009		7				
	Evaluate Generator end blade						() ()
	leading edge and ISB erosion per						りつとア
	Inspect Journal between L-5's						DON C
	Inspect Turbine End Journal						DONE

		Contr	Contractor Initial(s)		Yeal	
COMPONENT	ITEM	MT / PT	METHOD VT	ΤŪ	Witness	Comments
	Inspect Generator End Journal	2	7			Loss
	Inspect Turbine End Coupling					2000
	Inspect Generator End Coupling					2011
B-LP Stationary Blades	Inspect A-LP no. 1 lower blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints		7			$\sum_{O \cap O} O_{O}$ (
33	Inspect A-LP no. 1 upper blade ring turbine and generator Blades, Shrouds, Studs and Hor. Joints		1			Done
0	Inspect A-LP nos. 2, 3, 4 lower stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints					$\int_{\mathcal{O}} \mathcal{O} \mathcal{N} \mathcal{E}$ Both MT and UT on studs
۵	Inspect A-LP nos. 2, 3, 4 upper stationary generator and turbine end Blades, Shrouds, Studs and Hor. Joints					DON F
8	Inspect A-LP generator end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints					Both MT and UT on studs
	Inspect A-LP generator end no. 5 upper stationary Blades, Shrouds and Hor. Joints	N	7			DONE
0	Inspect A-LP turbine end no. 5 lower stationary Blades, Shrouds, Studs and Hor. Joints					Both MT and UT on studs
	Inspect A-LP turbine end no. 5 upper stationary Blades, Shrouds and Hor. Joints					Dont
O	Inspect A-LP generator end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints		7			DOM \mathcal{C} Both MT and UT on studs

2

		Contractor Initial(s)	,	
COMPONENT	MELL STATE OF THE	METHOD	- Acel	Comments
		MT PT VT UT	П	
	Inspect A-LP generator end no. 6 upper stationary Blades, Shrouds and Hor. Joints			Done
Q	Inspect A-LP turbine end no. 6 lower stationary Blades, Shrouds, Studs and Hor. Joints			$\bigcup_{Both\;MT\;and\;UT\;on\;studs}($
	Inspect A-LP turbine end no. 6 upper stationary Blades, Shrouds and Hor. Joints			Dont
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
7	LP-A Turbine End Exhaust Flow Guide piping, nozzles, struts, 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.
7	LP-B Turbine End Exhaust Flow Guide piping, nozzles, struts, bolt holes, dowels and horizontal joints.			UT bolting, dry MT is approved.
7	LP-B Generator End Exhaust Flow Guide piping, nozzles, struts, bolt holes, dowels and horizontal joints.			UT bolting, dry MT is approved.
7	Inspect LP-A desuperheater and gland steam piping			Check for OD erosion and wall thickness

Inspect LP-B desuperheater and gland steam piping Crossover pipe gasket surfaces Crossover pipe gasket surfaces Crossover pipe gasket surfaces Crossover pipe flange gasket surface LP-A to LP-B Coupling Bolts LP-A to LP-B Coupling Bolts LP-A Crossover Pipe Bolting LP-A Crossover Pipe Bolting LP-A Crossover Pipe Bolting LP-B Crossover Pipe Bolting LP-B Crossover Expansion Bellows LP-B Uner Case Bolting LP-B Inner Case Bolting LP-B Crossover Expansion Bellows LP-B Inner Case Bolting LP-B Crossover Expansion Bellows LP-B Turbine End Steam Gland UP-A Generator End Steam Gland Upper half case LP-A Generator End Steam Gland Upper half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland Upper half case LP-B Generator End Steam Gland		Contractor Initial(s)	itial(s)		Veel	·
Inspect LP-B desuperheater and gland steam piping Crossover pipe gasket surfaces Crossover pipe flange gasket surface Crossover pipe flange gasket surface LP-A to LP-B Coupling Bolts LP-A to LP-B Coupling Bolts LP-A Crossover Pipe Bolting LP-A Outer Case Bolting LP-A Outer Case Bolting LP-B Crossover Expansion Bellows LP-B Inner Case Bolting LP-B Inner Case Bolting LP-B Crossover Expansion Bellows LP-B Inner Case Bolting LP-A Turbine End Steam Gland Upper half case, studs, nuts, sleeves and washers LP-A Generator End Steam Gland Upper half case LP-B Turbine End Steam Gland Upper half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland Upper half case LP-B Turbine End Steam Gland Upper half case LP-B Turbine End Steam Gland Upper half case LP-B Generator End Steam Gland Upper half case LP-B Generator End Steam Gland Upper half case LP-B Generator End Steam Gland Upper half case	ITEM	METHOD	D		Witness	Comments
	TM	ΡΤ	<u> </u>	UT	AMERICAS	
	3 desuperheater and piping					Check for OD erosion and wall thickness
	ipe gasket surfaces				M/A	
	ipe flange gasket				2/2	
)	
	Coupling Bolts		7	2		
	3 Coupling Bolts		7	7		
	erator Coupling Bolts		7)		
	over Pipe Bolting					
	over Pipe Bolting					
	Case Bolting					
	Sase Bolting					
	Case Bolting					
	Sase Bolting					
	ver Expansion Bellows				4/4	PT if remoyed, VT if acçessible
	ver Expansion Bellows				N/a	PT if removed, VT if accessible
	e End Steam Gland					
0	ise, studs, nuts, sleeves		•			boundary of TM aboundary
0	End Steam Cland					or while, are in approved.
	ase					dry MT is approved
	ator End Steam Gland					
and washers LP-A Generator End Steam Gland upper half case LP-B Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland upper half case	ise, studs, nuts, sleeves $/$					
upper half case LP-B Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland upper half case	ofor End Stoom Cloud					UT bolting, dry MT is approved.
LP-B Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland upper half case LP-B Generator End Steam Gland	ase		ind out of			dry MT is approved
lower half case, studs, nuts, sleeves and washers LP-B Turbine End Steam Gland upper half case LP-B Generator End Steam Gland	e End Steam Gland					
and washers LP-B Turbine End Steam Gland upper half case LP-B Generator End Steam Gland	ise, studs, nuts, sleeves					
LP-B lurbine End Steam Gland upper half case LP-B Generator End Steam Gland			100			UT bolting, dry MT is approved.
LP-B Generator End Steam Gland	e End Steam Gland		3			
						ary IVI Is approved
V sleeves	ator End Steam Gland Steepers					
and washers						UT bolting, dry MT is approved.

			Contractor Initial(s)	r Initial(s)		Yeal	
COMPONENT	TEM		METHOD	유		Witness	Comments
		TM	PT	Ι	TD		
	LP-B Generator End Steam Gland	\		`			
	upper half case	۷		7			dry MT is approved
	LP-A Rotor Shaft Expansion						
	Bellows						RED DVG, CU
	LP-B Rotor Shaft Expansion						
	Bellows						Pao 070 (UM)
		SARCE STATE OF THE SAME OF THE					
Bearings	No. 3 Bearing		\	7	7		
	No. 4 Bearing		7	7	7		
	No. 5 Bearing		\	٢	7		
	No. 6 Bearing		7	7	7		

~

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 SIEMENS WESTINGHOUSE AND MITSUBISHI STEAM TURBINE GENERATORS ECT = EDDY CURRENT TESTING, UT = ULTRASONIC TESTING NDE REQUIREMENTS

TNENCOMO		Σ	METHOD	00	
COMPONENT		L	PT	PT VT UT	Comments
Turbine Rotors					Head shot and coil MT
	Blades	×	×	×	MT or PT depending on material properties
	Shrouds	×		×	Perform separate AC Yoke inspection
	Tenons	×		×	Perform separate AC Yoke inspection
	Stellite Strips		×	×	ECT may be substituted for PT. VPT is OK.
	Lashing Lugs	×	×	×	MT or PT depending on material properties
	Journals	×		×	
	, poo	>		>	Pay special attention to all circumferential
	, and a second	<		<	grooves and diameter fillets per PB2-12-0046-ST-EN-01 or PB2-12-0047-ST-EN-01 as applicable.
	Dummy Ring areas	×	T	×	
	Couplings	×		×	
	First 2 rows of HP & IP blade tenons			×	Per OMM-161
	Measure gaps between shrouds and blades			×	
	Measure shroud offset			×	
	HP Rotor center region grooves		×		Per PB12-0046-ST-EN-01
	Side entry blade roots		×	×	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	×		×	Use an AC Yoke for this inspection. Eddy current may be substituted for MT.
	Inspect titanium blade interlocks		×	×	Per SB-2004-019, Rev. 4
	Pins on any pinned rows			×	
	Compensator (bellows)		×	×	
	Evaluate LP Rotor L-0 Row trailing edge erosion on titanium blades			×	Per SB2-09-0010-ST-EN-01, Rev. 1
	Evaluate LP Rotor leading edge erosion			×	Per Westinghouse Service Position Paper on LP Blade Erosion dated July, 1975
	Evaluate shroud and leading edge erosion			×	Per Mitsubishi Technical Bulletin MSTB-008

		2	METHOD	5		
COMPONENT	ITEM	MT PT VT UT	PT	F	_	
Blade Rings and Diaphragms	Airfoils	×	×	×	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.	agnetic and Il magnetic ctions are in
	Studs, screws and pins	×		×		
	Nozzie Block screws	×		×	Per SB4-11-0042-ST-EN-01	
	Nozzle Block vanes		×	×	Per SB4-12-0017-ST-EN-01	
	Horizontal Joints	×		×		
	Seal Faces	×		×		
	Outer rings and inner webs	×		×		
				\dashv		
Dummy Rings	Rings	×		×		
	Studs	×	1	×		
			7			
Inner Cylinder	Horizontal joint studs	×	\dashv	×		
	Nuts, sleeves and washers	×		×		
	Fits and seal faces	×		×	WFMT or DMT is OK	
	Horizontal joints including bolt holes	×		×		
	Exhaust Hood spray piping, nozzles and supports			×		
	Exhaust Flow Guides			×		
	Flow Guide bolting	×		×		
	Flow Guide bolt holes	×		×		
	Flow Guide dowels	×		×		
	Flow Guide horizontal joints	×		×		
	Gasket surfaces and handhole covers			×		
			7			
Outer Case	Horizontal joint studs	×	7	×		
	Nuts, sleeves and washers	×		×		
	Fits and seal faces	×		×	WFMT or DMT is OK	
	Horizontal joints	×		×	WFMT or DMT is OK	
	Exhaust strut/bracing welds	×		×	WFMT or DMT is OK	
			7	\dashv		
Steam Glands	Gland Cases vetical and horizontal joints and packing seal faces	×		×	WFMT or DMT is OK	
	Desuperheater and gland steam piping			×	Per SB 53009ST	
	Studs, nuts, sleeves and washers	×		×		
			7	-		
Generator Rotor	Exposed shaft	×		×		

		_	핕	METHOD		
COMPONENT	IIEM	¥	PT	MT PT VT UT	Ę	Comments
	Coupling	×		×		
	Retaining rings	×	×	×	-	MT or FPT, depending on material properties
	Fan blades	×	×	×	-	MT or FPT, depending on material properties
Generator	Stationary Blower blade rings		×	×		Per PB2-10-0012-GN-EN-01
	Rotating Blower blades	×		×		
	Blower, Diffuser and Shroud	×	×	×		Per SB2-13-0023-GN-EN-01. MT or FPT, depending on material properties
	Blower blade locking inserts		×	×	Ħ	Per OMM-071
Exciter Rotor	Exposed shaft	×		×		
	Coupling	×		×		
	Retaining rings	×	×	×		MT or FPT, depending on material properties
Bearings & Seals	Thrust Bearings		×	×	X	VPT is OK
	Journal Bearings		×	×	X	VPT is OK
	Hydrogen Seals		×	×	×	
	Bearing rings and bolting	×		×		
						1
Throttle Valves	X Studs	×		-	×	MT per SB 54010ST
	Valve seat, seat seal weld & pilot valve seat		×	X	_	VPT is OK
	Pilot valve seat		×	×	_	VPT is OK
	X Strainer groove		×	×		Per TA2003-001
	Valve body (Steam Chest)		×	X		VPT is OK
	X Anti-swirl dam	×	×	×	-	MT or PT is OK. VPT is OK
	Disc/Plug	×		×		
	Disc/Plug Seat		×	×		VPT is OK
	Stem	×	×	×		Depending on material
	Strainer	×		×		
	Nuts and washers	×		×	_	Hardness test studs per Service Bulletin 54010
	Springs	×		×	-	
	Crossheads	×	×	×	_	Depending on material (VPT is OK)
Governor Valves	★ Studs	×			×	MT per SB 54010ST
	★ Valve seat		×	×		VPT is OK
	Valve body Rennet		×	×		Per SB4-14-0011-ST-EN-01 (VPT is OK)
	Disc/Plug	×		×		
	Disc/Plug Seat		×	×		VPT is OK
	Stem	×		×		

		ľ			ľ	
COMPONENT			METHOD	읽	T	Comments
		¥	ᆸ	PT VT UT	5	
	Crossheads	×	×	×		Depending on material (VPT is OK)
	Nuts and washers	×		×		
	Springs	X		×		
Intercept Valves	Studs	×		×	X	MT per SB 54010ST
Including Pilot Valves	Disc Seat		×	×	Ĺ	VPT is OK
	Disc	×		×		
4	Valve Seat		×	×		VPT is OK
CA	Strainer groove		×	×		Per TA98-004 (VPT is OK)
4	Anti-swirl dam		×	×	_	MT or PT is OK. VPT is OK
	Stem	×		×		
	Strainer	×		×		
	Valve body (Steam Chest)		×	×		VPT is OK
	Nuts and washers	×		×		
	Springs	×		×		
Reheat Stop Valves	Studs	×		×	×	X MT per SB 54010ST
<i>*</i>	Flapper Seat		×	×		VPT is OK
X	Flapper swing arms ≲<2,4	×		×		
×	X Valve body seating area		×	×		VPT is OK
	Nuts and washers	X		×		
			-	-		
Blowdown Valve	Studs A	×		×	×	
	Valve seat		×		_	VPT is OK
/	Disc Seat		×		_	VPT is OK
	Stem /	×		×		
	Nuts/and Washers	×		×		
	Springs	×		×		
Miscellaneous	Thrust collar	×		×		
	Rotor position collar	×		×		
	Coupling studs, nuts, sleeves and washers	×		×	×	
	Flange studs, nuts, sleeves and washers	×	\exists	×	×	
	Crossover pipe studs, nuts, sleeves and	×		×	×	
	Magners		1	1	1	

	Comments														ob. 17 Ob. do	MI and OI studs		MT and UT Studs		MT and UT Studs	
REMENTS PECIFICALLY ALLOWED		VT UT WITHESS																			
$\mathcal{HP}(P)$ COMANCHE UNIT 3 STEAM TURBINE NDE REQUIREMENTS S WFMT EXCEPT WHERE DRY IS SPECIFICALLY ALLOWED	Contractor Initial(s) METHOD	MT PT		pn		[5]	: Yoke	-IV	vo.			al	ling	Cast of Conference and An Art The Office 2020 (also	er Half		er Half ıtal	er Half Hor.	er Half ints	er Half Hor.	er Half ints
HP S ALL MT IS WFM	Mali		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		Inspect HP1 Blade Ring Lower Half Blades, Shrouds, Studs and	Horizontal Joints	Inspect HP1 Blade Ring Upper Half Blades, Shrouds and Horizontal Joints	Inspect HP2 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints	Inspect HP2 Blade Ring Upper Half Blades, Shrouds and Hor. Joints	Inspect HP3 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints	Inspect HP3 Blade Ring Upper Half Blades, Shrouds and Hor. Joints
	COMPONENT		HP/IP Turbine Rotor												HP/IP Blade Rings						

			Contractor Initial(s)	· Initial(s)				
COMPONENT			METHOD	00		Xcel	<u></u>	Comments
		MT	PT	М	UT	Withess		
	Inspect IP1 Blade Ring Lower Half Blades, Shrouds, Studs and Hor. Joints						MT and UT Studs	S
	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	6
	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	6
	Inspect IP3 Blade Ring Upper Half Blades, Shrouds and Hor. Joints							
	HP Dummy Ring Lower						UT bolting, dry MT is approved	T is approved.
	HP Dummy Ring Upper					1	Dry MT is approved	pə
	IP Dummy Ring Lower					1	UT bolting, dry MT is approved.	T is approved.
	IP Dummy Ring Upper					7	Dry MT is approved	pə
Cylinders, Cases & Misc.	Inspect Thrust Collar						:	
	Inspect Rotor Position Collar							
	HP Lower Inner Cylinder fits, seal faces and horizontal joints					7	Dry MT is approved	рө
	Inspect lower half Nozzle Block blades and horizontal joints in the HP cylinder		62					
	HP Upper Inner Cylinder fits, seal faces and horizontal joints	7				7	Dry MT is approved	90
	Inspect upper half Nozzle Block blades and horizontal joints in the HP cylinder	3		7				

COMPONENT TITEM				T. change of	(m)(m)			
HP Lower outer case fits, seal faces and horizontal joints and h				CONTINACIO	nitual(S)		Xcel	
HP Lower outer case fits, seal faces and horizontal joints and horizontal joints and horizontal joints and horizontal joints IP Flow Guide Upper HP Main Steam Lead Flange faces Main Steam Lead Flange Botting HP Turbine End Steam Gland lower HP Turbine End Steam Gland upper HP Gressover Plpe Botting HP Turbine End Steam Gland upper HP Gressover Plpe Botting HP Turbine End Steam Gland Washers HP Generator End Steam Gland In Thrust Bearing HP Generator End Steam Gland In Thrust Bearing HP Generator End Steam Gland In Thrust Bearing In Thrust Bearing In Thrust Bearing In Outer Description In Steam Gland In Steam Gland In Steam Gland In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Glower half case In Generator End Steam Gland In Generator End Steam Gl	NEW COMPONIEN			METH	OD		Witness	Comments
HP Lower outer case fits, seal faces HP Lower outer case fits, seal faces HP Upper outer case fits, seal faces and horizontal joints HP Upper outer case fits, seal faces HP Main Steam Lead Flange Bolting HP Intel Flange Bolting HP Crossover Pice Bolting HP Crossover Pice Bolting HP Turbine End Steam Gland lower half case study, nuts, sleeves and washers HP Generator End Steam Gland I washers I washers HP Generator End Steam Gland I washers I washer			MT	PT	₽	LΩ	WILLIGOS	
and horizontal joints AP Upper outer case fits, seal faces and horizontal joints IP Flow Guide Lower IP Flow Guide Upper HP Main Steam Lead Flange Botting HP Not LP-A Coupling Bolts HP Crossover Pipe Botting HP Outer Case Botting HP Outer Case Botting HP Turbine End Steam Gland lower HP Censerator End Steam Gland lower HP Generator End Steam Gland IP G		HP Lower outer case fits, seal faces		4	2700 5 6 7 4 6 6 7			
HP Upper outer case fits, seal faces and horizontal joints IP Flow Guide Upper IP Flow Guide Upper Main Steam Lead Flange Bolting Main Steam Lead Flange Bolting HP outer Case Bolting HP Outer Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper HP Generator End Steam Gland Upper Half case, studs, nuts, sleeves and washers HP Centrat Bearing HP Generator End Steam Gland Upper Half case No. 1 Bearing No. 2 Bearing No. 5 Bearing No. 6 Bearing		and horizontal joints						Dry MT is approved
and horizontal joints IP Flow Guide Lower IP Flow Guide Lower IP Flow Guide Upper HP Main Steam Lead Flange Bolting HP Inches Flange Bolting HP Outer Case Bolting HP Turbine End Steam Gland lower half case studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland No. 2 Bearing No. 3 Bearing No. 5 Bearing No. 6 Bearing		HP Upper outer case fits, seal faces						
IP Flow Guide Lower IP Flow Guide Upper HP Main Steam Lead Flange Bolting IP Inlet Flange Bolting HP to LP-A Coupling Bolts HP Crossover Pipe Bolting HP Crossover Pipe Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper HP Generator End Steam Gland In Grave Thrust Bearing Active Thrust Bearing No. 2 Bearing No. 4 Bearing No. 4 Bearing No. 6 Bearing		and horizontal joints			U HOUSE			Dry MT is approved
HP Main Steam Lead Flange Bolting Main Steam Lead Flange Bolting HP to LP-A Coupling Bolts HP Crossover Pipe Bolting HP Crossover Pipe Bolting HP Turbine End Steam Gland lower half case studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case HP Turbine End Steam Gland upper half case HP Generator End Steam Gland Inwer half case HP Turbine End Steam Gland Inwer half case HP Generator End Steam Gland Invertible HP Turbine End St		IP Flow Guide Lower						UT bolting, dry MT is approved.
HP Main Steam Lead Flange Botting Main Steam Lead Flange Botting IP Inlet Flange Botting HP to LP-A Coupling Botts HP Crossover Pipe Botting HP Urbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland I lower half case and washers HP Generator End Steam Gland I lower half case and washers HP Generator End Steam Gland I lower half case and stands and washers HP Generator End Steam Gland I lower half case HP Generator End Steam Gland I lower half case Active Thrust Bearing I low 1 Bearing I low 2 Bearing I low 2 Bearing I low 3 Bearing I low 5 Bearing I low 6 Bearing		IP Flow Guide Upper			CC 12.0 X			Dry MT is approved
Main Steam Lead Flange Bolting IP Inlet Flange Bolting HP to LP-A Coupling Bolts HP Crossover Pipe Bolting HP Outer Case Bolting HP Outer Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case and washers HP Cenerator End Steam Gland Iower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland Iower half case and star Gland Iower half case and star Gland Inactive Thrust Bearing Inactive		HP Main Steam Lead Flange faces			987 99 T Spart J 53 Jb			
HP to LP-A Coupling Bolts HP to LP-A Coupling Bolts HP Crossover Pipe Bolting HP Outer Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case HP Generator End Steam Gland upper half case HP Generator End Steam Gland I ower half case HP Generator End Steam Gland I ower half case HP Generator End Steam Gland I ower half case HP Generator End Steam Gland I ower half case HP Generator End Steam Gland I ower half case Active Thrust Bearing No. 1 Bearing No. 2 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		Main Steam Lead Flange Bolting						
HP to LP-A Coupling Bolts HP Crossover Pipe Bolting HP Outer Case Bolting HP Turbine End Steam Gland lower half case studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland upper half case In and washers HP Generator End Steam Gland Nov. 1 Bearing No. 2 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		IP Inlet Flange Bolting						
HP Crossover Pipe Bolting HP Outer Case Bolting HP Inner Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland Inverted that Case In Active Thrust Bearing In Active Th		HP to LP-A Coupling Bolts						
HP Outer Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland lower half case HP Generator End Steam Gland lower half case Active Thrust Bearing No. 1 Bearing No. 2 Bearing No. 2 Bearing No. 4 Bearing No. 5 Bearing No. 5 Bearing No. 6 Bearing		HP Crossover Pipe Bolting						
HP Inner Case Bolting HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case HP Generator End Steam Gland upper half case HP Generator End Steam Gland lower half case HP Generator End Steam Gland upper half case Active Thrust Bearing No. 1 Bearing No. 2 Bearing No. 2 Bearing No. 3 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		HP Outer Case Bolting						UT only if embedded; MT and UT if removed
HP Turbine End Steam Gland lower half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case HP Generator End Steam Gland lower half case and washers HP Generator End Steam Gland upper half case HP Generator End Steam Gland Lupper half case Active Thrust Bearing No. 2 Bearing No. 2 Bearing No. 3 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing No. 7 No. 7 No. 6 Bearing No. 6 Bearing No. 7 No. 7 No. 7 No. 6 Bearing No. 6 Bearing No. 6 Bearing No. 7 No. 7 No. 7 No. 7 No. 6 Bearing	-	HP Inner Case Bolting						UT only if embedded; MT and UT if removed
half case, studs, nuts, sleeves and washers HP Turbine End Steam Gland upper half case HP Generator End Steam Gland lower half case and washers and washers HP Generator End Steam Gland upper half case and washers HP Generator End Steam Gland upper half case Active Thrust Bearing No. 2 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		HP Turbine End Steam Gland lower						
washers HP Turbine End Steam Gland upper half case HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case HP Generator End Steam Gland upper half case Active Thrust Bearing No. 2 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		half case, studs, nuts, sleeves and						
HP Turbine End Steam Gland upper half case HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case upper half case hal		washers						UT bolting, dry MT is approved.
HP Generator End Steam Gland lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case Active Thrust Bearing No. 1 Bearing No. 2 Bearing No. 3 Bearing No. 4 Bearing No. 6 Bearing		HP Turbine End Steam Gland upper half case	>					dry MT is approved
lower half case, studs, nuts, sleeves and washers HP Generator End Steam Gland upper half case Active Thrust Bearing No. 1 Bearing No. 2 Bearing No. 3 Bearing No. 4 Bearing No. 5 Bearing No. 5 Bearing No. 6 Bearing No. 6 Bearing No. 6 Bearing No. 6 Bearing		HP Generator End Steam Gland						
and washers and washers HP Generator End Steam Gland upper half case		lower half case, studs, nuts, sleeves						
HP Generator End Steam Gland Upper half case		and washers						UT bolting, dry MT is approved.
Active Thrust Bearing Inactive Thrust Bearing No. 1 Bearing No. 2 Bearing No. 3 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		HP Generator End Steam Gland upper half case						dry MT is approved
Inactive Thrust Bearing No. 1 Bearing No. 3 Bearing No. 4 Bearing No. 5 Bearing No. 6 Bearing		Active Thrust Bearing		7	7	7		į
		Inactive Thrust Bearing		7	/	7		
		No. 1 Bearing		7	7	7		
7 2 7 3		No. 2 Bearing		7	7	/		
No. 5 Bearing V V V No. 6 Bearing V V V		No. 3 Bearing		7	7	/		
No. 5 Bearing / / / /		No. 4 Bearing		7	/	7		
No. 6 Bearing		No. 5 Bearing		7	7)		
		No. 6 Bearing		7	7)		

m

		VALVE	VALVE NDE REQUIREMENTS	REMENT	Ś		
			Contractor Initial(s)	nitial(s)		Yeal	
COMPONENT	XUL		METHOD	QC		Mitness	Comments
		MT	PT	M	ŪΤ	wirness	
			VALVES				
Left Throttle (Stop)	Valve body						
	/ Anti swirl bar welds						MT or PT as applicable
	Valve seat & seal weld						
	Plug and plug seat(s)			See Pares			
	Stem						PT if non-magnetic; UT if possible
	Stem back seat						
	Pilot Valve Seat						
	Springs	A STATE OF					
	Crossheads						PT if non-magnetic; MT if magnetic
	V Studs	140					
	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			I consider the constant of the			
	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

COMANCHE UNIT 3

		Contractor Initial(s)		
COMPONENT	Ē	METHOD	XCe	Comments
		MT PT VT		
#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)			
	V 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)			
	V 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
	1			
	V Studs			
· ·	Female Threads			MT or PT per MSTB-020
	Nuts			
	Washers			Possibly nitrited
#4 Governor (Control)	Valve body			
	/ Valve seat			

			Contracto	Contractor Initial(s)		100 A	
COMPONENT	E		MET	METHOD		Witness	Comments
		TM	PT	VT	TO	winess	
	Plug and plug seat(s)						
	Stem						PT if non-magnetic; UT if possible
	Cross head						Depending on material
	Spring(s)	Š					
	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	· 雅斯 · · · · · · · · · · · · · · · · · ·					
	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				200		Possibly nitrited
#2 Intercept Valve	Valve body						Either MT or PT is accentable
	Anti-swirl dam welds						Either MT or PT is acceptable
	Valve seat						
	Plug and plug seat(s)						
	Stem					1	PT if non-magnetic; UT if possible
	Strainer						
	Spring(s)	, A					
	Studs	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
	Female Threads					1	MT or PT per MSTB-020
	Nuts						
	Washers						
#2 Intercent Volve	Volue body						
#3 intercept valve	valve body					7	Either MT or PT is acceptable
	Anti-swirl dam welds					7	Either MT or PT is acceptable

m

		Contractor Initial(s)		
COMPONENT		METHOD	les X	Comments
		MT PT UT	witness	
	Valve seat			
	Plug and plug seat(s)			
	Stem			PT if non-magnetic; UT if possible
	Strainer			
	Spring(s)			
	Studs			
	Female Threads		V	MT or PT per MSTB-020
	Nuts			
	Washers		F	Possibly nitrited
#4 Intercept Valve	Valve body		8	Either MT or PT is acceptable
	Anti-swirl dam welds		4	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		V	MT or PT per MSTB-020
	Nuts			
	Washers		H H	Possibly nitrited
I S Reheat Ston Valve	Valve body			
	Valve seating area			12. C.
	Flapper seat			Either MT or PT is acceptable
	Flapper swing arms		3	Either MT or PT is acceptable
	Stem			
	Stem Bushing			
	Studs			
	Female Threads		~	MT or PT per MSTB-020
	Nuts			
	Spherical Washer		d	Per IR-18005
	Washers			
RS Reheat Stop Valve	Valve body			
	(500.00			

			Contracto	Contractor Initial(s)		Too	
COMPONENT	S IL		MET	METHOD		With one	Comments
		MT	PT	ΙΛ	5	Willess	
	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				i i		Per IR-18005
	Washers						

2

3-Angles NDE Report 2020-CF-5862 ...



3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 3/7/2020 Page 1 of 264

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 he sitate to contact our offices.

Sincerely,

Stephen Renkavinsky

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



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

3-Angles NDE Report 2020-CF-5862



 Project: CF-5862

 Site: Comanche Generating Station

 Date: 3/7/2020 Page 2 of 264

Xcel Energy

Comanche Generating Station

Pueblo, CO 81006

3ANGLES JOB NUMBER CF-5862

NDT REPORT OF
Mitsubishi Unit #3

<u>DATES OF EXAMINATIONS</u> 01/26/2020 TO 03/07/20

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

3-Angles NDE Report 2020-CF-5862



Project:	CF-5862				
Site:	Coman	che Genera	ting Sta	ation	
Date:	3/7/2020	Page	3	of	264

REPORT TABLE OF CONTENTS

1	HHIP	4
2	LPA	74
3	LPB	125
4	Coupling Bolts	189
5	Shells and Glands	
6	Steam Flanges	192
7	Expansion Bellows	193
8	Bearings	10/
9	Valves Studs	216
	Governor Valves	
	Throttle Valves	
	Reheat Stop Valves	
	Intercept Valves	237
	Misc. Bolting	247
	Generator Blower Fan Blades	248
	UT Linearity Sheets	250

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

3-Angles NDE Report 2020-CF-5862

_1 .	
<3 angles	3ar
	2 A
	P:
NDT, Engineering and Consulting	F: (

REQUIRE A DETAILED DESCRIPTION OF FINDINGS.

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

Project #:	CF-5	CF-5862					
Site:	Comanche Gene	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: TEST METHOD (S) UTILIZEI Magnetic Particle, Liquid Penetrant, Visual Testing 02/20/2020 to 03/05/2020 DATE(S) TESTED: MISCELLANEOUS INFORMATION: INSPECTION INDICATIONS ROTATING BLADE LOCATION KEY NOTED: RESULTS OF: VIEW FACING GENERATOR END COUPLING X ROTOR SPINDLE Notch Bucket PACKING GROOVES CW BUCKET COUNT **JOURNALS** COUPLING ROTATING BLADING EROSION SHIELDS TIE-WIRES X CW COUNT CCW COUNT **COVERS TENONS** NOTE: WHERE APPLICABLE, THE NOTCH BUCKET SHALL BE CALLED #1 AND NUMBERED SEQUENTIALLY IN PHOTOS INCLUDED EITHER A CW OR CCW MANNER; IF NOT, BLADE #1 NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL REFERENCE SHALL BE PROVIDED.

Member of ASNT*SNT-TC-1A Certified Technicians

3A-NDE-0000P_R9_040419 _Components Report_Rotor Inspection Form

3-Angles NDE Report 2020-CF-5862 ...

<	3	ar Indt, E	1 g	le:	3angles Inc. 2 Access Road Albany, NY 12 P: (518) 640-3 ting F: (518) 218-0
---	---	---------------	------------	-----	---

Project: CF-5862
Site: Comanche Generating Station
Date: 21-Feb-20 Page 5 of 264

NDT,	Engineering and Consulting	F: (518) 218-0490	2.			
		VISUAL INSP	ECTION R	EPORT		
CUSTOMER:			FCSS	S		
PO #:	4900073380		SURFACE	CONDITION:	Oxide Bl	asted
PROCEDURE/SPE	EC: KT-NDE-40	05 REV. 1	ACCEPTA	NCE STD:	Report Fin	ıdings
MATERIAL DEG	CDIDENON		C	1 11 1 2 1101	D	
MATERIAL DESC	CRIPTION:			nche Unit 3 HPI	P	
			ION RESUI		G 1 P 00	112/2020
WHITELIGHT ME		line AccuMAX		S/N: 1913223/		
WHITELIGHT: WHITELIGHT:		lashlight: Fenix U Flashlight: Coast I			READING: READING:	300.7 fc. 204.2 fc.
WIIITELIGIII.	1	Tashinght. Coast I	INJ_LC		READING	204.2 10.
Danartahla indiaati	ons found. See following	ng shoot for a list c	of datails and	nictures		
Reportable ilidicati	ons found. See following	ig sheet for a fist c	or details and	pictures.		
NDT Technician:	Stephen Renkavinsky	MT/PT/VT III, UT	ГП	Law	rence Craig MT/PT/	VT II
	n/	a			n/a	
	3.5	1 6 4 63 777 + 63 777		 		

 $\label{lem:member of ASNT * SNT - TC - 1A Certified Technicians} $3A-NDE-0000P_R9_040419 $$ Components Report_Visual Testing$

3-Angles NDE Report 2020-CF-5862 ... Page 396 of 719

_ 1	3angles Inc. 2 Access Road Site Albany, NY 12205 P: (518) 640-3000 Date	Project: CF-5862	et: CF-5862			
< 4 angles		Site: Comanche Generating Station				
NDT, Engineering and Consulting		Date: 21-Feb-20 Page 6 0	f 264			
USTOMER:	1. (210) 210 0190	FCSS				

#:			
	4900073380	SURFACE CONDITION:	Oxide Blasted
TATEDIAL	DESCRIPTION:	Comanche Unit 3 HPIP VT Resu	.lea
Stage	DESCRIPTION.	Description VI Rest	iits
Dummy Ring	Deep groove around entire body.	Description	
Castellations	• (1) set of castellations missing		
	Light foreign object damage to leading edge		
1	Rubbing on all shrouds		
_	Light foreign object damage to leading edge		
2	Rubbing on all shrouds		
2	Light foreign object damage to leading edge		
3	 Rubbing on all shrouds 		
4	Light foreign object damage to leading edge		
4	 Rubbing on all shrouds 		
5	Light foreign object damage to leading edge		
J	Rubbing on all shrouds		
6	Light foreign object damage to leading edge		
_	Rubbing on all shroudsShroud lifting on all blades on admission side.		
7			
	 Heavy rubbing on all shrouds. Shroud lifting on all blades on admission side.		
8	Heavy rubbing on all shrouds.		
9	• Row to be replaced.		
,	Rubbing on all shrouds.		
10	 Foreign object damage to leading edge. 		
10	• Erosion on shroud edge.		
	Rubbing on all shrouds		
11	 Light foreign object damage to leading edge. 		
12	Rubbing on all shrouds.		
12	 Light foreign object damage to leading edge. 		
13	Rubbing on all shrouds.		
13	Light foreign object damage to leading edge.		
	Rubbing on all shrouds.		
14	• Erosion/mechanical damage to shroud.		
	Light foreign object damage to leading edge.Rubbing on all shrouds.		
15	• Erosion/mechanical damage to shroud.		
13	 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	
	Member of ASNT * SNT - TC - 1A Certified	Technicians	

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: 21-Feb-20 Page 7 of 264

NDT, Engineering and Consulting	F: (518) 218-0490
CUSTOMER:	FCSS
PO #: 490007338	SURFACE CONDITION: Oxide Blasted
MATERIAL DESCRIPTION	
MATERIAL DESCRIPTION: Stage	Comanche Unit 3 HPIP VT Results Page 1 Description
• Deep groove around entire bo • (1) set of castellations missing	dy.
C. C. CINHITERED	

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

l

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 398 of 719

<3	angles
	NDT. Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 21-Feb-20 Page 8 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 2

Stage

- Description
 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

of 264

3-Angles NDE Report 2020-CF-5862 ...

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 21-Feb-20 Page 9

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 3

Stage

- Description
 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

/a n/a

of 264

3-Angles NDE Report 2020-CF-5862 ... Page 400 of 719

<3angles
NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 21-Feb-20 Page 10

CUSTOMER: FCSS

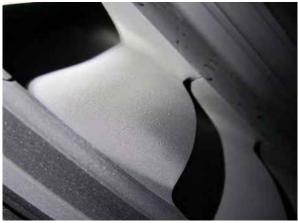
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 4

Stage

- 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

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: 21-Feb-20 Page 11 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 5

Stage

Description

- 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

'a n/a

264

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: 21-Feb-20 Page 12 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 6

Stage

- Description
 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

a n/a

of 264

3-Angles NDE Report 2020-CF-5862 Page 403 of 719



Project: CF-5862

Site: Comanche Generating Station

Date: 21-Feb-20 Page

13

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 7

Stage

- Description
- 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

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: 21-Feb-20 Page

14

of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 8

Stage

Description

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/

n/a

of 264

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: 21-Feb-20 Page 15

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 9

Stage

Description

• 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

n/a

3-Angles NDE Report 2020-CF-5862 ...



Project: CF-5862

Site: Comanche Generating Station

16

of 264

Date: 21-Feb-20 Page

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 10

Stage Stage

• Row to be replaced.











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

Lawrence Craig MT/PT/VT II

n/

n/a

264

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: 21-Feb-20 Page 17 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 11

Stage

10

Description

- 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

/a n/a

of 264

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: 21-Feb-20 Page 18

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 12

Stage

Description

• 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

/a n/a

3-Angles NDE Report 2020-CF-5862 ... Page 409 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 21-Feb-20 Page 19 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 13

Stage

Description

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

/a n/a

of 264

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: 21-Feb-20 Page 20

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 14

Stage

Description

• Rubbing on all shrouds.

· Light foreign object damage to leading edge.









n/a

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

Member of ASNT * SNT - TC - 1A Certified Technicians

264

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: <u>21-Feb-20</u> Page <u>21</u> of _

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 15

Stage

14

Description

- 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/

n/a

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: <u>21-Feb-20</u> Page <u>22</u> of <u>264</u>

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 HPIP VT Results Page 16

Stage

15

Description

- 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/

n/a

3-Angles NDE Report 2020-CF-5862

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project: CF-5862

Site: Comanche Generating Station

Date: 22-Feb-20 Page 23 of 264

	MAGNETIC PAR	TICLE 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: S / EQUIPMENT	IP
PARTICLES: X WET	DRY X FLUORES		n/a
	Magnaflux 14A / 18B071		n/a
WATER CONDITIONER N		Magnaflux WA	· · ·
MAGNETIC PARTICLE B.	-		.1525
	Spectroline AccuMAX	XRP-3000 S/N· 1913223	3/4 Cal Due: 06/13/2020
	Magnaflux EV6000		READING: 3726 μW/cm ²
BLACKLIGHT:	Magnaflux EV6000		
WHITELIGHT METER:	Spectroline AccuMAX		
WHITELIGHT:	At surface of 1		READING: 0.25 fc.
WHITELIGHT:	At surface of p	part	READING: 0.41 fc.
MAGNETIZATION:	Head Shot OUTP	UT: FWDC Circ	cular Amps 4930 TURN
			dinal Amps 1010-1210 6 TURN
MAGNETIZATION:	n/a OUTP		n/a TURN
FIELD VERIFICATION IN		QQI: KSC 230 Sta	andard QQI
MFG:	MXI 10KFW3	s/n: 71000 Cal Due: 0	
MFG: Parker DA-400	S/N: 25009 CAL. DUE:	06/06/2020 / Parker B-300	s/n: 25694 Cal Due: 06/09/20
	INSPECTI	ION RESULTS	
Head Shot and Bucking Fiel	d performed.		
No reportable indications fo	und.		
Rotor demagnetized +/- 5 G	auss.		
NDT Technician: Stephen	Renkavinsky MT/PT/VT III, UT	ΓΙΙ Law	vrence Craig MT/PT/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862

P: (518) 640	<3	an	gle	Sesultina	3angles Inc. 2 Access Road Albany, NY 12 P: (518) 640-3 F: (518) 218-0
--------------	----	----	-----	-----------	--

Project: CF-5862

Site: Comanche Generating Station

Date: 22-Feb-20 Page 24 of 264

	MAGNETI	C PARTICLE IN	SPECTION		
CUSTOMER:		FCS	SS		
PO #:	4900073380	SURFACI	E CONDITION:	Oxide l	Blasted
PROCEDURE/SPE	C: 3A-NDE-2001 REV. 6	ACCEPTA	ANCE STD:	Report I	Findings
MATERIAL DESCI		Com: ERIALS / EQUIP	anche Unit 3 HPIP		
PARTICLES: X V			COLOR:	n/	'a
	Magnaflux 14AM / 18K2			n/a	
_	ONER MFG. / BATCH:		n/a		
	ICLE BATH CONCENTRATION	N:		n/a	
BLACKLIGHT ME	TER: Spectroline Accul	MAX XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
BLACKLIGHT: _	Magnaflux EV600	00 S/N: 242	21	READING:	4004 µW/cm2
BLACKLIGHT: _		n/a		READING:	n/a μW/cm2
WHITELIGHT ME	ΓΕR: Spectroline Accul	MAX XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	At surf	ace of part		READING:	0.41 fc.
WHITELIGHT: _		n/a		READING:	n/a fc.
MAGNETIZATION	I: Yoke	OUTPUT: AC	Longitudina	al Amps n/a	TURN
MAGNETIZATION	I: n/a	OUTPUT: n/a	1	n/a	TURN
MAGNETIZATION	I: n/a	OUTPUT: n/a	- 	n/a	TURN
FIELD VERIFICAT	TION INDICATOR:	QQI	: KSC 4-230 Minia	ature QQI	
MFG:	Parker DA-400		CAL. DUE: 06/	06/2020	
	DA-400 S/N: 25009 CAL.				ue: 06/09/20
	INS	PECTION RESU	LTS		
Hand yoke of covers					
Traine yoke of covers	•				
No reportable indica	tions found.				
NDT Technician:	Stephen Renkavinsky MT/PT/VT	'III, UT II	Lawren	nce Craig MT/P	T/VT II
_					

 $Member\ of\ ASNT\ *SNT\ -TC\ -1A\ Certified\ Technicians$ $3A-NDE-0000P_R9_040419\ _Components\ Report_Magnetic\ Particle\ Testing$

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 22-Feb-20 Project: 22-Feb-20 Page 25 Project: 22-Feb-20 Page 25 Project: 22-Feb-20 Page 25 Project: 22-Feb-20 Page 25 Project: 22-Feb-20



Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	ion		
Date:	22-Feb-20	Page	25	of	264

Page ng mang	LIQUID PENI	ETRANT INSPECTION		
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / C	Cleaned
PROCEDURE/SPEC	: 3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Fine	dings
			•	
MATERIAL DESCR		omanche Unit 3 HPIP Nonmagnet	tic Stages	
		ALS / EQUIPMENT		
CLEANER/REMOVI		Magnaflux SKC-S / 1		
PENETRANT MFG		Magnaflux SKL-WP2		
DEVELOPER MFG /		Magnaflux SKD-S2 /	19A08K	
OTHER MATERIAL		n/a		
BLACKLIGHT MET		n/a	DE L DRIG	
BLACKLIGHT:	n/a		READING:	n/a μW/cm2
BLACKLIGHT:	n/a	WDD 2000 - GAL 1012222/4	READING:	<u>n/a</u> μW/cm2
WHITELIGHT MET			Cal Due: 06/	
WHITELIGHT:	Flashlight: Fenix		READING:	265.4 fc 242.2 fc
WHITELIGHT:	Flashlight: Coas	-	READING:	
PROCESS: X	Color Contrast Floures		able X Water	r Washable
C4	INSPEC	CTION RESULTS		
Stage No reporta	able indications found.	Description		
9				
10 • No reporta	able indications found.			
NDT Technician: S	tephen Renkavinsky MT/PT/VT III,	UT II Lawren	ice Craig MT/PT/V	/T II
	n/a		n/a	
·	Manahan of ACNIT * CD	VIT. TC 1A Contifical Technicisms		

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

3-Angles NDE Report 2020-CF-5862 ... Page 416 of 719

	<3	an	gle	5	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-300 F: (518) 218-049
--	----	----	-----	---	--

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	5-Mar-20	Page	26	of	264

	MAGNETIC PAR	TICLE INS	PECTION		
CUSTOMER:		FCSS	ı		
PO #:	4900073380	SURFACE	CONDITION:	Oxide E	Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTA	NCE STD:	Report F	indings
				•	J
MATERIAL DESCRI			ge 7, 8, 9 Blade At	tachment Serrati	ions
PARTICLES: X WE	MATERIAL ET DRY X FLUORES		COLOR:	n/a	a
MFG. / BATCH:		<u> </u>		n/a	
WATER CONDITION			n/a		
	LE BATH CONCENTRATION:		n/	′a	
BLACKLIGHT METE	ER: 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 METE	ER: Spectroline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due: (06/13/2020
WHITELIGHT:	At surface of 1	part		READING:	0.28 fc.
WHITELIGHT:	Flashlight: Fenix U	JC35_JK		READING:	485 fc.
MAGNETIZATION:	Coil Wrap OUTP	UT: FWDC	Longitudinal	1 Amps 1400	3 TURN
MAGNETIZATION:	n/a OUTP	UT: n/a		n/a	TURN
MAGNETIZATION:	n/a OUTP	UT: n/a		n/a	TURN
FIELD VERIFICATION	ON INDICATOR:		n/a		
MFG:	MXI 10KFW3	s/n: 71000	Cal Due: 06/18	/2020	
MFG:		n/a			
	INSPECTI	ON RESUL	TS		
Coil inspection of the l	HP-IP stage 7, 8, 9 blade root serration	s resulted in	no reportable indic	eations.	
-	ne HP-IP stage 7, 8, 9 blade root serrati		_		
visual hispection of th	le HF-IF stage 7, 8, 9 blade 100t selfati	ons resulted	in no reportable inc	iications.	
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT I	<u> </u>	Lawrence	ce Craig MT/PT	T/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490
	tars it midit	reering and	contamina	1: (316) 216-0490

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

	MAGNETIC PAR	TICLE INSPECTION						
CUSTOMER:		FCSS						
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted					
PROCEDURE/SPEC	C: KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings					
MATERIAL DESCRIPTION: HPIP Stationary Components MATERIALS / EQUIPMENT								
PARTICLES: X W								
<u> </u>	Magnaflux 14A / 18B071	<u> </u>	Magnaflux 1/AM / 18V20V					
WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070 MAGNETIC PARTICLE BATH CONCENTRATION: .1525								
	FER: Spectroline AccuMAX Magnaflux EV6000		Cal Due: 06/13/2020 READING: See Following µW/cm2					
BLACKLIGHT:		9/11. 2337	READING: see Following \(\mu \text{W/cm2} \)					
	TER: Spectroline AccuMAX							
WHITELIGHT:	At surface of p		READING: See Following fc.					
WHITELIGHT:	n/a		READING: n/a fc.					
MAGNETIZATION	: Coil OUTP	UT: HWDC Longitudin	al Amps 1000-1300 3 TURN					
MAGNETIZATION			n/a TURN					
MAGNETIZATION		<u> </u>	n/a TURN					
FIELD VERIFICATION INDICATOR: QQI: KSC 230 Standard QQI								
MFG:	Magnaflux M-500 s/							
MFG:		n/a						
INSPECTION RESULTS								
HP-IP Dianhraom se	t: See following sheet for details							
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 I	I Lawre	nce Craig MT/PT/VT II					
								

Stephen Renkavinsky MT/PT/VT III, UT II

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-NDE-}0000P_R9_040419_Components\ Report_Magnetic\ Particle\ Testing$

3-Angles NDE Report 2020-CF-5862 **Site: Comanche Generating Station** **Proceec** Confidential 2020-CF-5862 Project: CF-5862 Site: Comanche Generating Station** Page 418 of 719



	NDT, Engineering an	nd Consult	ing F: (518) 218-049	Date: 27-1-60-20 1 age	28 01 204
		STA	TIONARY CO	MPONENTS 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
	T	0.42	20.55		2/27/2020
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 14	Lower	0.43	2966 2966	Yes Yes	2/27/2020 2/27/2020
15	Lower Lower	0.43	2966	Yes	2/27/2020
13	Lower	0.43	2900	Tes	2/21/2020
				_	
ļ					

Data sheets of indications and photos on following sheets.

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Stationary Components Report Form

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 Page of 264

CUSTOMER: **FCSS**

SURFACE CONDITION: PO #: 4900073380 Oxide Blasted

MATERIAL DESCRIPTION: **HPIP Stationary Components**

Stage

Description

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

NDT Technician:

Joop Kraijesteijn MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 420 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 Page

ge 30 of 264

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 L

Lawrence Craig MT/PT/VT II

n/

n/a

of 264

3-Angles NDE Report 2020-CF-5862 ...



3U

Project: <u>CF-5862</u>

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>31</u>

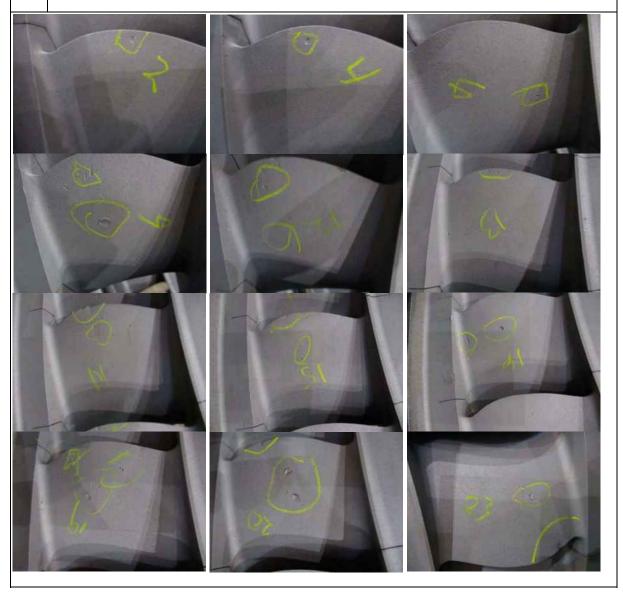
CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• 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

/a n/a

264

3-Angles NDE Report 2020-CF-5862 ... Page 422 of 719



4U

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 32 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

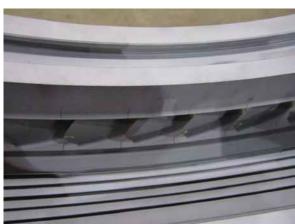
MATERIAL DESCRIPTION: HPIP Stationary Components

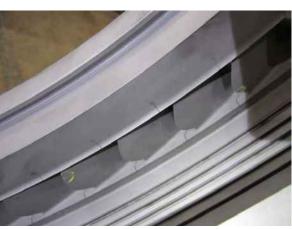
Stage Description

• Foreign object damage found on trailing edges.









n/a

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

<u>____</u>

3-Angles NDE Report 2020-CF-5862 ...

Date: 11-Feb-20



Project: CF-5862
Site: Comanche Generating Station

Page

33

of 264

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

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• Foreign object damage found on trailing edges.

5U







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

n/a n/a

3-Angles NDE Report 2020-CF-5862 ... Page 424 of 719



6U

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

34

of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• Foreign object damage found on trailing edges.







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

/a n/a

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

35 of 264

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

n/a

264

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: 13-Feb-20 Page 36 of

CUSTOMER: FCSS

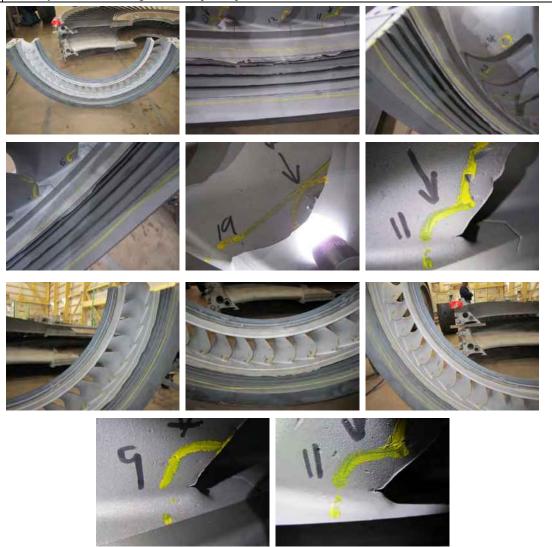
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

Description

- Heavy foreign object damage found on all trailing edges.
- Thinning of all trailing edges.
- 10U
- 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

n/a

264

3-Angles NDE Report 2020-CF-5862 ... Page 427 of 719



3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 13-Feb-20 Page 37 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

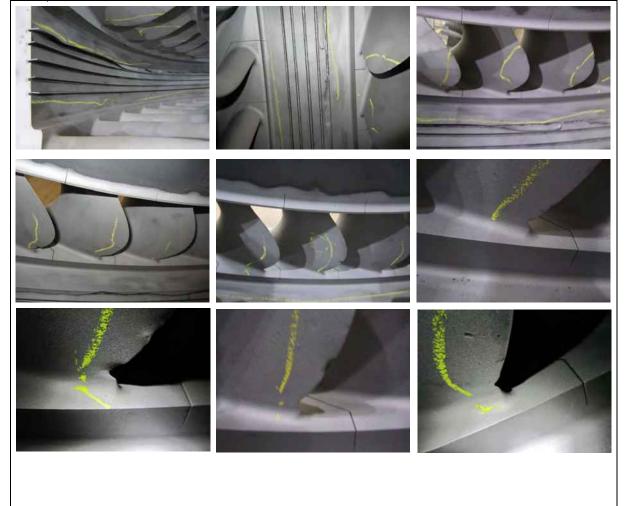
Stage

Description

- Foreign object damage found on all trailing edges.
- Thinning of all trailing edges.

11U

- 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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 428 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 13-Feb-20 Page 38 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

12U

Description

- 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

a n/a

264

3-Angles NDE Report 2020-CF-5862 ... Page 429 of 719



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 39 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

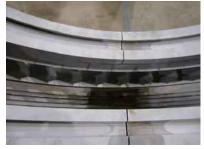
Stage Description

• 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 11-Feb-20

Page

of 264

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

264

3-Angles NDE Report 2020-CF-5862 ... Page 431 of 719



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

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

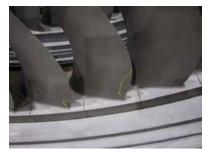
Stage Description

• Foreign object damage found on trailing edges.











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

/a n/a



1L

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

- 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

3-Angles NDE Report 2020-CF-5862



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

• Discharge: #26, 27, 31-33, 43, 44, 46, 48, 50 mild FOD 2L

Spill strips damaged



NDT Technician:

Joop Kraijesteijn MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/a



3L

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20

Page 44 of 264

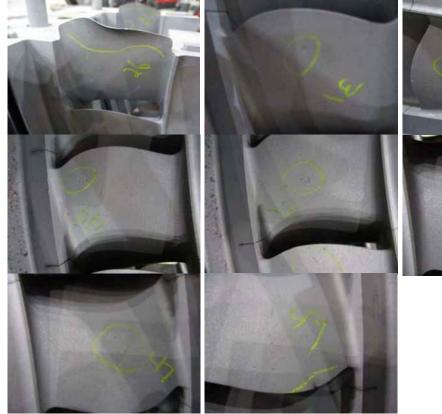
CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

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





n/a

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

<u>____</u>



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

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/

n/a

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: 27-Feb-20 Page 46

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• Discharge: #29, 33 mild FOD

5L





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

n/a

n/a

3-Angles NDE Report 2020-CF-5862 ...



6L

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 Page

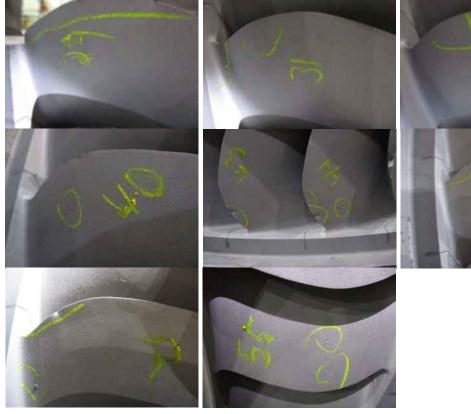
CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• 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

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: 27-Feb-20 Page 48

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

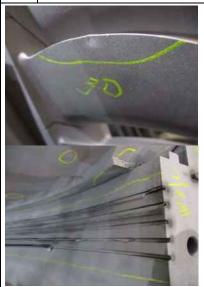
MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

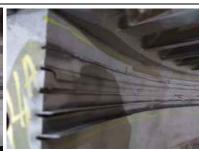
8L

• 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

264

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: 27-Feb-20 Page 49 of

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

n/a

3-Angles NDE Report 2020-CF-5862



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**

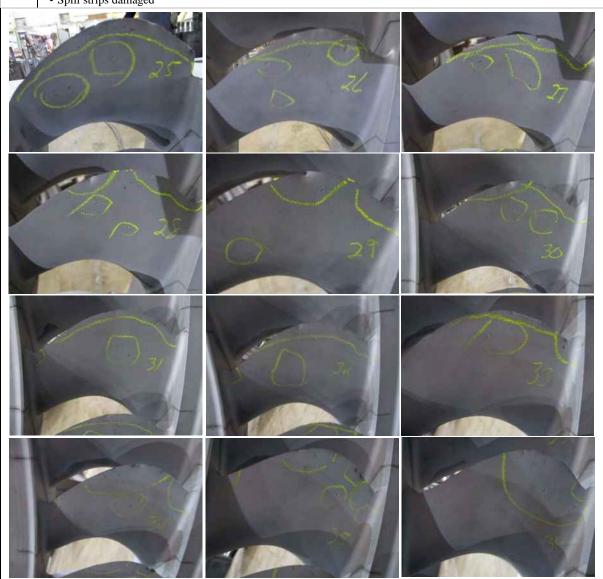
Stage

10L

Description

• 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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>51</u> of <u>264</u>

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

Description

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



NDT Technician:

Joop Kraijesteijn MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/a

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>52</u> of <u>264</u>

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

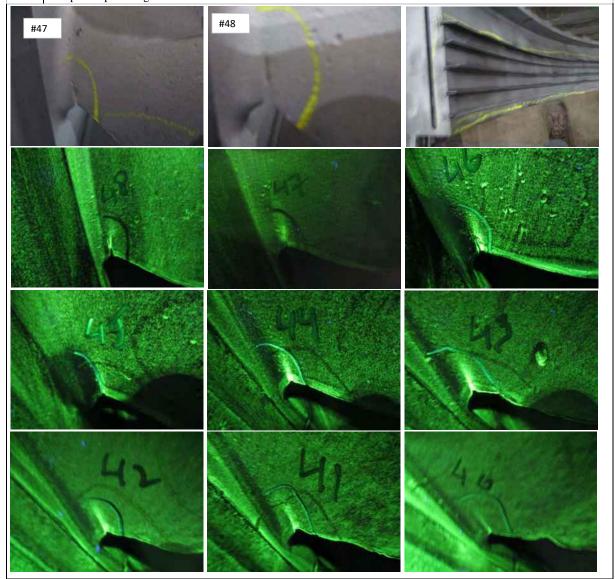
MATERIAL DESCRIPTION: HPIP Stationary Components

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>53</u> of <u>264</u>

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

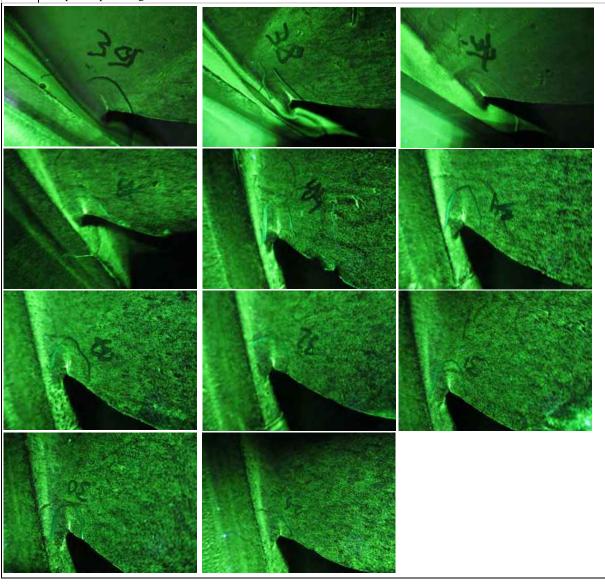
MATERIAL DESCRIPTION: HPIP Stationary Components

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/

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>54</u> of <u>264</u>

CUSTOMER: FCSS

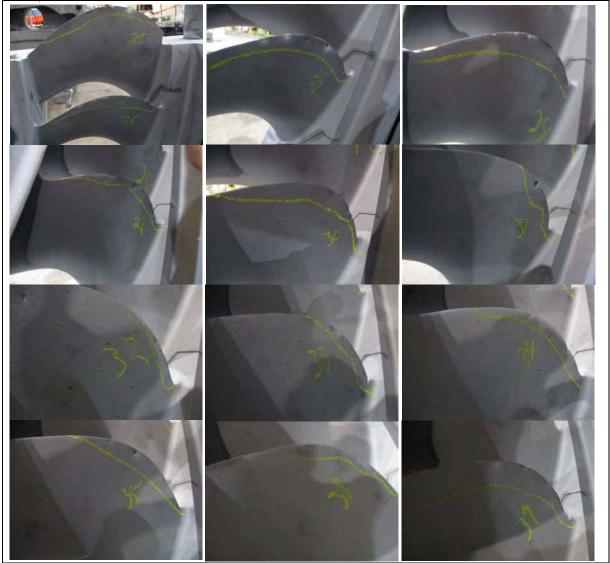
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

Description

- 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/

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

55

of 264

Date: 27-Feb-20 Page

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage

• Discharge: #25-36, 38-46, 48 mild to heavy FOD

11L • Ac (cont.) • L/

• Admission: #32 FOD

L/S horizontal joint FODR/S horizontal joint one broken stud



NDT Technician:

Joop Kraijesteijn MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/

n/a



Project: CF-5862

Site: Comanche Generating Station

Date: <u>27-Feb-20</u> Page <u>56</u> of <u>264</u>

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

 Stage
 Description

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

12L



NDT Technician:

Joop Kraijesteijn MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/

n/a

264

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: 27-Feb-20 Page 57 of

CUSTOMER: FCSS

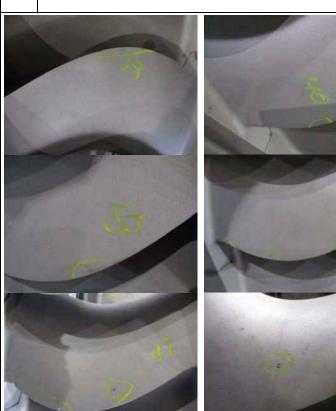
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

 Stage
 Description

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

12L (cont.)





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

n/a

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 448 of 719



3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

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

3-Angles NDE Report 2020-CF-5862 ...



14L

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 Page 59

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: HPIP Stationary Components

Stage Description

• 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

<3	angles
	NDT. Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 P

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

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	27-Feb-20	Page	61	of	264

	MAGNETIC PAR	RTICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC	C: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCR		HPIP Diaphragm Bolts	
DADTICI EG VV		S / EQUIPMENT	
PARTICLES: X W		<u> </u>	
	Magnaflux 14A / 18B071		
	ONER MFG. / BATCH:		
	CLE BATH CONCENTRATION:		525
	TER: Spectroline AccuMAX		
BLACKLIGHT:	Magnaflux EV6000	S/N: 2559	READING: 2966 μW/cm2
BLACKLIGHT:	n/a		READING: $n/a \mu W/cm2$
WHITELIGHT MET	ER: 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 OUTP	UT: HWDC Longitudina	al Amps 1000-1300 3 TURN
MAGNETIZATION	:OUTP	UT: n/a	n/a TURN
MAGNETIZATION		UT: n/a	n/a TURN
FIELD VERIFICATI	ION INDICATOR:	QQI: KSC 230 Stand	ard QQI
MFG:	Magnaflux M-500 s	/n: 82127 Cal Due: 06/09	9/2020
MFG:		n/a	
	INSPECT	ION RESULTS	
Magnetic particle ins	pection of the HPIP diaphragm bolting	resulted in no reportable indica	tions.
Demagnetized +/- 3 (Gauss.		
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT I	I Lawren	nce Craig MT/PT/VT II
	n/a		n/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 27-Feb-20 Page 62 of 264

	igineering and or	1.1	ULTRAS	ONIC INSI	PECTION		
CUSTOMER:				I	FCSS		
PO #:	4900	0073380		SURFA	CE CONDITI	ON:	In Service / Cleaned
PROCEDURE/SPEC	: KT-I	NDE-1003 I	REV. 3.2	ACCEI	PTANCE STD:		Report Findings
MATERIAL DESCR	AIPTION:		MATERI	HP ALS / EQU	PIP Diaphragm	Bolting	
UT SCOPE:			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				COUPLANT
	Г USMGO		1100358	CAL D	UE: 01/06/21		SAE 30
TRANSDUCER: LO	ONGITUDN.	AL					
MFG: GEIT Gam TRANSDUCER: SI		" Round	Fre	equency: 5M EDGE:	IHz. S/N	: 14A001	0A DELAY: 0.305
MFG:			n/a				DELAY: n/a
CAL BLOCK:	IIV	V: B06111		I INFA	RITY PERFOI	RMFD.	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	
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 Tarkeinia	T T7 ''		TATH I				

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

<3	an	gl	es d Consulting	3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGIN	issunft am	a consuming	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	ion		
Date:	26-Feb-20	Page	63	of	264

	MAGNETIC PAR	TICLE 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/F S / EQUIPMENT	H
PARTICLES: X WET	DRY X FLUORES		m/o
—	Magnaflux 14A / 18B071		n/a n/a
WATER CONDITIONER			
	BATH CONCENTRATION:	n	
	Spectroline AccuMAX		Cal Due: 06/13/2020
	Magnaflux EV6000		READING: 7183 μW/cm2
BLACKLIGHT:	n/a		READING: n/a µW/cm2
	Spectroline AccuMAX		·
WHITELIGHT:	At surface of p		READING: 0.35 fc.
WHITELIGHT:	n/a		READING: n/a fc.
MAGNETIZATION:	Coil OUTP	UT: HWDC Longitudina	1 Amps 1000 3 TURN
<u></u>	n/a OUTP	UT: n/a	n/a TURN
<u></u>	n/a OUTP	UT: n/a	n/a TURN
FIELD VERIFICATION I	<u> </u>	n/a	
MFG:	Magnaflux M-500 s/	n: 82127 Cal Due: 06/09/	/2020
MFG:		n/a	
	INSPECTI	ION RESULTS	
Magnetia mentiala inemaeti	on of the LID and ID Innan Casings	I /II magultad in ma manantahla in	diactions
wagnetic particle inspection	on of the HP and IP Inner Casings	L/H resulted in no reportable in	dications.
HP		LP	
NDT Technician: Joo	p Kraijesteijn MT/PT/VT III, UT I	I Lawren	ce Craig MT/PT/VT II

3-Angles NDE Report 2020-CF-5862 ... Page 454 of 719

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 26-Feb-20 Page 64 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: HP and IP Inner Case Bolting

MATERIAL DESCRI	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



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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

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













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

Lawrence Craig MT/PT/VT II

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 457 of 719

< 3	angles	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000
	NDT, Engineering and Consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Generating Station				
Date:	27-Feb-20	Page	67	of	264

MAGNETIC PARTICLE INSPECTION				
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted	
PROCEDURE/SPE	C: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings	
		•		
MATERIAL DESCI		N2 Packing Casing L/H LS / EQUIPMENT		
PARTICLES: X V		SCENT COLOR:	n/o	
	Magnaflux 14A / 18B071		n/a	
	ONER MFG. / BATCH:			
	ICLE BATH CONCENTRATION:		/a	
BLACKLIGHT ME	ΓΕR: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
	Magnaflux EV6000			
BLACKLIGHT:	n/a		READING: n/a μW/cm2	
WHITELIGHT MET	TER: Spectroline AccuMAX			
WHITELIGHT:	At surface of	part	READING: 0.43 fc.	
WHITELIGHT: _	n/a		READING: n/a fc.	
MAGNETIZATION	: Coil OUTP	PUT: HWDC Longitudina	al Amps 1000 3 TURN	
MAGNETIZATION	: n/a OUTP	PUT: n/a	n/a TURN	
MAGNETIZATION	: n/a OUTP	PUT: n/a	n/a TURN	
FIELD VERIFICAT	ION INDICATOR:	n/a		
MFG:	Magnaflux M-500 s	/n: 82127 Cal Due: 06/09	0/2020	
MFG:		n/a		
	INSPECT	TON RESULTS		
Magnetic particle in	spection of the N2 Packing Casing L/H 1	resulted in no reportable indicat	ions.	
Wagnetie partiere in	poetion of the 142 rucking Cusing E 111	resurred in no reportuoie indicae	10115.	
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT	II Lawren	ace Craig MT/PT/VT II	

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 27-Feb-20 Page 68 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: N2 Packing Casing Bolting L/H

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 NR
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
		ļ.		ļ		<u>!</u>	<u> </u>

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



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

Project:	CF-5862					
Site:	Site: Comanche Generating Station					
Date:	27-Feb-20	Page	69	of	264	

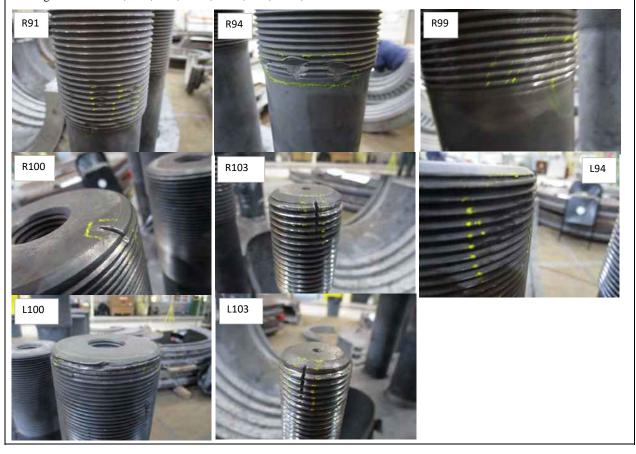
VISUAL INSPECTION REPORT						
CUSTOMER: FCSS						
4900073380	SURFACE CONDITION:	Oxide Blasted				
KT-NDE-4004 REV. 0	ACCEPTANCE STD:	Report Findings				
	4900073380	FCSS 4900073380 SURFACE CONDITION:				

MATERIAL DESCRIPTION: N2 Packing Casing Bolting

	INSPECTION RESULTS		
WHITELIGHT METER	R: 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

3-Angles NDE Report 2020-CF-5862 ... Page 460 of 719

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

Project: CF-5862				
Site: Comanche Ger				
Date: 27-Feb-20	Page	70	of	264

	MAGNETICIAN	TICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPE	EC: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESC		Rings U/H and L/H; N3 inner L S / EQUIPMENT	/H; N1 inner L/H
PARTICLES: X			n/a
MFG. / BATCH:	Magnaflux 14A / 18B071	<u> </u>	n/a
·-	IONER MFG. / BATCH:		/ 18J070
	TICLE BATH CONCENTRATION:		/a
BLACKLIGHT MI	ETER: 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 ME	ETER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020
WHITELIGHT:	At surface of p	part	READING: 0.43 fc.
WHITELIGHT:	n/a		READING: n/a fc.
MAGNETIZATIO	N: Coil OUTPU	UT: HWDC Longitudina	l Amps 1000 3 TURN
MAGNETIZATIO	N: n/a OUTPU	UT: n/a	n/a TURN
MAGNETIZATIO	N:OUTPU	UT: n/a	n/a TURN
FIELD VERIFICA	TION INDICATOR:	n/a	
MFG:	Magnaflux M-500 s/1	n: 82127 Cal Due: 06/09	/2020
MFG:		n/a	
	INSPECTI	ON RESULTS	
Magnetic particle in	nspection of the following components res	ulted in no reportable indicatio	ns:
- HP Dummy Rings	s U/H and L/H		
- N3 inner L/H			
- N1 inner L/H: sor	ne mechanical damage see picture		
			1 1 1 1 1 1 1 1
			ANGELLA
			S2
		100	116
			The second second
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT II	Lawren	ce Craig MT/PT/VT II

<3	angles
	NDT, Engineering and Consulting

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

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 Bol

MATERIAL DESCRI	PTION:			N2	Packing Casing	Bolting	
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
HP Dummy rings studs L/H HP Dummy rings	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



Project: CF-5862
Site: Comanche Generating Station
Date: 28-Feb-20 Page 72 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: IP Inlet Casing U/H and L/H Welds

		INSPEC	TION RESU	LIS			
WHITELIGHT MET	ER: Spectr	line 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
	-	

< jarigles 2 Ac Alban P: (5	ngles Inc access R any, NY (518) 64
-----------------------------	--

12205

Project: <u>CF-5862</u> Site: Comanche Generating Station

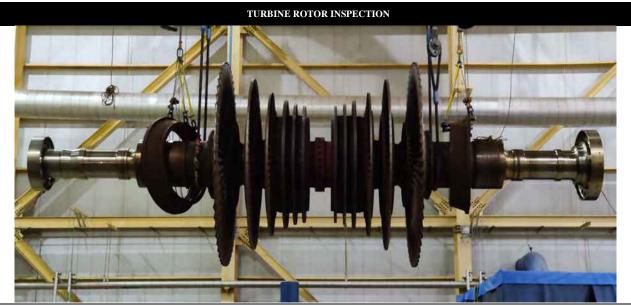
NDT, Eng	ineering and Co	P:	(518) 640-3000 (518) 218-0490		Date: 2-Mar-	20	Pag	e <u>73</u>	of_	264
	edi			ONIC INSI	PECTION					
CUSTOMER:				F	FCSS					
PO #:	490	0073380		SURFA	ACE CONDITION	ON:	In	Service / C	lean	ed
PROCEDURE/SPEC:	KT-	NDE-1003 I	REV. 3.2	ACCEI	PTANCE STD:			Report Fine	lings	
MATERIAL DESCRI	PTION:		MATERI	ALS / EQU	HPIP Casing S	tuds				
UT SCOPE:								COUPL	ANT	1
MFG: GEIT TRANSDUCER: LO	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21			SAE	30	
MFG: GEIT Gamr TRANSDUCER: SH	na .500 EAR)" Round		equency: 5M EDGE:	1Hz. S/N	: 14A00	10A	DELAY:		0.293
MFG:			n/a					DELAY:		n/a
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFOR	RMED:		Ok	(
			INSPE	CTION RE	SULTS					
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE		FIN	DINGS	
R/L 1	53.8	65.8	2	40.854	4.5	2-Ma	r N	No reportab	le ind	lications.
R/L 2, 3, 34, 35	44	56	8	35.695	3.75	2-Ma	r N	No reportab	le ind	lications.
R/L 4, 5, 6, 32, 33	48.2	60.2	10	50.091	3.75	2-Ma	r N	No reportab	le ind	lications.
R/L 7, 29, 30, 31	51.6	63.6	8	50.888	4	2-Ma	r N	No reportab	le ind	lications.
R/L 8, 9, 10, 12, 13, 14, 15, 16, 17	55.2	67.2	18	51.51	4.25	2-Ma	r N	No reportab	le ind	lications.
R/S 11	50	62	2	53.014	4.5	2-Ma	r N	No reportab	le ind	lications.
R/L 18, 19, 20, 21, 22, 23	51.6	63.6	12	37.864	4.25	2-Ma	r N	No reportab	le ind	lications.
R/L 24	46.6	58.6	2	42.35	4.75	2-Ma	r N	No reportab	le ind	lications.
R/L 25, 26	51.6	63.6	4	39.789	4.75	2-Ma	r N	No reportab	le ind	lications.
R/L 27, 28	51.6	63.6	4	51.489	4.5	2-Ma	r N	No reportab	le ind	ications.
R/L 36, 37, 38	51.8	63.8	6	29.045	3.75	2-Ma	r N	No reportab	le ind	ications.
R/L 39	59	71	2	23.234	3.5	2-Ma	r N	No reportab	le ind	ications.
R/L 40	50.2	62.2	2	40.357	3.5	2-Ma	r N	No reportab	le ind	ications.
R/L 41	53.2	65.2	2	37.662	3.5	2-Ma	r N	No reportab	le ind	ications.
NDT Tachnician		ataiin MT/D	mam III I			•				

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



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

Project #:	CF-5	862				
Site:	Comanche Gen	Comanche Generating Station				
Date:	8-Feb-20	Page	74	of	264	



TEST EXAMINER(S):			Stephen Renkav	insky, Lawrence Craig, Joop Kraijesteijn		
ROTOR UNIT:				Unit #3 LPA		
TYPE (SINGLE FLOW / DUAL FL	FLOW / DUAL FLOW): Dual		al	NUMBER OF STAGES: 6 (12)		
TEST METHOD (S) UTILIZEI	ZEI Magnetic Parti			Particle, Liquid Penetrant, Visual Testing		
DATE(S) TESTED:	02/05/2020 - 03/03/2020					
MISCELLANEOUS INFORMATION:						
INSPECTION	INDICATIONS			ROTATING BLADE LOCATION KEY		
RESULTS OF:	NOTED:			VIEW FACING GENERATOR END COUPLING		
ROTOR SPINDLE	YES	NO X	N/A	Notch Bucket CW BUCKET COUNT		
PACKING GROOVES		X				
JOURNALS		X				
COUPLING		X				
ROTATING BLADING	X					
EROSION SHIELDS	X			CCW Bucket Count		
TIE-WIRES			X	X CW COUNT CCW COUNT		
COVERS	X			A CW COUNT		
TENONS			X	NOTE: WHERE APPLICABLE, THE NOTCH BUCKET SHALL BE CALLED #1 AND NUMBERED SEQUENTIALLY IN EITHER A CW OR CCW MANNER; IF NOT, BLADE #1		
PHOTOS INCLUDED	X					
NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL				REFERENCE SHALL BE PROVIDED.		
REQUIRE A DETAILED DESCRIPTION OF FINDINGS.						

Member of ASNT*SNT-TC-1A Certified Technicians

3A-NDE-0000P_R9_040419 _Components Report_Rotor Inspection Form

		1		_		
<	3	ar	ng	le:		3angles Inc. 2 Access Road Albany, NY 12 P: (518) 640-36
		NDT, En	gineering	and Consu	iting	F: (518) 218-0

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

NDT	Engineering and Consulting F: (518)	218-0490	Date. 3-1-c0-20	rage	01 204
		UAL INSPECTION	NREPORT		
CUSTOMER:		F	CSS		
COSTOWILK.			CDD		
PO #:	4900073380	SURFA	CE CONDITION:	Oxide Blas	ted
PROCEDURE/SP	EC: KT-NDE-4005 RE	V. 1 ACCEP	TANCE STD:	Report Find	ings
MATERIAL DES	CRIPTION:	Co	omanche Unit 3 LPA		
		INSPECTION RES			
WHITELIGHT MI WHITELIGHT:		ccuMAX XRP-300 ht: Fenix UC35_SR		Cal Due: 06/1 READING:	
WHITELIGHT:		ght: Coast HX5_LC		READING:	175.5 fc. 171.6 fc.
		_			
Reportable indicat	ions found. See following pag	es for a list of details	and nictures		
Reportable indicat	ions found. See following pag	es for a fist of details	and pictures.		
NIDT To also tele	Charless Daulses's 1- NATE/IV		τ.	on as Cosis MEDDE	
NDT Technician:	Stephen Renkavinsky MT/P	1/ V I III, U I II	Lawre	ence Craig MT/PT/V	1 11
	n/a			n/a	
	Mombor of	ACNIT & CNIT TO 1A	Cortified Technicians		

 $\label{lem:member of ASNT * SNT - TC - 1A Certified Technicians} $3A-NDE-0000P_R9_040419 $$ Components Report_Visual Testing$

3-Angles NDE Report 2020-CF-5862 ... Page 466 of 719

< 3 angles	3angles Inc.	Project: CF-5862					
	2 Access Road Albany, NY 12205 P: (518) 640-3000	Site: Comanche Generating Station					
		Date: 5-Feb-20	Page	76	of	264	
	tars it residing a und soute a unit	F: (518) 218-0490					

	NDT, Engineering and Consulting F: (518) 218-0490		
CUSTO	OMER:	FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
	RIAL DESCRIPTION:	Comanche Unit 3 LPA VT Results	
Stage	 Erosion found on all Z locks. 	Description	
L-0 T	 General erosion found on erosion shields. Foreign object damage found in Erosion Shields Light pitting found on wheel dovetails and body. 	on blades: 27,32,35,42,46,51 and 62	2
L-1 T	 Erosion/pitting present Pitting found on all blades. Mostly around snubb	pers and on the admission side.	
L-2 T	 Erosion/pitting present Light pitting found on wheel dovetails and body.		
L-3 T	 Ergit pitting round on wheel dovetans and body. Erosion/pitting present 		
L-4 T	• Light foreign object damage found on leading ed	ges.	
L/-4 I	Pitting found on all blades.		
L-5 T	Light foreign object damage found on leading edPitting found on all blades.	_	
L-5 G	Light foreign object damage found on leading edPitting found on all blades.	_	
L-4 G	Light foreign object damage found on leading edPitting found on all blades.	ges.	
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 snubb	pers and on the admission side.	
	Erosion found on all Z locks.		
L-0 G	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	
			_

264

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: 5-Feb-20 Page 77 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 1

Stage

Description

- Erosion found on all Z locks.
- General erosion found on erosion shields.
- L-0 T
- 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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



Project: <u>CF-5862</u>
Site: Comanche Generating Station

Date: 5-Feb-20 Page 78 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 2 Stage Description • Erosion/pitting present 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/

n/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 79 of 264

NI NI	DT, Engineering and Consulting	Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490	Date: <u>5-Feb-20</u>	Page Page	
CUSTOMER:			FCSS		
) #:	4900073380		SURFACE CONDITION:	Oz	xide Blasted
ATERIAL DE tage	ESCRIPTION:	C	Comanche Unit 3 LPA VT Result	Its Page 3	
• Erosi	ion/pitting present t pitting found on wheel do				

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

of 264

3-Angles NDE Report 2020-CF-5862



L-3 T

Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 80

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 4

Stage Description • Erosion/pitting present









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

3-Angles NDE Report 2020-CF-5862 Page 471 of 719



Project: CF-5862

Site: Comanche Generating Station

81

of 264

Date: 5-Feb-20 Page

CUSTOMER: **FCSS**

4900073380 SURFACE CONDITION: Oxide Blasted PO #:

MATERIAL DESCRIPTION:

Comanche Unit 3 LPA VT Results Page 5

Stage

Description

• Light foreign object damage found on leading edges. L-4 T







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

n/a

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-NDE-}0000P_R9_040419_Components\ Report_Continuation\ Sheet$

264

3-Angles NDE Report 2020-CF-5862 ... Page 472 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 82 of

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

/a n/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

of 264

3-Angles NDE Report 2020-CF-5862 Page 473 of 719



Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 83

CUSTOMER: **FCSS**

4900073380 SURFACE CONDITION: PO #: 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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 84 of 264

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.













n/a



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

/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page

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







n/a

85

of 264





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

/a_____

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20

Page

of 264

86 CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 10 Stage Description • Erosion/pitting present L-3 G

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

n/a

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-NDE-}0000P_R9_040419_Components\ Report_Continuation\ Sheet$

of 264

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: 5-Feb-20 Page 87

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.





n/a



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

<u>_____</u>

of 264

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: 5-Feb-20 Page 88

CUSTOMER: FCSS

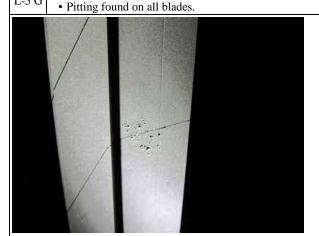
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA VT Results Page 12

Stage

Description

L-5 G • Light foreign object damage found on leading edges.







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

3-Angles NDE Report 2020-CF-5862 ... Page 479 of 719

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862					
Site:	Comanche Generating Station					
Date:	6-Feb-20	Page	89	of	264	

PO#: 4900073380 SURFACE CONDITION: Oxide Blasted PROCEDURE/SPEC: 3A-NDE-2001 REV. 6 ACCEPTANCE STD: Report Findings MATERIALS DESCRIPTION: Comanche Unit 3 LPA MATERIALS / EQUIPMENT PARTICLES: X WET DRY X FLUORESCENT COLOR: n/a WATER CONDITIONER MFG / BATCH: Magnaflux 14A / 18B071 MFG / BATCH: n/a WATER CONDITIONER MFG / BATCH: Magnaflux WA-2B / 18J070 MAGNETIC PARTICLE BATH CONCENTRATION: .1525 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 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: 0.66 fc. WHITELIGHT: At su	MAGNETIC PARTICLE INSPECTION							
MATERIAL DESCRIPTION: Comanche Unit 3 LPA	CUSTOMER:		FCSS					
MATERIAL DESCRIPTION: Comanche Unit 3 LPA MATERIALS/ EQUIPMENT PARTICLES: X WET DRY X FLUORESCENT COLOR: n/a MAGNETIC Magnaflux 14A / 188071 MFG. / BATCH: n/a WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 181070 MAGNETIC PARTICLE BATH CONCENTRATION: .1525 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 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: 0.64 fc. MAGNETIZATION: Head Shot OUTPUT: FWDC Circular Amps 3220-8820 TURN MAGNETIZATION: Bucking Field OUTPUT: FWDC Longitudinal Amps 1000-1300 6 TURN MAGNETIZATION: Bucking Field OUTPUT: WDC Longitudinal Amps 1000-1300 6 TURN MAGNETIZATION: 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.	PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted				
MATERIAL DESCRIPTION: Comanche Unit 3 LPA MATERIALS/ EQUIPMENT PARTICLES: X WET DRY X FLUORESCENT COLOR: n/a MAGNETIC Magnaflux 14A / 188071 MFG. / BATCH: n/a WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 181070 MAGNETIC PARTICLE BATH CONCENTRATION: .1525 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 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: 0.64 fc. MAGNETIZATION: Head Shot OUTPUT: FWDC Circular Amps 3220-8820 TURN MAGNETIZATION: Bucking Field OUTPUT: FWDC Longitudinal Amps 1000-1300 6 TURN MAGNETIZATION: Bucking Field OUTPUT: WDC Longitudinal Amps 1000-1300 6 TURN MAGNETIZATION: 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.	PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings				
MATERIALS / EQUIPMENT DRY X FLUORESCENT COLOR: n/a MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a MATERIALS / EQUIPMENT MAGNETIC PARTICLE BATCH: Magnaflux WA-2B / 18J070 MAGNETIC PARTICLE BATH CONCENTRATION: .1525				T and G				
PARTICLES: X WET	MATERIAL DESCRIPTIO							
MFG. / BATCH: Magnaflux 14A / 18B071 MFG. / BATCH: n/a WATER CONDITIONER MFG. / BATCH: Magnaflux WA-2B / 18J070 MAGNETIC PARTICLE BATH CONCENTRATION:								
WATER CONDITIONER MFG. / BATCH: MAGNETIC PARTICLE BATH CONCENTRATION: 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 METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020 WHITELIGHT: At surface of part READING: 0.64 fc. WHITELIGHT: READING: 0.64 fc. WHITELIGHT: READING: 0.64 fc. READING:			<u> </u>	n/a				
MAGNETIC PARTICLE BATH CONCENTRATION:	MFG. / BATCH:	Magnaflux 14A / 18B071	MFG. / BATCH:	n/a				
BLACKLIGHT METER: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020 BLACKLIGHT: Magnaflux EV6000 S/N: 2559 READING: 4161 µWcm² BLACKLIGHT: Magnaflux EV6000 S/N: 2421 READING: 4322 µWcm² BLACKLIGHT: Spectroline AccuMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/13/2020 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 READING: 0.64 fc. WHITELIGHT: AT SURFACE READING: 0.64 fc. WHITELIGHT: ACCUMAX XRP-3000 S/N: 1913223/4 Cal Due: 06/18/2020 TURN MAGNETIZATION: Bucking Field OUTPUT: FWDC Longitudinal Amps 1000-1300 fc. TURN MAGNETIZATION: n/a OUTPUT: n/a n/a n/a n/a TURN FIELD VERIFICATION INDICATOR: QQI: KSC 4-230 Miniature QQI MFG: MXI 10KFW3 s/n: 7100 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. Retading: At surface of part READING: All Due: 06/09/20 INSPECTION RESULTS READING: All Due: 06/18/2020 TURN FOR DETAIL DUE: 06/06/2020 / Parker B-300 s/n: 25694 Cal Due: 06/09/20 INSPECTION RESULTS READING: All Due: 06/18/2020 READING: All Due: 06/18/202	WATER CONDITIONER N	MFG. / BATCH:	Magnaflux WA-2E	3 / 18J070				
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	MAGNETIC PARTICLE B	ATH CONCENTRATION:	.15	525				
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: READING: 0.64 fc. WEADING: READING: 0.64 fc. WHITELIGHT: READING: 0.64 fc. WHAGNETIZATION: Head Shot OUTPUT: WHITELIGHT: READING: 0.64 fc. WHAGNETIZATION: n/a OUTPUT: WHITELIGHT: N/a n/a 1000-1300 fc. TURN MAGNETIZATION: n/a OUTPUT: n/a n/a 1000-1300 fc. WHITELIGHT: N/a N/a 1000-1300 fc. WHAGNETIZATION: n/a OUTPUT: WHITELIGHT: N/a n/a 1000-1300 fc. WHOTH INTERVIEW N/A	BLACKLIGHT METER:	Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020				
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: 0.64 fc. WHITELIGHT: At surface of part READING: 0.48 fc. WHITELIGHT: At surface of part READING: 0.48 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 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.	BLACKLIGHT:	Magnaflux EV6000	S/N: 2559	READING: 4161 μW/cm2				
WHITELIGHT: At surface of part READING: 0.64 fc. WHITELIGHT: At surface of part READING: 0.48 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.	BLACKLIGHT:	Magnaflux EV6000	S/N: 2421	READING: 4322 μW/cm2				
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 n/a TURN MAGNETIZATION 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.	WHITELIGHT METER:	Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020				
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 MAGNETIZATION 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.	WHITELIGHT:	At surface of	part	READING: 0.64 fc.				
MAGNETIZATION: Bucking Field OUTPUT: FWDC	WHITELIGHT:	At surface of	part	READING: 0.48 fc.				
MAGNETIZATION: Bucking Field OUTPUT: FWDC Longitudinal Amps 1000-1300 6 TURN MAGNETIZATION: n/a OUTPUT: n/a OUTPUT: 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 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.	MAGNETIZATION:	Head Shot OUTP	UT: FWDC Circula	ar Amps 3220-8820 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.	MAGNETIZATION:	Bucking Field OUTP	UT: FWDC Longitudina	al Amps 1000-1300 6 TURN				
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.	MAGNETIZATION:	n/a OUTP	UT: n/a	n/a TURN				
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.	FIELD VERIFICATION IN	DICATOR:	QQI: KSC 4-230 Mini	ature QQI				
Head Shot and Bucking Field performed. Reportable indications found. See following sheet for a list of details and pictures. Rotor demagnetized +/- 5 Gauss.	MFG:	MXI 10KFW3	s/n: 71000 Cal Due: 06/1	8/2020				
Head Shot and Bucking Field performed. Reportable indications found. See following sheet for a list of details and pictures. Rotor demagnetized +/- 5 Gauss.	MFG: Parker DA-400	S/N: 25009 CAL. DUE:	06/06/2020 / Parker B-300 s/	n: 25694 Cal Due: 06/09/20				
Reportable indications found. See following sheet for a list of details and pictures. Rotor demagnetized +/- 5 Gauss.		INSPECT	ION RESULTS					
Reportable indications found. See following sheet for a list of details and pictures. Rotor demagnetized +/- 5 Gauss.	Hood Shot and Rucking Fiel	d performed						
Rotor demagnetized +/- 5 Gauss.	Tread Shot and Ducking Fiel	d performed.						
Rotor demagnetized +/- 5 Gauss.	Reportable indications found	d. See following sheet for a list of	of details and nictures					
	Reportable indications found	a. See following sheet for a fist (or details and pictures.					
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II	Rotor demagnetized +/- 5 G	auss.						
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II	C							
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II								
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II								
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II								
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II								
	NDT Technician: Stephen	Renkavinsky MT/PT/VT III, U	Γ II Lawren	nce Craig MT/PT/VT II				

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

<3angles	3ansles Inc. Project: CF-5862							
	2 Access Road	Site: Comanche Ger	nerating Sta	tion				
	Albany, NY 12205 P: (518) 640-3000	Date: 6-Feb-20	Page	90	of	264		
	NDT, Engineering and Consulting	F: (518) 218-0490	· · · · · · · · · · · · · · · · · · ·	•				Ī

CUSTOMER: PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Description L-0 G • No reportable indications found. • 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-4 T • No reportable indications found. L-4 T • No reportable indications found. L-1 T • No reportable indications found. L-1 T • No reportable indications found. -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	
MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Description L-0 G No reportable indications found. 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-1.5" crack-like indications on discharge side of all snubbers.	
Stage L-0 G • No reportable indications found. - 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-4 T • No reportable indications found. L-3 T • No reportable indications found. L-2 T • No reportable indications found. - 1-1.5" crack-like indications on discharge side of all snubbers.	
Stage L-0 G • No reportable indications found. - 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-4 T • No reportable indications found. L-3 T • No reportable indications found. L-2 T • No reportable indications found. - 1-1.5" crack-like indications on discharge side of all snubbers.	
L-0 G • No reportable indications found. • 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. - 1-1.5" crack-like indications on discharge side of all snubbers.	
 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. 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. 1-1.5" crack-like indications on discharge side of all snubbers. 	
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. - 1-1.5" crack-like indications on discharge side of all snubbers.	
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. - 1-1.5" crack-like indications on discharge side of all snubbers.	
L-4 T • No reportable indications found. L-3 T • No reportable indications found. L-2 T • No reportable indications found. • 1-1.5" crack-like indications on discharge side of all snubbers.	
L-4 T • No reportable indications found. L-3 T • No reportable indications found. L-2 T • No reportable indications found. • 1-1.5" crack-like indications on discharge side of all snubbers.	
L-4 T • No reportable indications found. L-3 T • No reportable indications found. L-2 T • No reportable indications found. • 1-1.5" crack-like indications on discharge side of all snubbers.	
L-3 T • No reportable indications found. L-2 T • No reportable indications found. • 1-1.5" crack-like indications on discharge side of all snubbers.	
• 1-1.5" crack-like indications on discharge side of all snubbers.	
• 1-1.5" crack-like indications on discharge side of all snubbers.	
2-1 1 Multiple crack-like indications found on an oraces on admission side towards foot 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	

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

n/a n/a

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 6-Feb-20 Page of 264

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

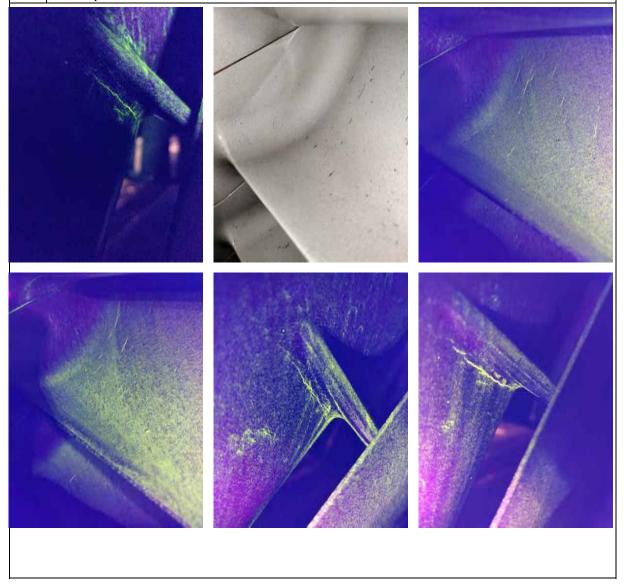
MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Page 1

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

Member of ASNT * SNT - TC - 1A Certified Technicians

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 6-Feb-20 Page of 264

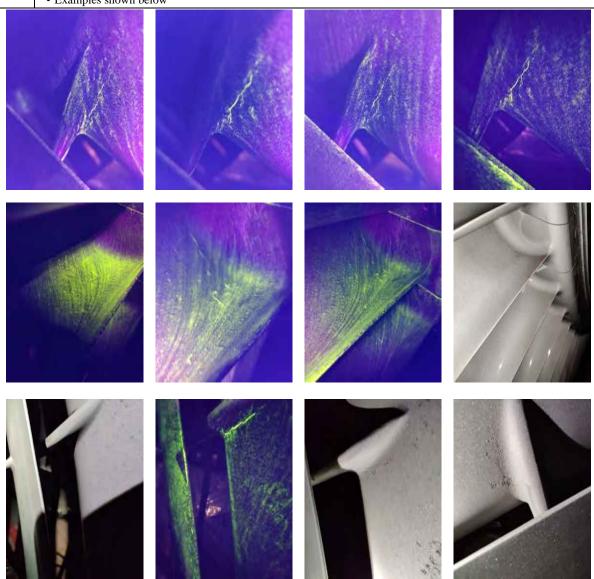
CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA MT Results Page 2

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

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-NDE-}0000P_R9_040419_Components\ Report_Continuation\ Sheet$

3-Angles NDE Report 2020-CF-5862 ... Page 483 of 719

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche G	enerating Stat	ion		
Date:	7-Feb-20	Page	93	of	264

	MAGNETIC PAR	TICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
TROCEDORE/STEC.	311 TODE 2001 REV. 0	Meeli Mitelsib.	Report I manigs
MATERIAL DESCRIPTION		Comanche Unit 3 LPA	
	MATERIAL	S / EQUIPMENT	
PARTICLES: X WET	DRY X FLUORES	COLOR:	n/a
MFG. / BATCH:	Magnaflux 14AM / 18K20K	MFG. / BATCH:	n/a
WATER CONDITIONER	MFG. / BATCH:	n/a	
MAGNETIC PARTICLE	BATH CONCENTRATION:	.15	525
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 1	part	READING: 0.44 fc.
WHITELIGHT:	n/a		READING: n/a fc.
MAGNETIZATION:	Yoke OUTP	UT: AC Longitudina	al Amps n/a TURN
MAGNETIZATION:	n/a OUTP	UT: n/a	n/a TURN
	n/a OUTP	UT: n/a	n/a TURN
FIELD VERIFICATION I	NDICATOR:	QQI: KSC 230 Stand	ard QQI
MFG:	Parker B-300	s/n: 25694 Cal Due: 06/0	09/20
MFG: Parker DA-4	00 S/N: 25009 CAL. DUE:	06/06/2020 / Parker B-300 s/s	n: 25694 Cal Due: 06/09/20
	INSPECT	ION RESULTS	
Hand yoke of covers and b	olade roots		
Traine yoke of covers and c	rade 100ts.		
No reportable indications to	found		
140 reportuble indications	ound.		
NDT Technician: Stepho	en Renkavinsky MT/PT/VT III, UT	Γ II Lawren	nce Craig MT/PT/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

	-	
	7	
	<u> </u>	00
	211/1	
N	allu	
· · · · · · · · · · · · · · · · · · ·	7 <i>3</i>	100
	MDT Engineering	and Canadillac
< 3	ang	les

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

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	ion		
Date:	7-Feb-20	Page	94	of	264

NDI,	Engineering and Consulting F: (518) 218-0490				
	LIQUID PEN	ETRANT INSPEC	TION		
CUSTOMER:		FCSS			
PO #:	4900073380	SURFACE CO	NDITION:	In Service /	Cleaned
PROCEDURE/SPE	EC: 3A-NDE-3000 REV. 9	ACCEPTANCE	E STD:	Report Fi	ndings
				•	
MATERIAL DESC		Comanche Unit 3 l		elds	
	MATERIA	ALS / EQUIPMEN	T		
CLEANER/REMO	VER MFG / BATCH:	Magnat	flux SKC-S / 19J0)1K	
PENETRANT MFO	G / BATCH:	Magnaflı	ux SKL-SP2 / 180	C02K	
DEVELOPER MFG	G / BATCH:	Magnafl	lux SKD-S2 / 19A	.08K	
OTHER MATERIA	ALS	n/a			
BLACKLIGHT ME	ETER:	n/a	a		
BLACKLIGHT:	n/a		R	EADING:	n/a μW/cm2
BLACKLIGHT:	n/a		R	EADING:	n/a μW/cm2
WHITELIGHT ME	ETER: Spectroline AccuMAX	XRP-3000 S/N	N: 1913223/4	Cal Due: 0	6/13/2020
WHITELIGHT:	Flashlight: Fenix	UC35_SR	R	EADING:	311.7 fc.
WHITELIGHT:	Flashlight: Coas	st HX5_LC	R	EADING:	245.1 fc.
PROCESS: X	Color Contrast Fluores	scent Sol	vent Removable	X Wat	er Washable
	INSPEC	CTION RESULTS			
Stage	at found of the following blades.	Description			
	9,12-15,18-20,23,24,27,31,33,34,37,38.	,40,41-47,48,49,53-	-56,58		
	at found of the following blades.	1 44 46 49 51 52 56	. 50		
1,2,4,0-	8,14-16,18-20,22,26-29,31-34,35-38,41	1-44,40,48,31,33-33),38		
See following pages	s for pictures.				
NDT Technician:	Stephen Renkavinsky MT/PT/VT III,	IIT II	Lawrence	Craig MT/PT	/VT II
1.D1 Technician.			Lawience		
-	n/a Member of Δ SNT * SN	NT - TC - 1A Certified	Technicians	n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians

3A-NDE-0000P_R9_040419 _Components Report_Liquid Penetrant Testing



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 7-Feb-20 Page 95 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 1 Description Stage Bleedout found of the following blades. L-0 G 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

264

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: 7-Feb-20 Page 96 of

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 2 Description Stage Bleedout found of the following blades. L-0 G 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

264

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: 7-Feb-20 Page 97 of

CUSTOMER: **FCSS** 4900073380 SURFACE CONDITION: Oxide Blasted PO #: MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 3 Description Stage • Bleedout found of the following blades. L-0 G 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

of 264

3-Angles NDE Report 2020-CF-5862 ...



L-0 T

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 7-Feb-20 Page 98

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 4

Stage Description

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



L-0 T

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 7-Feb-20 Page 99 of 264

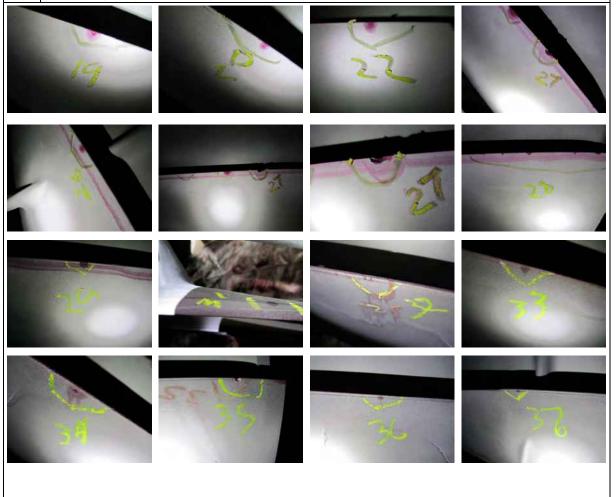
CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 5

Stage Description

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

<u>_____</u>



L-0 T

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 7-Feb-20 Page 100 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPA PT Results Page 6

Stage Description • 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

3-Angles NDE Report 2020-CF-5862 ... Page 491 of 719

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	enerating Sta	tion		
Date:	3-Mar-20	Page	101	of	264

NDT, Engineeri	ing and Consulting F: (518) 218-0490				
	MAGNETIC PA	RTICLE IN	SPECTION		
CUSTOMER:		FCS	SS		
PO #:	4900073380	SURFACE	E CONDITION:	Oxide	Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTA	ANCE STD:	Report 1	Findings
		•		•	
MATERIAL DESCRIPTION			A L-1 Blade Attachi	ment Serrations	
	MATERIAI	LS / EQUIP	MENT		
PARTICLES: X WET	DRY X FLUORE	SCENT	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: 242	21	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 OUTI	PUT: FWDC	Longitudina	l Amps 1900) 3 TURN
MAGNETIZATION:	n/a OUTI	PUT: n/a]	n/a	TURN
MAGNETIZATION:	n/a OUTI	PUT: n/a		n/a	TURN
FIELD VERIFICATION I	NDICATOR:		n/a		
MFG:	MXI 10KFW3	s/n: 71000	Cal Due: 06/18	3/2020	
MFG:		n/a			
	INSPECT	TION RESU	LTS		
Coil inspection of the LPA	L-1 blade root serrations resulted	d in no repor	table indications.		
-		•			
Visually the following was - overall pitting	observed:				
- (1) Folded metal GE					
See following page for pic	tures.				
NDT Technician: Joop	p Kraijesteijn MT/PT/VT III, UT	II	Lawren	ce Craig MT/P	T/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing



Project: <u>CF-5862</u>

Site: Comanche Generating Station

Date: 3-Mar-20 Page

102 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPA L-1 Blade Attachment Serrations Folded material

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

n/a

n/a

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

Project: CF-5862

Site: Comanche Generating Station

Date: 10-Feb-20 Page 103 of 264

NDT, En	gineering and Consulting F: (518) 218-0490		
	MAGNETIC PAR	RTICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC	: KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings
			1 0
MATERIAL DESCR	IPTION:	LPA Stationary Componen	nts
	MATERIAL	S / EQUIPMENT	
PARTICLES: X W	TET DRY X FLUORES	COLOR: n/a	a
MFG. / BATCH:	Magnaflux 14A / 18B071	MFG. / BATCH:	Magnaflux WA-2B / 18J070
WATER CONDITIC	NER MFG. / BATCH:	n/a	
MAGNETIC PARTI	CLE BATH CONCENTRATION:	.15	525
BLACKLIGHT MET	TER: 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 MET	ER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020
WHITELIGHT:	At surface of J	part	READING: See Following fc.
WHITELIGHT:	n/a		READING: n/a fc.
MAGNETIZATION	Coil OUTP	UT: HWDC Longitudin	al Amps 1000-1300 3 TURN
MAGNETIZATION:	n/a OUTP	UT: n/a	n/a TURN
MAGNETIZATION	n/a OUTP	UT: n/a	n/a TURN
FIELD VERIFICATI	ON INDICATOR:	QQI: KSC 230 Stand	lard OOI
MFG:	Magnaflux M-500 s/		
MFG:		n/a	
	INSPECT	ION RESULTS	
I DA Diaphraam est:	See following sheet for details.		
Li A Diapinagin set.	see following sheet for details.		
Stationary parts dema	agnetized +/- 3 Gauss.		
* Diaphragms were n	ot completely blasted therefore headsho	ot could not be performed.	
	Stephen Renkavinsky MT/PT/VT III, UT		nce Craig MT/PT/VT II
	, , , , , , , , , , , , , , , , , , , ,		
_	Member of ASNT * SNT	- TC - 1A Certified Technicians	

3-Angles NDE Report 2020-CF-5862 **Site: Comanche Generating Station** **Proceec** Confidential 2020-CF-5862 Project: CF-5862 Site: Comanche Generating Station**



	NDT, Engineering an	nd Consult	ing F: (518) 218-049	Date. 10-1-60-20 1 age	104 01 204			
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.

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Stationary Components Report Form

of 264

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: 8-Feb-20 Page 105

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

• 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
		-	

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

264

3-Angles NDE Report 2020-CF-5862 ... Page 496 of 719



1TL

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20 Page 106 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



1GU

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20

Page

107 of 264

 CUSTOMER:
 FCSS

 PO #:
 4900073380
 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

• 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
	-	-	



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20 Page

e 108 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

• 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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 P

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.









n/a

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

9

3-Angles NDE Report 2020-CF-5862

<3angles	3angles l 2 Access Albany, P: (518)
NDT, Engineering and Consulting	F: (518)

s Road NY 12205

Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20

Page

110 of 264

CUSTOMER: **FCSS** SURFACE CONDITION: PO #: 4900073380 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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 5-Feb-20 Page 111 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

2GU • Lite pitting

- 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20 Page

112 of 264

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components Description

Stage

2GL • Pitting on all surfaces.







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

n/a

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: 8-Feb-20 Page 113 of

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

/a n/a

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: 5-Feb-20 Page 114 of

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

/a n/a

<3angles	3a 2 . Al
	P:
NDT, Engineering and Consulting	F:

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20

Page

115 of 264

PO #: 4900073380 SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION: Stage LPA Stationary Components Description	
3TL • Pitting on all surfaces.	

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

n/a

n/a

Member of ASNT * SNT - TC - 1A Certified Technicians

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: 5-Feb-20 Page 116 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

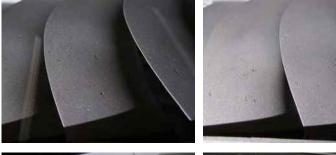
MATERIAL DESCRIPTION: LPA Stationary Components

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

117 of

264

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: 5-Feb-20 Page

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

/a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 8-Feb-20

Page

118 of 264

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

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: 5-Feb-20 Page 119 of

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage

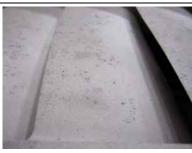
Description

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

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: 8-Feb-20 Page 120 of

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

<3angles	3angles Inc 2 Access P Albany, N P: (518) 64
NDT, Engineering and Consulting	F: (518) 21

Project:	CF-5862				
Site:	Comanche Ge	enerating Stat	ion	•	
Date:	4-Feb-20	Page	121	of	264

tern til ment	gineering and Consulting F: (518) 218-0	P120	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted

MATERIAL DESCRIPTION: LPA Stationary Components

Stage Description

• Foreign object damage found on blade 1

5TU



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

3-Angles NDE Report 2020-CF-5862 ... Page 512 of 719

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	enerating Stat	ion		
Date:	8-Feb-20	Page	122	of	264

	MAGNETIC PAR	TICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC	C: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCI		LPA Diaphragm Bolts S/EQUIPMENT	
PARTICLES: X V			n/a
<u> </u>	Magnaflux 14A / 18B071	<u> </u>	
	ONER MFG. / BATCH:		
	ICLE BATH CONCENTRATION:		525
BLACKLIGHT ME	TER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020
	Magnaflux EV6000	S/N: 2559	
BLACKLIGHT:	n/a		READING: n/a µW/cm2
WHITELIGHT MET	TER: Spectroline AccuMAX		Cal Due: 06/13/2020
WHITELIGHT:	At surface of p	part	READING: 0.15 fc.
WHITELIGHT: _	n/a		READING: n/a fc.
MAGNETIZATION	: Coil OUTPU	UT: HWDC Longitudir	nal Amps 1000-1300 3 TURN
MAGNETIZATION	i: n/a OUTPU	UT: n/a	n/a TURN
MAGNETIZATION	:OUTPU	UT: n/a	n/a TURN
FIELD VERIFICAT	ION INDICATOR:	QQI: KSC 230 Stand	dard QQI
MFG:	Magnaflux M-500 s/	n: 82127 Cal Due: 06/0	9/2020
MFG:		n/a	
	INSPECTI	ION RESULTS	
Stage 5T: (4) Bolts - Stage 4,3,2T: (9) Bo Stage 1T: (2) Bolts - Stage 6G: (4) Bolts - Stage 5G: (4) Bolts - Stage 4,3,2G: (15) B	No reportable indications. No reportable indications. lts - No reportable indications. olts - No reportable indications. No reportable indications.		
NDT Technician:	Stephen Renkavinsky MT/PT/VT III, UT	<u>Lawre</u>	ence Craig MT/PT/VT II
	n/a		n/a

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 8-Feb-20 Page 123 of 264

NDT, Engi	neering and Co		(518) 640-3000 (518) 218-0490		Date: 8-Feb-2	20	Page 123 01 204
			ULTRAS	ONIC INSI	PECTION		
CUSTOMER:				F	CSS		
PO #:	490	0073380		SURFA	CE CONDITION	ON:	In Service / Cleaned
PROCEDURE/SPEC:	KT-I	NDE-1003 I	REV. 3.2	ACCE	PTANCE STD:		Report Findings
MATERIAL DESCRI	PTION:		MATERI	LP ALS / EQ U	'A Diaphragm I	Bolting	
UT SCOPE:				III TEQU			COUPLANT
MFG: GEIT TRANSDUCER: LOI	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21		Ultragel II / 19E099
MFG: GEIT Gamm FRANSDUCER: SHI	na .500	" Round	Fre WE	equency: 5M EDGE:	IHz. S/N	: 14A0010.	A DELAY:
MFG:			n/a				DELAY: n/a
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFOR	RMED:	ОК
			INSPE	CTION RE	SULTS		
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
	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.
LPA Diaphragm Bolts	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: Ste	nhan Dank	ovinsky MT	'/DT/VT III	IIT II		1	<u> </u>

NDT Technician. Stephen Renkavnisky W17/1 1/ V1 III, O1 II

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 29-Feb-20 Page 124 of 264

NDT, Engli	neering and C	onsulting F:	518) 218-0490						
			ULTRAS	ONIC INSI	PECTION				
CUSTOMER:				F	CSS				
PO #:	490	0073380		SURFA	CE CONDITI	ON:	In	Service / Cle	aned
PROCEDURE/SPEC:	KT-	NDE-1003 F	REV. 3.2	ACCEF	TANCE STD	1		Report Findin	ıgs
MATERIAL DESCRIF	PTION:		MATEDI	ALS / EQU	LPA Casing S	tuds			
UT SCOPE:			MAILKI	ALS / EQU				COUPLA	NT
	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21			SAE 30	
MFG: GEIT Gamm FRANSDUCER: SHI)" Round	Fre WE	equency: 5M EDGE:	IHz. S/N	: 14A00	10A	DELAY:	0.293
MFG:			n/a					DELAY:	n/a
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFOI	RMED:		OK	
	INSPECTION RESULTS								
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE		FINDIN	GS
R/L 201, 244	39	51	4	14.146	2.25	29-Fe	b l	No reportable	indications.
R/L 202, 243	39	51	4	11.014	1.75	29-Fe	b I	No reportable	indications.
R/L 203, 204, 206, 208, 209, 236, 237, 239, 241, 242	39	51	20	11.79	2	29-Fe	b I	No reportable	indications.
R/L 210-221 223-235	39	51	50	13.363	2.75	29-Fe	b l	No reportable	indications.
R/L 222	39	51	2	14.339	2.75	29-Fe	b I	No reportable	indications.
R/L 205, 207, 238, 240	39	51	8	13.341	2	29-Fe	b I	No reportable	indications.
NDT Technician:	Joop Kraiie	esteijn MT/P	T/VT III. I	''''''''''''''''''''''''''''''''''''''		ı			



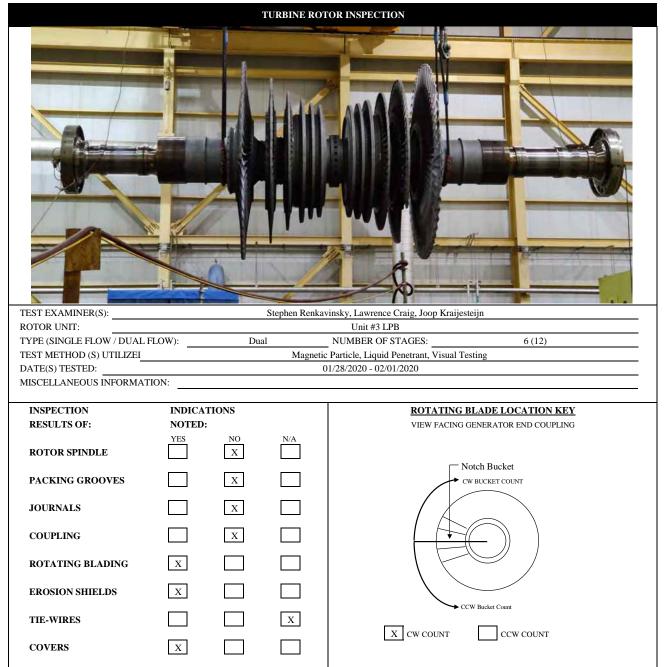
TENONS

PHOTOS INCLUDED

NOTE: A "YES" RESPONSE TO ANY ITEM NOTING INDICATIONS SHALL

REQUIRE A DETAILED DESCRIPTION OF FINDINGS.

Project #:	CF-5862					
Site:	Comanche Generating Station					
Date:	1-Feb-20	Page	125	of	264	



Member of ASNT*SNT-TC-1A Certified Technicians

3A-NDE-0000P_R9_040419 _Components Report_Rotor Inspection Form

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.

	1_			
/	an	α I	Δ C	3 angles Inc. 2 Access Road
	aıı	Y	てコ	Albany, NY 12205
				P: (518) 640-3000
	NDT, Engir	leering an	d Consulting	F: (518) 218-0490

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

ND I	VISUAL I	INSPECTION REPORT		
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blaste	ed
PROCEDURE/SPE	EC: KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findir	ıgs
MATERIAL DESC		Comanche Unit 3 LPB		
		ECTION RESULTS	G.1.D. 06/12	(2020
WHITELIGHT ME WHITELIGHT:	ETER: Spectroline AccuMA Flashlight: Fe		Cal Due: 06/13 READING:	/2020 247 fc.
WHITELIGHT:	Flashlight: Co		READING:	192.7 fc.
NDT Technician:	Stephen Renkavinsky MT/PT/VT II	II, UT II Lawre	ence Craig MT/PT/VT	Ш
	n/a	SNT TC 14 Contified Technicisms	n/a	

7200100		3angles Inc.					
<	Zanales	2 Access Road Albany, NY 12205	Site: Comanche Ger	nerating Sta	ition		
•	NDT, Engineering and Consulting	P: (518) 640-3000	Date: 29-Jan-20	Page	127	of	264
	ND I, Engineering and Constituting	F: (518) 218-0490					

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Description 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: 11-54, 56, 57 and 58. (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. Blades 34: Foreign object strike to cover. L-2 G Erosion/pitting present L-3 G Erosion/pitting present L-4 G Erosion/pitting present L-5 G L-5 G L-5 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-4 T Erosion/pitting present L-4 T L-4 T Erosion/pitting present L-4 T L-5 T L-5 T L-6 Erosion/pitting present L-7 T Erosion/pitting present L-8 L-9 Light foreign object damage present. Deposits under covers. Erosion/pitting present L-1 T Erosion/pitting present L-2 T Erosion/pitting present L-3 T Erosion/pitting present L-4 T Erosion/pitting present L-5 T Erosion/pitting present L-6 T Erosion/pitting present L-7 T Erosion/pitting present	
MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Description 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: 11-54, 56, 57 and 58. (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-4 G Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Light foreign object damage present. Deposits under covers. Erosion/pitting present L-4 T Light foreign object damage present. L-5 T Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-1 T Poposits under covers. Erosion/pitting present L-1 T Poposits under covers. Erosion/pitting present L-1 T Pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting present L-1 T Pitting found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Description 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: 11-54, 56, 57 and 58. (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 Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Light foreign object damage present. Deposits under covers. Erosion/pitting present L-4 T Light foreign object damage present. L-5 T Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-1 T Pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting present L-1 T Pitting found on all blades and erosion shields. Erosion found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
Stage • 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: 11-54, 56, 57 and 58. • (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 • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion/pitting found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades:	
Stage • 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: 11-54, 56, 57 and 58. • (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 • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion/pitting found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades:	
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 11-54, 56, 57 and 58. (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 Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Erosion/pitting present L-5 T Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-1 T Erosion/pitting present L-1 T Pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting present L-1 T Pitting found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
Erosion found on all Z locks. Medium to heavy mechanical damage found on the leading edges of the following blades. Numbered as 11-54, 56, 57 and 58. (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 Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Erosion/pitting present L-5 T Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T 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. Erosion found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
• Medium to heavy mechanical damage found on the leading edges of the following blades. Numbered as 11-54, 56, 57 and 58. • (7) Blades removed. • Pitting found on all blades. Mostly around snubbers and on the admission side. L-1 G • 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-4 G • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 G • Erosion/pitting present L-5 T • Erosion/pitting present L-4 T • Light foreign object damage present. • Erosion/pitting present L-4 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-4 T • Light foreign object damage present. Deposits under covers. • Erosion/pitting present L-3 T • Erosion/pitting present L-3 T • Pitting foreign object damage present. Deposits under covers. L-2 T • Erosion/pitting present Poposits under covers. E-cosion/pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting found on all blades and erosion shields. Erosion/pitting found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
11-54, 56, 57 and 58. • (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 - Erosion/pitting present - Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 G • Light foreign object damage present. • Deposits under covers. - Erosion/pitting present L-4 T • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. - Erosion/pitting present L-1 T • Pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion/pitting found on all blades. • Erosion object damage found on the following erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades:	marked:
• (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 - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting present - Light foreign object damage present. - Deposits under covers. - Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. - Erosion found on all Z locks. - Erosion found on all Blades and erosion shields. - Foreign object damage found on the following erosion shields on the as marked blades:	markea.
 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 Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. Erosion found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades: 	
L-1 G • 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 • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present 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. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-4 T • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-1 T • Pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion/pitting found on all blades and erosion shields. • Erosion object damage found on the following erosion shields on the as marked blades:	
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 Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 G • Erosion/pitting present L-5 T • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion found on all Z locks. • Erosion found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades:	
L-2 G • Erosion/pitting present L-3 G • Erosion/pitting present • Erosion/pitting present • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 G • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 T • Light foreign object damage present. • Erosion/pitting present L-4 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. - Erosion/pitting present L-3 T • 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. • Erosion/pitting found on all blades and erosion shields. • Foreign object damage found on the following erosion shields on the as marked blades:	
L-3 G • Erosion/pitting present • Erosion/pitting present L-4 G • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-5 G • Light foreign object damage present. • Deposits under covers. L-5 T • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • 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. • 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:	
Erosion/pitting present L-4 G Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Light foreign object damage present. Deposits under covers. L-5 T Erosion/pitting present Light foreign object damage present. Erosion/pitting present Light foreign object damage present. Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T 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. Erosion/pitting found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
L-4 G Light foreign object damage present. Deposits under covers. Erosion/pitting present L-5 G Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Light foreign object damage present. Erosion/pitting present L-4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-1 T Erosion/pitting present L-1 T Pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting found on all blades and erosion shields. Erosion/pitting found on all blades and erosion shields on the as marked blades:	
 Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T 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. 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: 	
Erosion/pitting present L-5 G Light foreign object damage present. Deposits under covers. L-5 T Erosion/pitting present Light foreign object damage present. Erosion/pitting present L4 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T Light foreign object damage present. Deposits under covers. Erosion/pitting present L-3 T Erosion/pitting present L-1 T Pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting found on all blades and erosion shields. Erosion/pitting found on all blades and erosion shields on the as marked blades:	
L-5 G • Light foreign object damage present. • Deposits under covers. L-5 T • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present L-4 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-1 T • Pitting found on all blades. Mostly around snubbers and on the admission side. • Erosion/pitting found on all blades and erosion shields. • Erosion/pitting found on all blades and erosion shields on the as marked blades:	
Deposits under covers. Erosion/pitting present Light foreign object damage present. Erosion/pitting present Left object damage present. Erosion/pitting present Left object damage present. Deposits under covers. Erosion/pitting present Left foreign object damage present. Deposits under covers. Erosion/pitting present Left object damage present. Deposits under covers. Erosion/pitting present Erosion/pitting present Erosion/pitting present Erosion/pitting found on all blades. Mostly around snubbers and on the admission side. Erosion/pitting found on all blades and erosion shields. Foreign object damage found on the following erosion shields on the as marked blades:	
L-5 T • Erosion/pitting present • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. • Deposits under covers. • 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. • 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:	
L-5 I • Light foreign object damage present. • Erosion/pitting present • Light foreign object damage present. • Deposits under covers. • Erosion/pitting present L-3 T • Light foreign object damage present. • Deposits under covers. • 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. • 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:	
Erosion/pitting present Let T Light foreign object damage present. Deposits under covers. Erosion/pitting present Let T Light foreign object damage present. Deposits under covers. Deposits under covers. Let T Erosion/pitting present Let T Pitting found on all blades. Mostly around snubbers and on the admission side. 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:	
Deposits under covers. Erosion/pitting present L:3 T 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. Erosion found on all Z locks. Erosion/pitting found on all blades and erosion shields. Erosion bject damage found on the following erosion shields on the as marked blades:	
Erosion/pitting present Laght 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. Erosion found on all Z locks. Erosion/pitting found on all blades and erosion shields. Erosion bject damage found on the following erosion shields on the as marked blades:	
L-3 T • 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. • 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:	
Deposits under covers. L-2 T	
L-2 T • Erosion/pitting present L-1 T • Pitting found on all blades. Mostly around snubbers and on the admission side. • 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:	
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:	
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:	
• Foreign object damage found on the following erosion shields on the as marked blades:	
• 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	I/VT II
	n/a	n/a	

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: 29-Jan-20 Page 128 of

CUSTOMER: FCSS

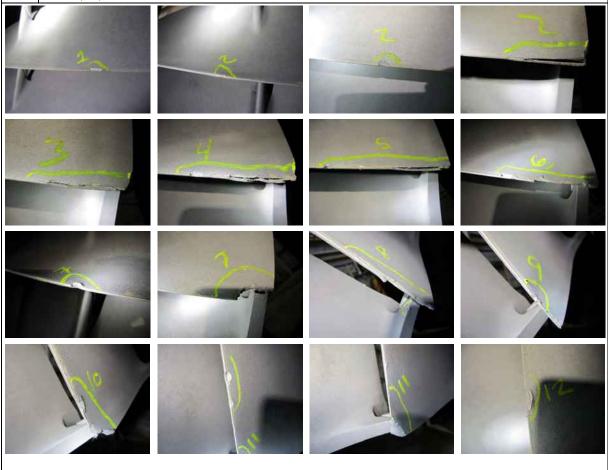
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Stage

Description

- Erosion/pitting and foreign object damage found on all blades and erosion shields.
- L-0 G 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



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

3-Angles NDE Report 2020-CF-5862 ...



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page 130 of

CUSTOMER: **FCSS** SURFACE CONDITION: PO #: 4900073380 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

/a n/a



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page 131 of 264

CUSTOMER: **FCSS** SURFACE CONDITION: PO #: 4900073380 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

<u>_____</u>

n/a

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page 132 of 264

CUSTOMER: **FCSS** SURFACE CONDITION: PO #: 4900073380 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

3-Angles NDE Report 2020-CF-5862 ... Page 523 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20

Page

133 of 264

NDT, Engineering and Co	12: (518) 640-5000 resulting F: (518) 218-0490	Date: <u>29-Jan-20</u>	Page
JSTOMER:		FCSS	
#: 4900	073380	SURFACE CONDITION:	Oxide Blasted
ATERIAL DESCRIPTION:	C	Comanche Unit 3 LPB VT Resu	ılts Page 6
	450		7
5 8			

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

n/a

n/a

of 264

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: 29-Jan-20 Page 134

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

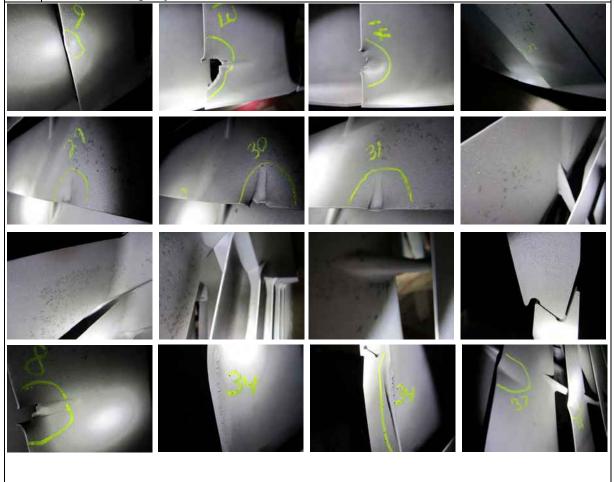
MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20

Page

135 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION:

Comanche Unit 3 LPB VT Results Page 2

Description

Stage

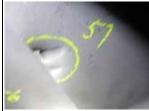
- (7) Blades removed.
- Pitting found on all blades. Mostly around snubbers and on the admission side.
- L-1 G Foreign object damage and missing material found on the following blades. Numbered as marked: 8, 9, 13, 14, 20, 22, 26, 27, 29, 31, 37, 38, 46, 49-51, 54, 55, 56, 57.
 - Blade 34: Foreign object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



















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

'a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20

Page

136 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1







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

/a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Pag

Page

137 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1 Stage Description Erosion/pitting present

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

Lawrence Craig MT/PT/VT II

n/

n/a

of 264

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page 138

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1 Description

Stage

• Erosion/pitting present

L-4 G

• 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20

Page 139 of 264

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

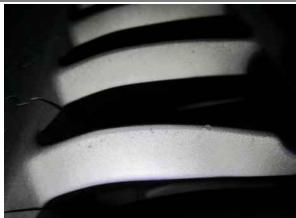
MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1 Description

Stage

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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page 140 of

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

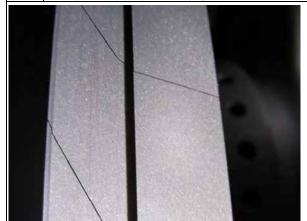
MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1

Description

Stage 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page

141 of

CUSTOMER: **FCSS**

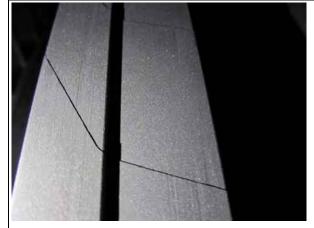
PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB VT Results Page 1 Description

Stage

• Erosion/pitting present L-4 T

- 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

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 Description

Stage

• Erosion/pitting present

L-3 T

- 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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20 Page

age 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 29-Jan-20

Page

144 of 264

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

MATERIAL DESCRIPTION:

Comanche Unit 3 LPB VT Results Page 1

Stage

Description • 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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

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

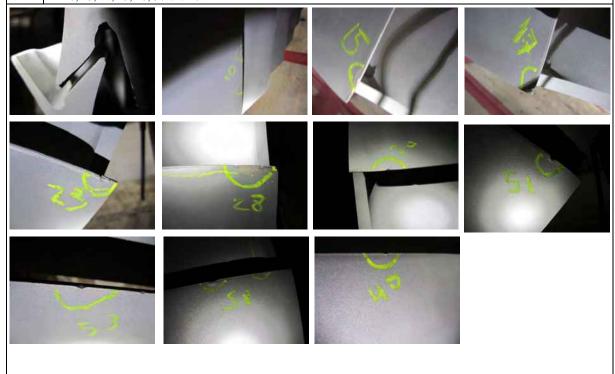
Stage

Description

Erosion found on all Z locks.

• Erosion/pitting found on all blades and erosion shields. L-0 T

• 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

3-Angles NDE Report 2020-CF-5862 ... Page 536 of 719

<3	an	gle	es Conscibility	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000
	ND I, Engir	reering and i	Pousning	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	nerating Sta	tion		
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 DESCRIPTIO		Comanche Unit 3 LPB				
DADTICI EG V WET		S / EQUIPMENT	,			
PARTICLES: X WET	DRY X FLUORES		n/a			
MFG. / BATCH:	Magnaflux 14A / 18B071		n/a			
WATER CONDITIONER		Magnaflux WA-2B				
MAGNETIC PARTICLE B	ATH CONCENTRATION:	.15	25			
_	Spectroline AccuMAX		Cal Due: 06/13/2020			
BLACKLIGHT:	Magnaflux EV6000		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 1	part	READING: 0.19 fc.			
WHITELIGHT:	At surface of 1	part	READING: 0.42 fc.			
MAGNETIZATION:	Head Shot OUTP	UT: FWDC Circula	r Amps 3220-5730 TURN			
MAGNETIZATION:	Bucking Field OUTP	UT: FWDC Longitudina	l Amps 1000-1300 6 TURN			
MAGNETIZATION:	n/a OUTP	UT: n/a	n/a TURN			
FIELD VERIFICATION IN	DICATOR:	n/a				
MFG:	MXI 10KFW3	s/n: 71000 Cal Due: 06/18	3/2020			
MFG: Parker DA-400) S/N: 25009 CAL. DUE:	06/06/2020 / Parker B-300 s/r	n: 25694 Cal Due: 06/09/20			
	INSPECT	ION RESULTS				
H 101 (1D 1' E')	11 6 1					
Head Shot and Bucking Field	а регтогтеа.					
Reportable indications found. See following sheet for a list of details and pictures.						
Rotor demagnetized +/- 5 Gauss.						
Trotor demagnetized 17 0 0	4455					
NDT Technician: Stepher	n Renkavinsky MT/PT/VT III, UT	Γ II Lawren	ce Craig MT/PT/VT II			
<u></u>	<u> </u>					

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862 ... Page 537 of 719

	Project: CF-5862	
	Access Road Site: Comanche Generating Station	
P:	Dany, NY 12205 C518) 640-3000 Date: 30-Jan-20 Page 147 of C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490 C518) 218-0490	264

CUSTOMER: 4900073380	Comanche Unit 3 LPB MT Results Description
PO #: 4900073380	Comanche Unit 3 LPB MT Results Description
	Comanche Unit 3 LPB MT Results Description
	Description
CAMERIAL REGERENCE	Description
MATERIAL DESCRIPTION:	
Stage L-0 G • No reportable indications foun	d
• 1-1.5" crack-like indications o	n discharge side of all snubbers.
-1 G • Multiple crack-like indications	found on all blades on admission side towards root in corrosion areas
L-2 G • No reportable indications foun	d.
L-3 G • No reportable indications foun	
L-4 G • No reportable indications foun	
L-5 G • No reportable indications foun	
L-5 T • No reportable indications foun L-4 T • No reportable indications foun	
L-3 T • No reportable indications foun	
L-2 T • No reportable indications foun	
• 1-1.5" crack-like indications o	n discharge side of all snubbers.
-1 T • Multiple crack-like indications	found on all blades on admission side towards root in corrosion areas
L-0 T • No reportable indications foun	d.
NDT Technician: Stephen Renkavinsky	MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

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

264

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20 Page

148 of

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

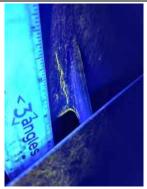
MATERIAL DESCRIPTION: Comanche Unit 3 LPB MT Results Page 1

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

3-Angles NDE Report 2020-CF-5862



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

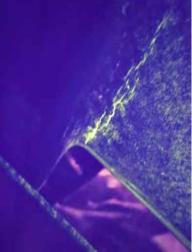
Description

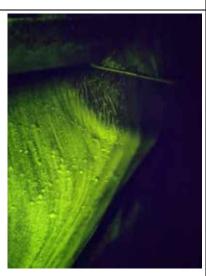
L-1 T

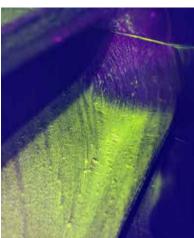
• 1-1.5" crack-like indications on discharge side of all snubbers.

- · Multiple crack-like indications found on all blades on admission side towards root in corrosion areas
- Examples shown below











n/a

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

3-Angles NDE Report 2020-CF-5862 ... Page 540 of 719

<	3	a NDT.	n (gl	e de Cons	S	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000 F: (518) 218-0490
---	---	-----------	-----	----	-----------	---	--

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	1-Feb-20	Page	150	of	264

MAGNETIC PAR	RTICLE INSPECTION	
CUSTOMER:	FCSS	
PO #: 4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPEC: 3A-NDE-2001 REV. 6	ACCEPTANCE STD:	Report Findings
	THE CENTER OF STATE	rtopott i manigo
MATERIAL DESCRIPTION:	Comanche Unit 3 LPB	
	S / EQUIPMENT	
	COLOR: n/a	
MFG. / BATCH: Magnaflux 14AM / 18K20K		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 OUTP	UT: AC Longitudinal	Amps TURN
MAGNETIZATION: n/a OUTP	UT: n/a	n/a TURN
MAGNETIZATION:n/a OUTP	UT: n/a	n/a TURN
FIELD VERIFICATION INDICATOR:	QQI: KSC 230 Standar	rd 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
INSPECT	ION RESULTS	
Hand yoke of covers and blade roots.		
fraid yoke of covers and blade foots.		
N		
No reportable indications found.		
NDT Technician: Stephen Renkavinsky MT/PT/VT III, U	Γ II Lawrence	ce Craig MT/PT/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 31-Jan-20 Page 151 of 201



Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	ion		
Date:	31-Jan-20	Page	151	of	264

ND I, Engineer	mg and Consulting F: (518) 218-0490				
	LIQUID PENET	RANT INSI	PECTION		
CUSTOMER:		FCSS	5		
PO #:	4900073380	SURFACE	CONDITION:	In Service	/ Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTA	NCE STD:	Report I	Findings
				•	
MATERIAL DESCRIPTION	ON:	Comanche Uni	it 3 LPB Erosion S	Shields	
	MATERIAI	.S / EQUIPM	1ENT		
CLEANER/REMOVER M	MFG / BATCH:	Ma	gnaflux SKC-S / 1	9J01K	
PENETRANT MFG / BA	TCH:	Magı	naflux SKL-SP2 /	18C02K	
DEVELOPER MFG / BA	ТСН:	Mag	gnaflux SKD-S2 / 1	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 U	JC35_SR		READING:	265.7 fc.
WHITELIGHT:	Flashlight: Coast	HX5_LC		READING:	249 fc.
PROCESS: X Co	olor Contrast Fluoresc	ent	Solvent Remova	ıble X Wa	ater Washable
Cana	INSPECT	ION RESUL			
	d of the following blades. Mostly	Description in foreign obj		ed as marked:	
• Rleedout found	1, 34, 37-39, 41-52, and 54-57. d of the following blades. Mostly:	in foreign ohi	iect areas Number	ed as marked:	
	, 17, 19, 20, 24, 26-30, 36, 37, 38,				
See following pages for pi	ctures.				
~ · · · · · · · · · · · · · · · · · · ·					
NIDT To the Control of the	D. I. C. I. MENDERS IN AN			Cont. MED.	TATE II
NDT Technician: Stepho	en Renkavinsky MT/PT/VT III, U	1 11	Lawren	ce Craig MT/P	1/V1 II
	n/a Member of Δ SNT * SNT		ified Technisiss	n/a	
	viember of ANNI * SNI	- II - IA Certi	med Lechnicians		

 $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20

Page

152 of 264

CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTIO Stage • Bleedout found	of the following blades. Mostly i	manche Unit 3 LPB PT Results Pa Description n foreign object areas. Numbered	
L-0 G Sheedout found 1-25, 27-29, 31,	34, 37-39, 41-52, and 54-57.		
	1		
9/1			

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

n/a

264

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: 30-Jan-20 Page 153 of

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 2 Stage Description • Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: L-0 G 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

a n/a

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20 Page

Lawrence Craig MT/PT/VT II n/a

154 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 3 Stage Description • Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: L-0 G 1-25, 27-29, 31, 34, 37-39, 41-52, and 54-57.

> Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Continuation\ Sheet$

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

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 • Bleedout found of the following blades. Mostly in foreign object areas. Numbered as marked: L-0 G 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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 546 of 719



3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20 Page 156

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 5

Stage Description

• 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 G







of 264

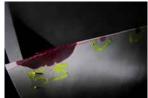














NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II Lawrence Craig MT/PT/VT II

n/a

n/a

3-Angles NDE Report 2020-CF-5862 ... Page 547 of 719



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

Description

Stage 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
Member of ASNT * SNT - TC - 1A Certified Technicians

n/a

3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20 P

Page

158 of 264

CUSTOMER:	Engineering and Consulting F: (518) 218-0490	FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESC Stage L-0 T • Bleedor 1, 2, 4,	ut found of the following blades. Mo	Comanche Unit 3 LPB PT Results 1 Description ostly in foreign object areas. Numbere 7, 38, 40, 45, 46, 48, 49, 51-53, 55, 57	d as marked:
	4	3	
			7.6
No.	7 28	23	

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

n/a

of 264

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: 30-Jan-20 Page 159

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: Comanche Unit 3 LPB PT Results Page 2

Stage

L-0 T

Description

• 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 I	I
		<u> </u>	

Member of ASNT * SNT - TC - 1A Certified Technicians

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 30-Jan-20

Page

160 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION:

Stage

L-0 T

Comanche Unit 3 LPB PT Results Page 3

Description

• 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

	1			
<	3	Ing T, Engineering	les and Consulting	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000 F: (518) 218-0490

Project: CF-5862
Site: Comanche Generating Station
Date: 24-Feb-20 Page 161 of 264

NDT, Engineeri	ng and Consulting F: (518) 218-0490				
	MAGNETIC PAR	RTICLE IN	SPECTION		
CUSTOMER:		FCS	S		
PO #:	4900073380	SURFACE	E CONDITION:	Oxide	Blasted
PROCEDURE/SPEC:	3A-NDE-2001 REV. 6	ACCEPTA	ANCE STD:	Report 1	Findings
MATERIAL DESCRIPTION			B L-1 Blade Attachi	ment Serrations	
	MATERIAL				
PARTICLES: X WET	DRY X FLUORES		COLOR:	n	/a
	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: 242	1	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 U	JC35_JK		READING:	464.4 fc.
MAGNETIZATION:	Coil Wrap OUTP	UT: FWDC	Longitudina	1 Amps 2300) 3 TURN
MAGNETIZATION:	n/a OUTP	UT: n/a]	n/a	TURN
MAGNETIZATION:	n/a OUTP	UT: n/a]	n/a	TURN
FIELD VERIFICATION I	NDICATOR:	QÇ	QI: KSC 230 Standa	ard QQI	
MFG:	MXI 10KFW3	s/n: 71000	Cal Due: 06/18	3/2020	
MFG:		n/a			
	INSPECT	ION RESU	LTS		
Coil inspection of the LPB	L-1 blade root serrations resulted	in no repor	table indications.		
Visually the following was - overall pitting					
- (1) FOD location GE - (6) FOD locations TE					
See following pages for pie	ctures.				
NDT Technician: Joop	p Kraijesteijn MT/PT/VT III, UT I	<u>I</u>	Lawren	ce Craig MT/P	T/VT II

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

264

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: 24-Feb-20 Page 162 of

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



Project: CF-5862

Site: Comanche Generating Station

Date: 24-Feb-20 Page 163 of 264

CUSTOMER: **FCSS** SURFACE CONDITION: PO #: 4900073380 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

/a n/a

P: (518) 640-3	<	3 a	ng Engineering	les	3angles Inc. 2 Access Road Albany, NY 12 P: (518) 640-30 F: (518) 218-04
----------------	---	-----	-------------------	-----	--

Project: CF-5862

Site: Comanche Generating Station

Date: 3-Feb-20 Page 164 of 264

MAGNETIC PARTICLE INSPECTION				
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted	
PROCEDURE/SPE	C: KT-NDE-2013 REV. 0*	ACCEPTANCE STD:	Report Findings	
MATERIAL DESC		LPB Stationary Componen	nts	
	MATERIAL;	S / EQUIPMENT		
PARTICLES: X V		CENT COLOR: n/a		
	Magnaflux 14A / 18B071			
WATER CONDITION	ONER MFG. / BATCH:	n/a		
MAGNETIC PART	ICLE BATH CONCENTRATION:	.15	525	
BLACKLIGHT ME	TER: 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 ME	TER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020	
WHITELIGHT:	At surface of I	oart	READING: See Following fc.	
WHITELIGHT: _	n/a		READING: fc.	
MAGNETIZATION	I: Coil OUTPU	UT: HWDC Longitudin	al Amps 1000-1300 3 TURN	
MAGNETIZATION	I: n/a OUTPU	UT: n/a	n/a TURN	
MAGNETIZATION	I:OUTPU	UT: n/a	n/a TURN	
FIELD VERIFICAT	TON INDICATOR:	QQI: KSC 4-230 Mini	ature QQI	
MFG:	Magnaflux M-500 s/	n: 82127 Cal Due: 06/09	9/2020	
MFG:		n/a		
	INSPECTI	ON RESULTS		
IDD D'				
LPB Diaphragm set:	See following pages for details.			
Stationary parts dem	nagnetized +/- 3 Gauss.			
* Diaphragms were not completely blasted therefore headshot could not be performed.				
	Stephen Renkavinsky MT/PT/VT III, UT		nce Craig MT/PT/VT II	
TIDI Teciliician: _	Stephen Renkavnisky W11/F 1/V 1 III, U1	Lawre	nee craig with 1/VIII	
_	M. J. CAGNER & GNE			

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862 **Site: Comanche Generating Station** **Proceed** Confidential 2020-CF-5862 Project: CF-5862 Site: Comanche Generating Station** Page 555 of 719



	NDT, Engineering an	nd Consult	ing F: (518) 218-049	90 Date: 3-1-60-20 1 age	103 01 204
		STA	TIONARY CO	OMPONENTS 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
					1

Data sheets of indications and photos on following sheets.

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Stationary Components Report Form



1TU

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 31-Jan-20 Pa

Page

166 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage Description

• 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
	_	

'a n/a



1TL

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

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



|--|

a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 31-Jan-20 Pa

Page

168 of 264

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/

n/a



1GL

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

169

of 264

Date: 31-Jan-20 Page

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage Description

• 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

/a n/a

3-Angles NDE Report 2020-CF-5862 ... Page 560 of 719

<3angles
NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

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	

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209

Page

171 of 264

N	IDT, Engineering and Consulting F: (518) 218-0490	Date. 02/03/207	1 age 1/1 of 204
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
		•	
MATERIAL DE Stage	ESCRIPTION:	LPB Stationary Components	
• Dam	nage to spill strips.	Description	
2TL • Eros	nage to spill strips. sion/pitting of blade surfaces.		

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

n/a

n/a

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209

Page

172 of 264

CUSTOMER: **FCSS** PO #: 4900073380 SURFACE CONDITION: Oxide Blasted MATERIAL DESCRIPTION: LPB Stationary Components Stage Description • Blade 21: foreign object damage on trailing edge. 2GU • 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

3-Angles NDE Report 2020-CF-5862 ... Page 563 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 F

Page

173 of 264

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/2	



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 Page 174 of 264

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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209

Page

175 of 264

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage

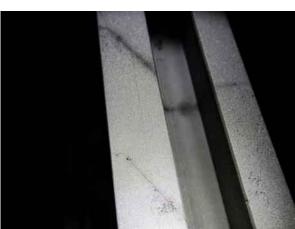
Description • Thinning of trailing edges.

3TL

• Erosion/pitting of blade surfaces.









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

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 Pag

Page 176 of 264

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

/a n/a

177 of 264

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 Page

CUSTOMER:	FCSS
-----------	------

SURFACE CONDITION: PO #: 4900073380 Oxide Blasted

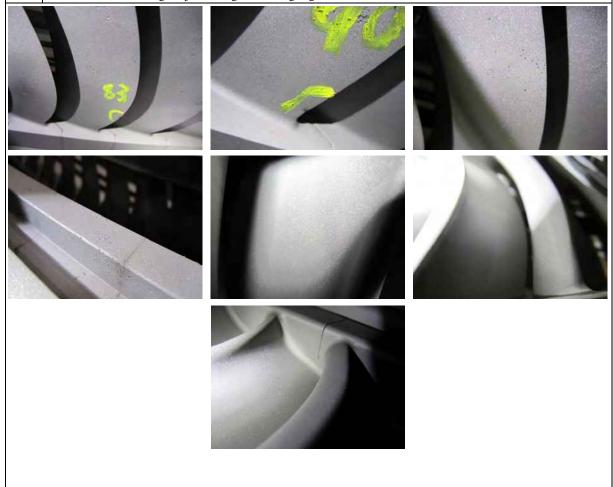
MATERIAL DESCRIPTION: LPB Stationary Components

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 Pa

Page 1

178 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage

• Thinning of trailing edges.

4TU

• Erosion/pitting of blade surfaces.







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

/a n/a

3-Angles NDE Report 2020-CF-5862

<3angles	
NDT, Engineering and Consulting	

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

Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209

Page

179

of 264

CUSTOMER: **FCSS**

SURFACE CONDITION: PO #: 4900073380 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

of 264

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: 02/03/209 Page 180

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

3-Angles NDE Report 2020-CF-5862



Project: CF-5862

Site: Comanche Generating Station

Date: 02/03/209 Page

CUSTOMER: **FCSS**

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage

Description • Thinning of trailing edges.

4GL

• Erosion/pitting of blade surfacs.







181

of 264







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

of 264

3-Angles NDE Report 2020-CF-5862 ...



5GL

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 31-Jan-20 Page 182

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION: LPB Stationary Components

Stage Description

• Damage to spill strip on discharge side.







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

/a n/a

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: 1-Feb-20 Page 183

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

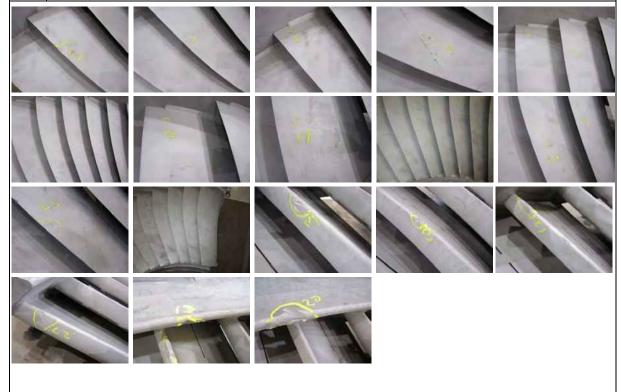
MATERIAL DESCRIPTION: LPB Stationary Components

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/2	



3angles Inc. 2 Access Road Albany, NY 12209 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 31-Jan-20

Page

184 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: Oxide Blasted

MATERIAL DESCRIPTION:

LPB Stationary Components

Stage

Description

• Partition 28: Multiple crack-like indications in foreign object strike area in leading edge.

6GL Partition 29: foreign object damage.

• Ring between partition 28 and 30: foreign object damage.









n/a

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

3-Angles NDE Report 2020-CF-5862 ... Page 575 of 719

< 3	angles	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000
	NDT, Engineering and Consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Gen	erating Sta	tion		
Date:	3-Feb-20	Page	185	of	264

NDT,	Engineering and Gonsulting F: (518) 218-0490		
	MAGNETIC PART	FICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPI	EC: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESC		LPB Diaphragm Bolts	
		S / EQUIPMENT	
PARTICLES: X		<u> </u>	
	Magnaflux 14A / 18B071		
WATER CONDIT	TONER MFG. / BATCH:	Magnaflux WA-2B	3 / 18J070
MAGNETIC PAR	TICLE BATH CONCENTRATION:	.15	525
BLACKLIGHT M	ETER: Spectroline AccuMAX X	KRP-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 MI	ETER: Spectroline AccuMAX X	KRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020
WHITELIGHT:	At surface of pa	art	READING: fc.
WHITELIGHT:	n/a		READING: fc.
MAGNETIZATIO	N: Coil OUTPU	T: HWDC Longitudina	al Amps 1000-1300 3 TURN
MAGNETIZATIO	N:OUTPU	JT: n/a	n/a TURN
MAGNETIZATIO	N:OUTPU	JT: n/a	n/a TURN
FIELD VERIFICA	TION INDICATOR:	QQI: KSC 230 Stand	lard QQI
MFG:	Magnaflux M-500 s/n	n: 82127 Cal Due: 06/09	9/2020
MFG:		n/a	
	INSPECTION	ON RESULTS	
Stage 5T: (4) Bolts Stage 4T: (4) Bolts Stage 4,3,2T: (11) Stage 1T: (2) Bolts Stage 6G: (4) Bolts Stage 5G: (4) Bolts Stage 4G: (4) Bolts Stage 4,3,2G: (11)	s - No reportable indications. s - No reportable indications. s - No reportable indications. Bolts - No reportable indications. s - No reportable indications. Bolts - (10) No reportable indications. (1) The second content of the second conte	Гhreads Heavily galled.	
NDT Technician:	Stephen Renkavinsky MT/PT/VT III, UT	II Lawren	nce Craig MT/PT/VT II
	n/a	<u> </u>	n/a

 $Member\ of\ ASNT\ *\ SNT\ -\ TC\ -\ 1A\ Certified\ Technicians$ $3A-NDE-0000P_R9_040419\ _Components\ Report_Magnetic\ Particle\ Testing$

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490
 Project: CF-5862

 Site: Comanche Generating Station

 Date: 4-Feb-20
 Page 186 of 264

NDT, Engi	neering and Co	nsulting F:	(518) 218-0490				1 ugo or		
			ULTRAS	ONIC INSI	PECTION				
CUSTOMER:				F	CSS				
PO #:	4900073380				CE CONDITI	In Service / Cleaned			
PROCEDURE/SPEC:	ROCEDURE/SPEC: KT-NDE-1003 REV. 3.2				PTANCE STD:		Report Findings		
MATERIAL DESCRI	PTION:		MATERI		B Diaphragm l	Bolting			
MATERIALS / EQUIPMENT UT SCOPE: COUPLANT									
OT SCOLE.							COOLLANT		
MFG: GEIT TRANSDUCER: LO	USMGO NGITUDN.		1100358	CAL D	UE: 01/06/21		Ultragel II / 19E099		
MFG: GEIT Gamma .500" Round Frequency: 5MHz. S/N: 14A0010A DELAY:									
TRANSDUCER: SHI	EAR		WI	EDGE:					
MFG:			n/a	<u>, </u>			DELAY: n/a		
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFOI	RMED:	OK		
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS		
	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		
LPB Diaphragm Bolts	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: Ste	ephen Renk	avinsky MT	/PT/VT III	, UT II					

<3	ang	les
	NDT. Engineering :	and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 3-Feb-20 Page 187 of 264

	0 0(/		
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
		•	
MATERIAL DESCR	PIPTION:	I PR Dianhragm Rolling	

MATERIAL DESCRI	1 11011.			LA	ъ Diapiliagili i	Johnng	
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTED	FINDINGS
	45.8	57.8	2	13.96	1.75	2/3/2020	No reportable indications
LPB Diaphragm Bolts	55	67	1	15.5	1.75	2/3/2020	No reportable indications
LPB Diaphragin Bolts	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
		·

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 29-Feb-20 Page 188 of 264

NDT, Engi	ineering and Co		(518) 640-3000		Date. 27-100	-20	1 ago	100 0	204
				ONIC INSI	PECTION				
CUSTOMER:				F	ECSS .				
PO #:	490	0073380		SURFA	SURFACE CONDITION: In Service / Cleaned				
PROCEDURE/SPEC:	KT-I	NDE-1003 F	REV. 3.2	ACCEF	PTANCE STD:			Report Findin	igs
MA TERRAL TO THE TAX T	DELOT.				1 DD G . ~				
MATERIAL DESCRI	PTION:		MATERI	ALS / EQU	LPB Casing St	tuds			
UT SCOPE:				ALS / EQC	AIOMENT.			COUPLA	NT
MFG: GEIT TRANSDUCER: LO	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21			SAE 30)
MFG: GEIT Gamm TRANSDUCER: SH		" Round		equency: 5M EDGE:	IHz. S/N	: 14A00	10A	DELAY:	0.293
MFG:			n/a					DELAY:	n/a
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFO	RMED:		OK	
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE		FINDIN	GS
R/L 401, 444	39	51	4	14.146	2.25	29-Fe	b N	o reportable	indications.
R/L 402, 443	39	51	4	11.014	1.75	29-Fe	b N	lo reportable	indications.
R/L 403, 404, 406, 408, 409, 436, 437, 439, 441, 442	39	51	20	11.79	2	29-Fe	b N	o reportable	indications.
R/L 410-421 423-435	39	51	49/50	13.363	2.75	29-Fe	h	reportable indica nspected. Was alr	
R/L 422	39	51	2	14.339	2.75	29-Fe	b N	lo reportable	indications.
R/L 405, 407, 438, 440	39	51	8	13.341	2	29-Fe	b N	o reportable	indications.
									· · · · · · · · · · · · · · · · · · ·
NDT Technician:	Joop Kraije	steijn MT/P	T/VT III, U	T II					

<3angles	3m 2 A All P:
NDT, Engineering and Consulting	F: (

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

Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	18-Feb-20	Page	189	of	264

NDT, Engl	neering and Co	onsulting F:	(518) 640-3000 (518) 218-0490	ONIC INC	Date: 18-Feb	-20	Pag	e <u>189</u>	01
CUSTOMER:				ONIC INSI	CSS				
20 #:	4900	0073380			CE CONDITI	ON:		Cleaned	
PROCEDURE/SPEC:	KT-1	NDE-1003 F	REV. 3.2	ACCEI	TANCE STD:			Report Findi	ngs
MATERIAL DESCRIE	PTION:			IJr	it #3 Coupling	Rolts			
WITERINE DESCRI	11011.		MATERI	ALS / EQU		Bons			
UT SCOPE:			MATIBAL	ALS / LQC				COUPLA	NT
MFG: GEIT	USMGO		1100358	CAL D	UE: 01/06/21			SAE 30)
MFG: GEIT Gamm		" Round	Fre	equency: 5M	IHz S/N	: 14A00	10A	DELAY:	n/a
TRANSDUCER: SHI		rtouna	WE	EDGE:	5/11	. 111100	1011	DEELTT.	11/ U
MFG:			n/a					DELAY:	
CAL BLOCK:	IIV	V: B06111			RITY PERFOI	RMED:		OK	
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE		FINDI	NGS
"A" Coupling Bolts	54.8	66.8	16	15.07	2.25	2/17/20	20 1	No reportable	indications.
"B" Coupling Bolts	62.4	68.4	20	14.631	2.25	2/17/20	20 N	No reportable	indications.
"C" Coupling Bolts	68	74	18	19.79	2.375	2/17/20	20 N	No reportable	indications.
							\perp		
							-		
NDT Technician: Ste	h D 1	and NOT	VDT/VT III	IIT II					

Member of ASNT * SNT - TC - 1A Certified Technicians

3A-NDE-0000P_R9_040419 _Components Report_Ultrasonic Report Form

3-Angles NDE Report 2020-CF-5862 ... Page 580 of 719

<	3 a	ng Engineering	les	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-300 F: (518) 218-049
---	-----	-------------------	-----	--

Project:	CF-5862				
Site:	Comanche Ger	nerating Stat	tion		
Date:	18-Feb-20	Page	190	of	264

NDT,	Engineering and Consulting F: (518) 218-0490		
	MAGNETIC PAR	TICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	Oxide Blasted
PROCEDURE/SPE	EC: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESC		Shells and Glands Page 1 S / EQUIPMENT	
PARTICLES: X		CENT COLOR:	
	Magnaflux 14A / 18B071		Magnafluy 14AM / 18K20K
<u>-</u>			
	ONER MFG. / BATCH: FICLE BATH CONCENTRATION:		i25
	ETER: Spectroline AccuMAX		
BLACKLIGHT:	Magnaflux EV6000		
BLACKLIGHT:		S/N: 2421	
	TER: Spectroline AccuMAX		
WHITELIGHT:	At surface of p		READING: 0.15 fc.
WHITELIGHT:	At surface of p	part	READING: 0.32 fc.
MAGNETIZATIO	N: Yoke OUTPU	UT: DC Longitudina	al Amps n/a TURN
MAGNETIZATIO	N:OUTP	UT: HWDC Circula	ar Amps 1000-1250 X TURN
MAGNETIZATIO	N: n/a OUTPU	UT: n/a	n/a TURN
FIELD VERIFICA	TION INDICATOR:	QQI: KSC 230 Stand	ard QQI
MFG:	Parker DA-400 S/N	: 25009 CAL. DUE: 06/	06/2020
MFG:	Magnaflux M-500 s/	n: 82127 Cal Due: 06/09	9/2020
	INSPECTI	ON RESULTS	
 LP2 Gen T Upp LP1 Gov T Upp LP1 Gen T Upp N1 Inner Upper N3 Inner Upper N3 Outer Uppe LPB Inner Case LPA Inner Cylind HP Inner Cylind LPB Inner Case 	per: No reportable indications. per: Upper: No reportable indications. per: Upper: No reportable indications. per: Upper: No reportable indications. per: No reportable indications.		
NDT Technician:	Stephen Renkavinsky MT/PT/VT III, UT	<u>Lawren</u>	ace Craig MT/PT/VT II
-			

<3	angles
	IDT. Engineering and Consulting

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

Project:	CF-5862				
Site:	Comanche Ge	nerating Sta	tion		
Date:	18-Feb-20	Page	191	of	264

NDT, Engineering and Consult	ing F: (518) 218-0490		
CUSTOMER:		FCSS	
PO #: 4900073	380	SURFACE CONDITION:	Oxide Blasted
MATERIAL DESCRIPTION:		Shells and Glands Page 2	
N7 Upper: No reportable indicationN7 Lower: No reportable indication	ons.		
N6 Upper: No reportable indicationN6 Lower: No reportable indication	ons.		
 N5 Upper: No reportable indication N5 Lower: No reportable indication 	ons.		
• N4 Upper: No reportable indication	ons.		
N4 Lower: No reportable indicationHP Outer Shell_Lower: No report	able indications.		

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

3-Angles NDE Report 2020-CF-5862 ... Page 582 of 719

P: (518) 640-3	<3	an	gle	es Consulting	3angles Inc. 2 Access Road Albany, NY 122 P: (518) 640-30 F: (518) 218-04
----------------	----	----	-----	------------------	---

Project:	CF-5862				
Site:	Comanche Gen	erating Sta	tion		
Date:	2/22;25/2020	Page	192	of	264

ND1,		(518) 218-0490				
	MA	GNETIC PAR		PECTION		
CUSTOMER:			FCSS			
PO #:	4900073380		SURFACE (CONDITION:	Oxide Bl	asted
PROCEDURE/SPI	EC: KT-NDE-2000	REV. 11	ACCEPTAN	ICE STD:	Report Fi	ndings
MATERIAL DESC	CRIPTION:			team Inlet Flange	es	
		MATERIAL		_		
PARTICLES:	· —		<u> </u>	X COLOR: Re		
	Magnaflux 8A-RE	ED / 16J078	MFG. / I		n/a	
	IONER MFG. / BATCH:			n/a		
MAGNETIC PAR	TICLE BATH CONCENT	RATION:		1	n/a	
BLACKLIGHT M	ETER:			n/a		
BLACKLIGHT:					READING:	μW/cm2
BLACKLIGHT:		n/a			READING:	μW/cm2
WHITELIGHT MI	ETER: Spectroline	AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due: 06	5/13/2020
WHITELIGHT:	Flasi	hlight: Fenix U	JC35_SR		READING:	265.4 fc.
WHITELIGHT:		n/a			READING:	fc.
MAGNETIZATIO	N: Yoke	OUTP	UT: AC	Longitudin	al Amps	TURN
MAGNETIZATIO	N:n/a	OUTP	UT: n/a		n/a	TURN
MAGNETIZATIO	N: n/a	OUTP	UT: n/a		n/a	TURN
FIELD VERIFICA	TION INDICATOR:		QQI:	KSC 230 Stand	ard QQI	
MFG:	Parker l	3-300	s/n: 25694	Cal Due: 06/0	09/20	
MFG:	Magnaflı	x M-500 s/	n: 82127	Cal Due: 06/09	9/2020	
		INSPECT	ON RESUL	TS		
 Reheat Steam I HP Steam Inlet HP Steam Inlet Reheat Steam I Reheat Steam I HP Steam Inlet 	Inlet Flange_RS_Valve Sid Inlet Flange_LS_Valve Side It Flange_RS_Valve Side: N It Flange_LS_Valve Side: N Inlet Flange_RS_Shell Side Inlet Flange_LS_Shell Side: N It Flange_LS_Shell Side: N	e: No reportable in No reportable in No reportable in No reportable: No reportable o reportable in No report	le indications. adications. dications. e indications. e indications. dications.			
NDT Technician:	Stephen Renkavinsky MT	PT/VT III, UT	L II	Joop Kraij	esteijn MT/PT/VT	III, UT II

264

193 of

3-Angles NDE Report 2020-CF-5862



Project:	CF-5862		
Site:	Comanche Gen	erating Sta	tion
Date:	2/20; 25/2020	Page	19

		ULTRASON	NIC INSPEC	TION		
CUSTOMER:			FCSS	S		
PO #:	49	900073380	SURFACE	CONDITION:	In Service	e / Cleaned
PROCEDURE/SP	EC: 3	A-NDE-3000 REV. 9	АССЕРТА	NCE STD:	Report	Findings
MATERIAL DESC	CRIPTION:			Expansion Bellow	S	
		MATERIAI	LS / EQUIPN	MENT		
CLEANER/REMO	OVER MFG /	BATCH:	Ma	agnaflux SKC-S /	19J01K	
PENETRANT MF	G / BATCH:		Mag	naflux SKL-WP2	/ 18A044	
DEVELOPER MF	G / BATCH:		Mag	gnaflux SKD-S2/	19A08K	
OTHER MATERI	ALS			n/a		
BLACKLIGHT M	ETER:			n/a		
BLACKLIGHT:		n/a			READING:	µW/cm2
BLACKLIGHT:		n/a			READING:	μW/cm2
WHITELIGHT MI	ETER:	Spectroline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:		Flashlight: Fenix U	JC35_SR		READING:	295.4 fc.
WHITELIGHT:		Flashlight: Coast	HX5_LC		READING:	198.7 fc
PROCESS: 2	Color C	Contrast Fluoresc	ent	Solvent Remova	able X W	ater Washable
		INSPECT	ION RESUI	LTS		
• LPA_GE_Top:	No reportaba	Lindiagtions				
• LPA_GE_Top:						
-	-					
LPB_GE_Top:LPB_GE_Top:						
Note: areas that we	ere not cleane	d could not be inspected.				
NDT Technician:	Stephen Re	nkavinsky MT/PT/VT III, U	T II	Lawrer	nce Craig MT/F	PT/VT II
		n/a			n/a	

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station



Project:	CF-5862				
Site:	Comanche Gene	erating Sta	tion		
Date:	2/14,15,17,25,28	Page	194	of	264

May 19 mighteening and someoning	LIQUID PENE	TRANT IN	SPECTION		
CUSTOMER:		FCS	SS		
PO #: 490007338	0	SURFAC	E CONDITION:	In Servic	e / Cleaned
PROCEDURE/SPEC: 3A-NDE-	3000 REV. 9	ACCEPT	ANCE STD:	Report	Findings
MATERIAL DESCRIPTION:	MATERIA		Init #3 Bearings		
CLEANER/REMOVER MFG / BATCH			Iagnaflux SKC-S / 1	9J01K	
PENETRANT MFG / BATCH:	•		gnaflux SKL-SP2 / 1		
DEVELOPER MFG / BATCH:			agnaflux SKD-S2 / 1		
OTHER MATERIALS			n/a		
BLACKLIGHT METER:			n/a		
BLACKLIGHT:	n/a			READING:	μW/cm2
BLACKLIGHT:	n/a			READING:	μW/cm2
WHITELIGHT METER: Spectr	oline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	HX5_LC		READING:	251.4 fc	
WHITELIGHT:	n/a	n/a			fc
PROCESS: X Color Contrast	Fluoreso	cent X	Solvent Remova	ble W	ater Washable
	INSPECT	TION RESU	JLTS		
T1_Upper: Reportable indications found					
T2_Upper: Reportable indications found T3_Upper: Reportable indications found					
T4_Upper: Reportable indications found	. See following sh	eets for data			
T5_Upper: Reportable indications found T6_Upper: Reportable indications found					
T7_Upper: No reportable indications.	. See following sin	eets for data	•		
T8_Upper: No reportable indications.					
T9_Upper: No reportable indications. T1_Lower: Reportable indications found	Con following al	anta for data			
T2_Lower: Reportable indications found					
T3_Lower: Reportable indications found	. See following sh	eets for data	ı .		
T4_Lower: Reportable indications found	. See following sh	eets for data	••		
T5_Lower: Reportable indications found T6_Lower: Reportable indications found					
T7_Lower: No reportable indications.	. Bee following sin	icets for data	•		
T8_Lower: No reportable indications.					
T9_Lower: No reportable indications. TE Thrust Bearing_Upper: No reportable	indications				
TE Thrust Bearing_Lower: No reportable					
GE Thrust Bearing_Upper: No reportable GE Thrust Bearing_Lower: No reportable					
NDT Technician: Lawrence Cra	ig MT/PT/VT II		Stephen Renka	avinsky MT/P	T/VT III, UT II
Joop Kraijesteijn l	MT/PT/VT III, UT	II		n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

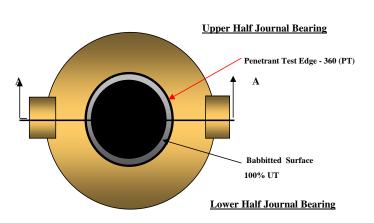
<3	angles
	NDT, Engineering and Consulting

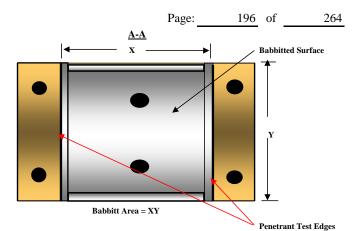
3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490

Project: CF-5862				
Site: Comanche Gen	erating Sta	tion		
Date: 2/14,15,17,25,28	Page	195	of	264

NDT, Engineerin	g and Consulting F: (518) 218-0490		227	· · · · · · · · · · · · · · · · · · ·	
	ULTRA	ASONIC INSPECTION	ON		
CUSTOMER:		FCSS			
PO #:	4900073380	SURFACE CO	ONDITION:	In Service / C	Cleaned
PROCEDURE/SPEC:	KT-NDE-1005 REV. 1	ACCEPTANC	E STD:	Report Fin	ıdings
				•	
MATERIAL DESCRIPTIO	N:	Unit #	3 Bearings		
	MATE	RIALS / EQUIPME	NT		
UT SCOPE:				COUPI	LANT
MFG: GEIT USM		CAL DUE: 01	/06/21	SAE	2 30
TRANSDUCER: LONGI	i'UDNAL				
MFG: Sensor Networks TRANSDUCER: SHEAR		Frequency: 10MHz. WEDGE:	S/N: 1161	1719 DELAY	23.01
TRANSDUCER. SHEAR	v	WEDGE.			
MFG:	n/a	ı		DELAY	: n/a
CAL BLOCK:	RF: E-UT-261	LINEARITY F	ERFORMED:	OI	K
	INSP	PECTION RESULTS	S		
T1_Upper: No reportable in T2_Upper: No reportable in T4_Upper: No reportable in T5_Upper: No reportable in T6_Upper: No reportable in T7_Upper: No reportable in T8_Upper: No reportable in T9_Upper: No reportable in T1_Lower: No reportable in T2_Lower: No reportable in T3_Lower: No reportable in T4_Lower: No reportable in T4_Lower: No reportable in T5_Lower: No reportable in T6_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T7_Lower: No reportable in T8_Lower: No reportable in T8_Lower: No reportable in T9_Lower: No reportable in T6_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T8_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T6_Lower: No reportable in T6_Lower: No reportable in T7_Lower: No reportable in T6_Lower: No reportab	ndications. No reportable indications. No reportable indications.				
NDT Technician: Stenher	n Rankavinsky MT/PT/VT	III IITII	Ioon Kraije	esteiin MT/PT/VT	шитш

3-Angles NDE Report 2020-CF-5862 GE @ Xcel Ene...





ULTRASONIC TESTING RESULTS LIQUID PENETRA								D PENETRAI	NT TEST RE	SULTS	
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%
1	Lower	16.25	10.13	258.45	0	0.0%	1	Lower	71.275	0	0.0%
2	Upper	17.00	10.75	287.06	0	0.0%	2	Upper	74.88	0	0.0%
2	Lower	17.00	10.75	287.06	0	0.0%	1 -	Lower	74.88	0	0.0%
3	Upper	17.25	14.31	387.80	0	0.0%	3	Upper	82.789	0	0.0%
3	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%
4	Lower	17.25	14.31	387.80	0	0.0%	1 4	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%
3	Lower	17.25	14.31	387.80	0	0.0%]	Lower	82.789	3.5	4.2%
,	Upper	18.25	15.00	430.01	0	0.0%		Upper	87.305	3.75	4.3%
6	Lower	18.25	15.00	430.01	0	0.0%	6	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%	1 ′	Lower	100.94	0	0.0%
8	Upper	19.25	16.38	495.14	0	0.0%	8	Upper	93.195	0	0.0%
ð	Lower	19.25	16.38	495.14	0	0.0%	1 8	Lower	93.195	0	0.0%
	Upper	8.75	3.50	48.11	0	0.0%		Upper	34.475	0	0.0%
9	Lower	8.75	3.50	48.11	0	0.0%	9	Lower	34.475	0	0.0%

3A-NDE-0000P_R9_040419 _Components Report_Journal Bearings



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

/a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20

Page

198 of 264

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

a n/a

3-Angles NDE Report 2020-CF-5862 ... Page 589 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20 Page 199

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

/a n/a

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: 15-Feb-20 Page 200

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

a n/a

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: 15-Feb-20 Page 201

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

/a n/a



Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20 Page

age 202

of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

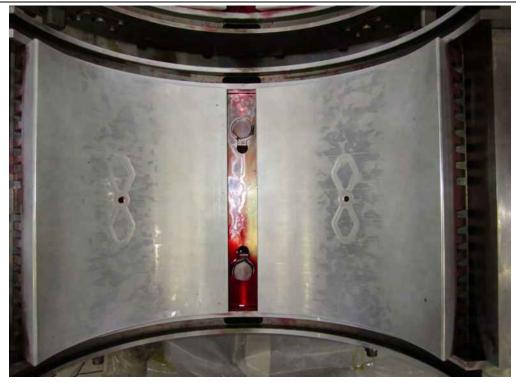
Stage

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20 Page

e <u>203</u> of <u>264</u>

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

/a n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20 Page 15-Feb-20

Page

204 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

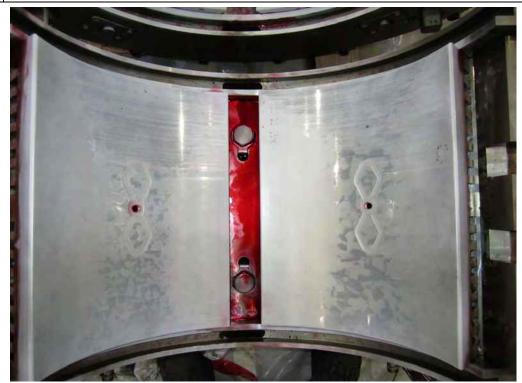
Stage

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



Project: CF-5862

Site: Comanche Generating Station

205 of 264

Date: 15-Feb-20 Page

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

'a n/a

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: 15-Feb-20 Page 206

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

Stage

• 4.2% PT lack of bond

T5L

- 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



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 bondScoring on babbitt surface.

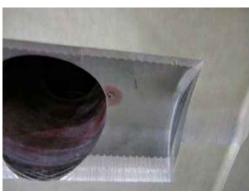












NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 15-Feb-20

Page

208 of 264

CUSTOMER: FCSS

PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

MATERIAL DESCRIPTION: Unit #3 Bearings

Stage

Description

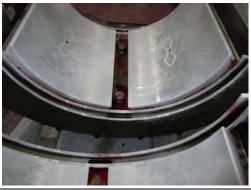
T6L

• 0.6% PT lack of bond

• Scoring on babbitt surface.







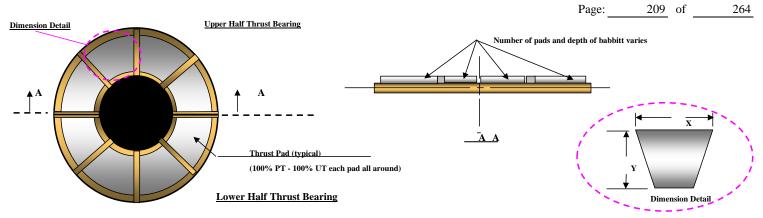
NDT Technician: Stephen Renkavinsky MT/PT/VT III, UT II

Lawrence Craig MT/PT/VT II

n/

n/a

3-Angles NDE Report 2020-CF-5862 GE @ Xcel Ene...



ULTRASONIC TESTING RESULTS								LIQUI	D PENETRA	NT TEST <u>re</u>	SULTS
Bearing	Pad #	X (in)	Y (in)	Area (in)	LOB (in)	LOB %	Bearing	Pad #	Area (in)	LOB (in)	% PT Lack of Bon
	1	7.75	5.375	41.65625	0	0%		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%
TE U	4	7.75	5.375	41.65625	0	0%	TE U	4	26.25	0	0%
IL U	5	7.75	5.375	41.65625	0	0%	IE C	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%
	1	7.75	5.375	41.65625	0	0%		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%
TE L	4	7.75	5.375	41.65625	0	0%	TEL	4	26.25	0	0%
ILL	5	7.75	5.375	41.65625	0	0%	IEL	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%	1	8	26.25	0	0%

3A-NDE-0000P_R9_040419 _Components Report_Thrust Bearings

_1 .	
<3 angles	
NDT, Engineering and Consulting	

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: <u>18-Feb-20</u> Page <u>210</u> of <u>264</u>

	LIQUID PENET	RANT INS	PECTION		
CUSTOMER:		FCS	S		
PO #: 49000733	80	SURFACE	CONDITION:	In Service	ce / Cleaned
PROCEDURE/SPEC: KT-NDE	-1005 REV. 1	ACCEPT A	NCE STD:	Repor	t Findings
MATERIAL DESCRIPTION:		Unit #3	Bearing Seal Rings		
	MATERIAL	S / EQUIP	MENT		
CLEANER/REMOVER MFG / BATCH	[:	M	agnaflux SKC-S / 19	9J01K	
PENETRANT MFG / BATCH:			gnaflux SKL-SP2 / 1		
DEVELOPER MFG / BATCH:		-	gnaflux SKD-S2 / 1		
OTHER MATERIALS			n/a		
BLACKLIGHT METER:			n/a		
BLACKLIGHT:	n/a			READING:	n/a μW/cm2
BLACKLIGHT:	n/a			READING:	
	roline AccuMAX	XRP-3000	S/N: 1913223/4		06/13/2020
WHITELIGHT:	Flashlight: Coast I			READING:	
WHITELIGHT:	n/a			READING:	
PROCESS: X Color Contras		ent X	Solvent Removal		/ater Washable
	INSPECT	<u> </u>			
T3 T Upper: No reportable indications.	INSTILCT	ION KESU	L13		
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 four T4 G Upper: No reportable indications.	nd. See following sho	eets for deta	iils.		
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 fou T6 T Upper: No reportable indications. T6 T Lower: No reportable indications.	nd. See following sh	eets for deta	nils.		
T6 G Upper: No reportable indications. T6 G Lower: Reportable indication fou T7 T Upper: No reportable indications.	_				
T7 T Lower: Reportable indication four 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.	nd. See following she	eets for deta	ils.		
T8 G Lower: No reportable indications NDT Technician: Lawrence Cr.	nig MT/PT/VT II			n/a	
	n/a			n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Liquid Penetrant Testing

264

3-Angles NDE Report 2020-CF-5862 ...

<3angles	
NDT, Engineering and Consulting	

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 18-Feb-20 Page 211 of

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



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

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/

n/a



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 18-Feb-20 Page

ge <u>213</u> of <u>264</u>

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.



		-		
	n/a		n/a	
NDT Technician:	Lawrence Craig MT/PT/VT II	_	n/a	



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 18-Feb-20 Page 214 of 264

CUSTOMER: FCSS

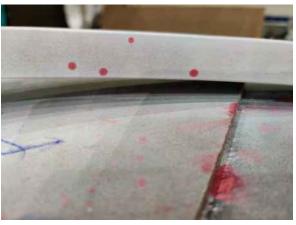
PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

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

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 19-Feb-20 Page 215 of 264

NDT, Engine	pering and Consulting F: (518) 218-0490		17-100-20	1 age		
		SONIC INSPECTIO	N			
CUSTOMER:		FCSS				
PO #:	4900073380	SURFACE CO	NDITION:	In Ser	vice / Clea	ined
PROCEDURE/SPEC:	KT-NDE-1005 REV. 1	ACCEPTANCE	E STD:	Rep	ort Finding	gs
MATERIAL DESCRIP			ring Seal Rings			
	MATE	RIALS / EQUIPMEN	Т			
UT SCOPE:				(COUPLAN	NT
MFG: GEIT U		CAL DUE: 01/	06/21		SAE 30	
TRANSDUCER: LON	GHUDNAL					
MFG: Sensor Netwo		Frequency: 10MHz. WEDGE:	S/N: 1161	719 D	ELAY:	23.01
THE RESIDENCE OF THE PARTY OF T	,	, EDGE.				
MFG:	n/a	l Total		D	ELAY:	n/a
CAL BLOCK:	RF: E-UT-261	LINEARITY PI	ERFORMED:		OK	
	INSP	PECTION RESULTS				
T3 T Upper: No reporta T3 T Lower: No reporta T3 G Lower: No reporta T4 T Upper: No reporta T4 T Lower: No reporta T4 G Upper: No reporta T5 T Upper: No reporta T5 T Upper: No reporta T5 T Lower: No reporta T6 T Upper: No reporta T6 T Upper: No reporta T6 T Upper: No reporta T6 T Lower: No reporta T7 T Upper: No reporta T6 G Upper: No reporta T7 T Lower: No reporta T7 T Lower: No reporta T7 T Lower: No reporta T7 G Upper: No reporta T8 T Upper: No reporta T8 G Upper: No reporta T8 G Upper: No reporta T8 G Upper: No reporta	able indications.					
NDT Technician: Step	ohen Renkavinsky MT/PT/VT I	III, UT II				

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Ultrasonic Report Form



Project: CF-5862 Site: Comanche Generating Station Date: 29-Feb-20 216 of 264 Page

NDT, Engi	neering and Co	onsulting F:	(518) 218-0490						
•			ULTRAS	ONIC INSI	PECTION				
CUSTOMER:				F	CSS				
PO #:	490	0073380		SURFA	CE CONDITION	ON:	Ir	Service / Cle	aned
PROCEDURE/SPEC:	KT-	NDE-1003 F	REV. 3.2	ACCEI	PTANCE STD:			Report Findin	gs
				•					
MATERIAL DESCRIPTION: Valves Bolting, Pins and Stems									
UT SCOPE:			MATERI	IALS / EQU	IIPMENT			COLIDIA	NT.
UT SCOPE:								COUPLA	N1
MFG: GEIT TRANSDUCER: LO	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21			SAE 30	
			Е.		III- C/N	. 14400	104	DELAY.	0.202
MFG: GEIT Gamm TRANSDUCER: SHI	EAR)" Round		equency: 5M EDGE:	IHZ. S/N	: 14A00	010A	DELAY:	0.293
MFG:			n/a					DELAY:	n/a
CAL BLOCK:	IIV	V: B06111		LINEA	RITY PERFOR	RMED:		OK	
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE		FINDIN	GS
Governor 1, 2, 3, 4	50	56	48	18.615	2.5	28-Fe	b l	No reportable i	ndications.
Throttle R/S L/S	53.6	59.6	36	23.050	3	28-Fe	b R	/S 7 studs and no or loss of	
Reheat Stop R/S L/S	41	53	48	16.357	2	29-Fe	b l	No reportable i	
Bearing end cap studs R/S L/S	44.2	56.2	24	13.975	1.75	29-Fe	b l	No reportable i	ndications.
Intercept Control Valves R/S L/S Outboard Inboard	40	52	112	14.837	1.75	2-Ma	ır l	No reportable i	ndications.
Intercept Valves Strainer bolts	42	48	32	5.786	0.75	4-Ma	ır l	No reportable i	ndications.
Intercept Valves Plugs Pins	23	35	32	0.704	1.375	4-Ma	ır l	No reportable i	ndications.
Throttle Valves Strainer Studs	36	48	16	7.579	1.5	4-Ma	ır l	No reportable i	ndications.
Governor Stems 1, 2, 3, 4	46	58	4	39.095	~3	4-Ma	ır	Best effort. No indicati	•
Governor Valves Body Pins	46.6	58.6	16	2.251	0.625	5-Ma	ır l	No reportable i	
Dody I IIIS									
NDT Technician:	Joop Kraije	steijn MT/P	T/VT III, U	JT II					

Member of ASNT * SNT - TC - 1A Certified Technicians

<3angles	3. 2 A
NDT, Engineering and Consulting	F

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 4-Mar-20 Page 217 of 264

NDT, Eng	ineering and Co		(518) 640-3000 (518) 218-0490		Date: <u>4-</u>	Mar-20	Page	<u>217</u> c	of <u>264</u>
				ONIC INSI	PECTION	1			
CUSTOMER:				F	CSS				
PO #:	4900	0073380		SURFA	CE CON	DITION:	In	Service / Cle	aned
PROCEDURE/SPEC:	KT-N	NDE-1003 F	REV. 3.2	ACCEI	PTANCE	STD:		Report Findin	gs
AATEDIAL DECON	DTION			W.1 D	. le' D'	1.04	(
MATERIAL DESCRI	PHON:		MATERI	ALS / EQU		s and Stems ((cont.)		
UT SCOPE:			MATIDAL	ALSTEQU				COUPLA	NT
	USMGO		1100358	CAL D	UE: 01/0	6/21		SAE 30	
TRANSDUCER: LO	NGHUDN	AL							
MFG: GEIT Gamn TRANSDUCER: SH	na .500 EAR	" Round	Fre WE	equency: 2.2 EDGE:	5MHz.	S/N: 14A0	0081	DELAY:	1.292
MFG:			n/a					DELAY:	n/a
CAL BLOCK:	IIW	7: B06111		LINEA	RITY PEI	RFORMED:		OK	
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETE	DATI R(in) TESTE		FINDIN	GS
Reheat Stop Valve Stem L/S	27.4	39.4	1	64.107	5.25		No	reportable indic tested as it will	ations. R/S not
NDT Technician:	Joop Kraijes	steijn MT/P	T/VT III, U	JT II					

Member of ASNT * SNT - TC - 1A Certified Technicians



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

Project:	CF-5862
Site:	Comanche Generating Station

Date: 2/28-29 2020 Page 218 of 264

	LIQUID PEN	ETRANT INSPECT	ΓΙΟΝ		
CUSTOMER:		FCSS			
PO #:	4900073380	SURFACE CON	NDITION:	In Service	e / Cleaned
PROCEDURE/SPI	EC: 3A-NDE-3000 REV. 9	ACCEPTANCE	STD:	Report	Findings
MATERIAL DESC	CRIPTION: Govern	nor Valves R/S #2, 4	L/S #1, 3 Seats and	d Corners	
	MATERI	ALS / EQUIPMENT	Т		
CLEANER/REMO	OVER MFG / BATCH:	Magnafl	lux SKC-S / 19J01	K	
PENETRANT MF	G / BATCH:	Magnaflu	x SKL-SP2 / 18C0)2K	
DEVELOPER MF	G / BATCH:	Magnaflu	ıx SKD-S2 / 19A0	8K	
OTHER MATERIA	ALS	n/a			
BLACKLIGHT MI	ETER:	n/a	ı		
BLACKLIGHT:	n/a		RE	ADING:	n/a μ W/cm2
BLACKLIGHT:	n/a		RE	ADING:	n/a μW/cm2
WHITELIGHT ME	ETER: Spectroline AccuMAX	X XRP-3000 S/N	V: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	Flashlight: Coa	st HX5_LC	RE	ADING:	271.9/240.6 fc.
WHITELIGHT:	WHITELIGHT: Flashlight: Fenix UC35_JK				485/356.4 fc.
PROCESS: X	Color Contrast Fluore	scent X Solv	ent Removable	W	ater Washable
	INSPE	CTION RESULTS			
Penetrant inspectio	n of the seats and corners of the #1, 2,	3 and 4 Governor Va	alves resulted in the	following	
- R/S #4 No reporta	corner of the seat - see picture next page				
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, U	<u>T II</u>	Lawrence Cr	raig MT/F	PT/VT II
	n/a			n/a	

of 264

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: 2/28-29 2020 Page 219

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

/a n/a

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 29-Feb-20 Proceeding N Page Page 200 of 201 Project 29-Feb-20 Page 200 of 201 Project 29-Feb-20 Page 200 of 201 Project 29-Feb-20



Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	29-Feb-20	Page	220	of	264

ND I, E	angineering and Consulting F: (518) 218-0490			
	LIQUID PENE	TRANT INSPECTION		
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	In Service / C	Cleaned
PROCEDURE/SPE	C: 3A-NDE-3000 REV. 9	ACCEPTANCE STD:	Report Find	dings
				<u>. 6 </u>
MATERIAL DESC	RIPTION:	Governor Valves Disks #1, 2, 3	3, 4 Seats	
		LS / EQUIPMENT		
CLEANER/REMO'	VER MFG / BATCH:	Magnaflux SKC-S	/ 19J01K	
PENETRANT MFC	G / BATCH:	Magnaflux SKL-SP2	2 / 18C02K	
DEVELOPER MFC	G / BATCH:	Magnaflux SKD-S2	/ 19A08K	
OTHER MATERIA	LS	n/a		
BLACKLIGHT ME	TER:	n/a		
BLACKLIGHT:	n/a		READING:	n/a μW/cm2
BLACKLIGHT:	n/a		READING:	n/a μW/cm2
WHITELIGHT ME	TER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	4 Cal Due: 06/	13/2020
WHITELIGHT:	Flashlight: Coas	t HX5_LC	READING:	240.6 fc.
WHITELIGHT:	TELIGHT: Flashlight: Fenix UC35_JK READING:			356.4 fc.
PROCESS: X	Color Contrast Fluores	scent X Solvent Remov	vable Water	r Washable
	INSPEC	TION RESULTS		
Penetrant inspection	of the Governor Valves Disks #1, 2, 3	, 4 Seats resulted in no reportab	le indications.	
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT	Lawn	ence Craig MT/PT/V	
_				
_	n/a Member of A SNT * SN	IT - TC - 1A Certified Technicians	n/a	

 $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

< 7	a	ng Engineering	le:	5	3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490
-----	---	-------------------	-----	---	---

pad Si 12205 1-3000 Da

roject:	CF-5862				
Site:	Comanche Ge	enerating Stat	tion		
Date:	4-Mar-20	Page	221	of	264

	MAGN	NETIC PARTICLE	INSPECTION		
CUSTOMER:		F	CSS		
PO #:	4900073380	SURFA	CE CONDITION:	In Service / Cle	aned
PROCEDURE/SPE	EC: KT-NDE-2000 RE	EV. 11 ACCEP	TANCE STD:	Report Findir	ıgs
MATERIAL DESC			or Valves Stems #1, 2	2, 3, 4	
DADTICI EG V		IATERIALS / EQU		,	
PARTICLES: X MFG. / BATCH:		FLUORESCENT	<u> </u>	n/a Magnaflux SKC-S / 1	1010112
-	IONER MFG. / BATCH:	INIT	n/a	Wagnanux SKC-S/	19JUIK
	FICLE BATH CONCENTRA	TION:	II/ a	n/a	
BLACKLIGHT MI		ccuMAX XRP-300	00 S/N: 1913223/4		2/2020
BLACKLIGHT WI	Magnaflux E			READING:	2996 μW/cm2
BLACKLIGHT:	TVIAGILITAX D	n/a	.721	READING:	n/a μW/cm2
WHITELIGHT ME	ETER: Spectroline A	ccuMAX XRP-300	00 S/N: 1913223/4	_	
WHITELIGHT:		t surface of part		READING:	0.4 fc.
WHITELIGHT:		n/a		READING:	n/a fc.
MAGNETIZATIO:	N: Yoke	OUTPUT: DO	C Longitudin	nal Amps n/a	TURN
MAGNETIZATIO	N: n/a	OUTPUT: n/	a	n/a	TURN
MAGNETIZATIO	N: n/a	OUTPUT: n/	a	n/a	TURN
FIELD VERIFICA	TION INDICATOR:	Q	— QI: KSC 4-230 Min	iature QQI	
MFG:	Parker DA-40	0 S/N: 25009	CAL. DUE: 06	5/06/2020	
MFG:		n/a			
		INSPECTION RE	SULTS		
Magnetic particle in	nspection of the Governor Val	lves Stems #1, 2, 3, 4	resulted in no report	table indications.	
	•	, , ,			
NDT Technician:	Joop Kraijesteijn MT/PT/	VT III, UT II			
-	-				
-		A CONTRACTOR TO THE	G .:		

 $Member of ASNT * SNT - TC - 1A Certified Technicians \\ 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing$

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station



Project:	CF-5862						
Site:	Site: Comanche Generating Station						
Date:	4-Mar-20	Page	222	of	264		

LIQUID PENETRANT INSPECTION						
CUSTOMER:			FCS	SS		
PO #:	4900073380)	SURFACI	E CONDITION:	In Servic	ce / Cleaned
PROCEDURE/SPEC	: 3A-NDE-3	000 REV. 9	ACCEPTA	ANCE STD:	Report	Findings
MATERIAL DESCR	IPTION:			Body Inside Bushin	gs and Back C	brooves
		MATERIAL				
CLEANER/REMOVI				lagnaflux SKC-S / 1		
PENETRANT MFG /	BATCH:			gnaflux SKL-SP2/		
DEVELOPER MFG /	BATCH:		Ma	ignaflux SKD-S2 / 3	19A08K	
OTHER MATERIAL	<u>S</u>			n/a		
BLACKLIGHT MET	ER:			n/a		
BLACKLIGHT:		n/a			READING:	$n/a \mu W/cm2$
BLACKLIGHT:		n/a			READING:	<u>n/a</u> μW/cm2
WHITELIGHT MET	ER: Spectro	oline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:		Flashlight: Coast I	HX5_LC		READING:	260 fc.
WHITELIGHT:		n/a			READING:	n/a fc.
PROCESS: X	Color Contrast	Fluoresce	ent X	Solvent Remova	nble W	ater Washable
		INSPECTI	ION RESU	LTS		
Penetrant inspection on reportable indication		res #1, 2, 3, 4 Body	Inside Bus	hings and Back Gro	oves resulted i	n
NDT Technician:	Lawrence Craiş	g MT/PT/VT II			n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project: CF-5862

Site: Comanche Generating Station

Date: 5-Mar-20 Page 223 of 264

NDT, Engineer	ing and Consulting F: (518) 218-0490		-atc. 9 War 20		01 204
	MAGNETIC PA	RTICLE IN	SPECTION		
CUSTOMER:		FCS	S		
PO #:	4900073380	SURFACE	E CONDITION:	Oxide l	Blasted
PROCEDITRE/SPEC	KT-NDE-2000 REV. 11	ACCEPT 4	ANCE STD:	Report I	Gindings
rocedore, si ee.	K1-14DL-2000 KL v. 11	Necel II	INCESTD.	Керопт	manigs
MATERIAL DESCRIPTION	ON: Governor V	alves #1, 2,	3, 4 Body Pins Area	as and Transition	18
	MATERIAL	LS / EQUIP	MENT		
PARTICLES: X WET	DRY X FLUORE	SCENT	COLOR:	n/	'a
MFG. / BATCH:	Magnaflux 14AM / 18K20K	MFG.	/ BATCH:	Magnaflux SKC	C-S / 19J01K
WATER CONDITIONER	MFG. / BATCH:		n/a		
MAGNETIC PARTICLE	BATH CONCENTRATION:		r	n/a	
BLACKLIGHT METER:	Spectroline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
BLACKLIGHT:	Magnaflux EV6000	S/N: 242	1	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		-	0.28 fc.
WHITELIGHT:	n/a			READING:	n/a fc.
MAGNETIZATION:	Yoke OUTI	PUT: DC	Longitudina	al Amps n/a	TURN
MAGNETIZATION:	n/a OUTI	PUT: n/a]	n/a	TURN
MAGNETIZATION:	n/a OUTI	PUT: n/a]	n/a	TURN
FIELD VERIFICATION I	NDICATOR:	QQI	: KSC 4-230 Minia	ature QQI	<u> </u>
MFG:	Parker DA-400 S/	N: 25009	CAL. DUE: 06/	06/2020	
MFG:		n/a			
	INSPECT	TION RESU	LTS		
Magnetic particle inspection reportable indications.	on of the Governor Valves #1, 2,	3, 4 Body Pir	ns Areas and Transi	tions resulted in	no
NDT Technician:	Lawrence Craig MT/PT/VT II				

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

Proceeding No. 20I-0437E 3-Angles NDE Report 2020-CF-5862 Page 614 of 719 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 29-Feb-20 Page 224 of 2020 Page 614 of 719 Project: 29-Feb-20 Page 614 of 719 Project: 29-Feb-20 Page 224 of 2020 Page 224



Project:	CF-5862				
Site:	Comanche Ge	nerating Stat	tion		
Date:	29-Feb-20	Page	224	of	264

ND I, E	Engineering and Consulting F: (5)	18) 218-0490				
	LIQ	UID PENETRA	NT INSP	ECTION		
CUSTOMER:			FCSS			
PO #:	4900073380	SI	JRFACE (CONDITION:	In Servic	e / Cleaned
PROCEDURE/SPE	C: 3A-NDE-3000 R	REV. 9 A	CCEPTAN	NCE STD:	Report	Findings
MATERIAL DESC		Valves R/S and L		Seal Welds, Straine	r Grooves and	l Swirl Dams
CLEANER/REMO'	VER MFG / BATCH:		Mag	gnaflux SKC-S / 1	9J01K	
PENETRANT MFC	3 / BATCH:		Magn	aflux SKL-SP2 / 1	18C02K	
DEVELOPER MFC	3 / BATCH:		Magr	naflux SKD-S2 / 1	9A08K	
OTHER MATERIA	LS		r	n/a		
BLACKLIGHT ME	TER:			n/a		
BLACKLIGHT: _		n/a			READING:	m/a μW/cm2
BLACKLIGHT: _		n/a			READING:	m/a μW/cm2
WHITELIGHT ME	TER: Spectroline	AccuMAX XR	RP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT: _	WHITELIGHT: Flashlight: Coast HX5_LC				READING:	240.6 fc.
WHITELIGHT: _	Flash	light: Fenix UC3	35_JK		READING:	356.4 fc.
PROCESS: X	Color Contrast	Fluorescent	XS	Solvent Remova	ble W	ater Washable
		INSPECTION	N RESUL	TS		
resulted in the follow - R/S Seat: Cracklik - R/S Seal weld: No - R/S Strainer groov - R/S Swirl Dam:: N - L/S Seat: No repor - L/S Seal weld: No - L/S Strainer groov	te indication through the sea oreportable indications res: No reportable indication No reportable indications	at - see pictures no		ms of the R/S and I	/S Throttle V	alves
NDT Technician:	Lawrence Craig MT	C/PT/VT II	_		n/a	
	n/a		_		n/a	



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 29-Feb-20 Pag

Page

225 of 264

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:	an: Lawrence Craig MT/PT/VT II		n/a
	n/a		n/a

Proceeding No. 20I-0437E 3-Angles NDE Report 2020-CF-5862 Page 616 of 719 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 29-Feb-20 Page 226 of 201 Project: CF-5862



Project:	CF-5862						
Site:	Comanche Ge	Comanche Generating Station					
Date:	29-Feb-20	Page	226	of	264		

ND I,	Engineering and Consulting	F: (518) 218-0490		-		
	1	LIQUID PENET	RANT INS	PECTION		
CUSTOMER:			FCS	S		
PO #:	4900073380		SURFACE	E CONDITION:	In Servic	e / Cleaned
PROCEDURE/SPI	EC: 3A-NDE-300	00 REV. 9	ACCEPT!	ANCE STD:	Report	Findings
					1	
MATERIAL DESC	CRIPTION:	Throttle '	Valves R/S a	and L/S Disk Seats a	nd Back Seats	
		MATERIAL	S / EQUIP	MENT		
CLEANER/REMC	OVER MFG / BATCH: _		M	agnaflux SKC-S / 1	9J01K	
PENETRANT MF	G / BATCH:		Mag	gnaflux SKL-SP2/	18C02K	
DEVELOPER MF	G / BATCH:		Ma	gnaflux SKD-S2 / 1	19A08K	
OTHER MATERL	ALS			n/a		
BLACKLIGHT M	ETER:			n/a		
BLACKLIGHT:		n/a			READING:	$n/a \mu W/cm2$
BLACKLIGHT:		n/a			READING:	$\underline{\hspace{1cm}} n/a \hspace{1cm} \mu W/cm2$
WHITELIGHT MI	ETER: Spectrol	ine AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	F	lashlight: Coast	HX5_LC		READING:	240.6 fc.
WHITELIGHT:		n/a			READING:	n/a fc.
PROCESS: \(\Sigma\)	Color Contrast	Fluoresc	ent X	Solvent Remova	ıble W	ater Washable
		INSPECT	ION RESU	LTS		
Penetrant inspectio	n of the Throttle Valves	R/S and L/S Disk	Seats and I	3ack Seats resulted 1	n no reportable	e indications.
NDT Technician:	Lawrence Craig	MT/PT/VT II			n/a	
	n/a				n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

3-Angles NDE Report 2020-CF-5862 ... Page 617 of 719

	1_			
< 5	an	qu	es	3angles Inc. 2 Access Road Albany, NY 12
	NDT, Engir	neering and	Consulting	P: (518) 640-30 F: (518) 218-04

Project:	CF-5862					
Site:	Comanche Generating Station					
Date:	4-Mar-20	Page	227	of	264	

NDT, Eng	ineering and Consulting F: (518) 218-0490			
	VISUAL IN	SPECTION REPORT		
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blast	ed
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findi	ngs
			•	
MATERIAL DESCRI		Throttle Valves R/S L/S Stra	iners	
WHITE ICHT MET		CTION RESULTS	G 1 D 06/11	2/2020
WHITELIGHT METH WHITELIGHT:	ER: Spectroline AccuMAX Flashlight: Fen		Cal Due: 06/13 READING:	408 fc.
WHITELIGHT:	n/a		READING:	$\frac{408}{\text{n/a}}$ fc.
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, U	Т II	n/a n/a	
		NT - TC - 1A Certified Technicians	11/ α	

 $\label{lem:member of ASNT * SNT - TC - 1A Certified Technicians} $3A-NDE-0000P_R9_040419 $$ Components Report_Visual Testing$

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project: CF-5862

Site: Comanche Generating Station

Date: 4-Mar-20 Page 228 of 264

NDT, E	ngineering and Consulting F: (518) 218-0490 MAGNETIC	PARTIC	T.F.INS	PECTION——		
			אוראפי			
CUSTOMER:		I	FCSS	<u> </u>		
PO #:	4900073380	SU	RFACE	CONDITION:	Oxide	Blasted
PROCEDURE/SPE	C: KT-NDE-2000 REV. 11	AC	CEPTAI	NCE STD:	Report 1	Findings
MATERIAL DESC	RIPTION: Thro	tle Valves	R/S L/S	Strainers Flange T	ransition Areas	S
	MATE	RIALS / H	EQUIPM	IDNT		
PARTICLES: X	WET DRY X FLU	ORESCE	NT	COLOR:	n	/a
MFG. / BATCH:	Magnaflux 14AM / 18K20	K	MFG. /	ВАТСН:	n/a	
WATER CONDITION	ONER MFG. / BATCH:			n/a		
MAGNETIC PART	ICLE BATH CONCENTRATION	:		n/	a	
BLACKLIGHT ME	TER: Spectroline AccuM	AX XRI	P-3000	S/N: 1913223/4	Cal Due:	06/13/2020
	Magnaflux EV6000					2996 μW/cm2
BLACKLIGHT:	r	/a			READING:	n/a μW/cm2
WHITELIGHT ME	TER: Spectroline AccuM	AX XRI	2-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	At surfa	ce of part			READING:	0.4 fc.
WHITELIGHT:		/a			READING:	fc.
MAGNETIZATION	I: Yoke (OUTPUT:	DC	Longitudinal	Amps n/a	TURN
MAGNETIZATION	J: n/a (OUTPUT:	n/a		n/a	TURN
MAGNETIZATION	I: n/a (OUTPUT:	n/a		n/a	TURN
FIELD VERIFICAT	TION INDICATOR:		QQI:	KSC 4-230 Minia	ture QQI	
MFG:	Parker DA-400	S/N: 25				
MFG:			n/a			
	INSF	ECTION	RESUL	TS		
M						
no reportable indica	spection of the Throttle Valves R/S tions.	L/S Strai	ners Fian	ige Transition Area	is resulted in	
1						
NDT Technician:	Lawrence Craig MT/PT/VT	П	-			
_			_			

 $Member\ of\ ASNT\ *SNT\ -TC\ -1A\ Certified\ Technicians$ $3A-NDE-0000P_R9_040419\ _Components\ Report_Magnetic\ Particle\ Testing$

3-Angles NDE Report 2020-CF-5862 **Sangles Inc. 2 Access Road Albamy, NY 12205 **Site: Comanche Generating Station**



Date: 4-Mar-20 264 Page of

LIQUID PENETRANT INSPECTION					
CUSTOMER:		FCS	SS		
PO #: 49	000073380	SURFACE	E CONDITION:	In Service	e / Cleaned
PROCEDURE/SPEC: 3	A-NDE-3000 REV. 9	ACCEPTA	ANCE STD:	Report	Findings
MATERIAL DESCRIPTION:	Throttle Valves MATERIA		Body Back Seats a	nd (1) Pilot Dis	sk Seat
CLEANER/REMOVER MFG /	BATCH:	M	agnaflux SKC-S / 1	9J01K	
PENETRANT MFG / BATCH:			gnaflux SKL-SP2 /		
DEVELOPER MFG / BATCH:			gnaflux SKD-S2 / 1		
OTHER MATERIALS			n/a		
BLACKLIGHT METER:			n/a		
BLACKLIGHT:	n/a			READING:	n/a μW/cm2
BLACKLIGHT:	n/a			READING:	m/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 C	Contrast Fluoresc	cent X	Solvent Remova	ıble W	ater Washable
	INSPECT	TION RESU	LTS		
Penetrant inspection of the Thro no reportable indications.	ttle Valves R/S and L/S Boo	ly Back Seat	s and (1) Pilot Disk	Seat resulted in	n
NDT Technician: Lawr	ence Craig MT/PT/VT II			n/a	
	n/a			n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$



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

Project:	CF-5862						
Site:	Comanche Ge	Comanche Generating Station					
Date:	7-Mar-20	Page	230	of	264		

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



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

Project:	CF-5862				
Site: Comanche Generating Station					
Date:	2/29-3/2,4 2020	Page	231	of	26

	LIQUID PENETRANT INSPECTION							
CUSTOMER:		FCSS						
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned					
PROCEDURE/SP	EC: 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/REMO	OVER MFG / BATCH:	Magnaflux SKC-S /	19J01K					
PENETRANT MF	G / BATCH:	Magnaflux SKL-SP2 /	18C02K					
DEVELOPER MF	G / BATCH:	Magnaflux SKD-S2 /	19A08K					
OTHER MATERI	ALS	n/a						
BLACKLIGHT M	ETER:	n/a						
BLACKLIGHT:	n/a		READING: n/a µW/cm2					
BLACKLIGHT:	n/a		READING: n/a µW/cm2					
WHITELIGHT MI	ETER: Spectroline AccuMAX	XRP-3000 S/N: 1913223/4	Cal Due: 06/13/2020					
WHITELIGHT:	Flashlight: Coast H	HX5_LC	READING: 240.6/174/260 fc.					
WHITELIGHT:	Flashlight: Fenix U	JC35_JK	READING: <u>56.4/493.1/408</u> fc.					
PROCESS: 2	PROCESS: X Color Contrast Fluorescent X Solvent Removable Water Washable							
	INSPECT	ION RESULTS						
Penetrant inspection	on of the seats and bushings of the R/S and	L/S Reheat Stop Valves result	ed in the following:					
- R/S Seat: No repo - R/S Bushing: Cra - L/S Seat: No repo	ortable indications acklike indication spiraling from seat into the ortable indications	-	-					
- L/S Bushing: No	reportable indications							
NDT Technician:	Lawrence Craig MT/PT/VT II		n/a					
TOT Technician.								
	n/a		n/a					

3-Angles NDE Report 2020-CF-5862 ... Page 622 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 2-Mar-20 Page 232 of 264

CUSTOMER: FCSS

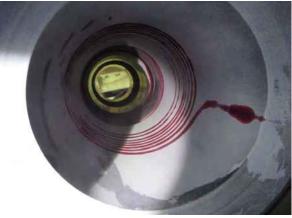
PO #: 4900073380 SURFACE CONDITION: In Service / Cleaned

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		Technician: Lawrence Craig MT/PT/VT II n/a			
	n/a		n/a			

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station



Project:	CF-5862				
Site:	Comanche Ge	nerating Sta	tion		
Date:	7-Mar-20	Page	233	of	264

out of months of the	LIQUID PENE	ΓRANT INSF	PECTION		
CUSTOMER:		FCSS	;		
PO #:	4900073380	SURFACE	CONDITION:	In Servic	e / Cleaned
PROCEDURE/SPEC:	3A-NDE-3000 REV. 9	ACCEPTAI	NCE STD:	Report	Findings
		•			
MATERIAL DESCRIPTION			alves L/S Stem Ke	yways	
CLEANED/DEMOVED M		LS / EQUIPM		01011/	
CLEANER/REMOVER M PENETRANT MFG / BAT	·		gnaflux SKC-S / 1 naflux SKL-SP2 /		
DEVELOPER MFG / BAT	·		naflux SKD-S2 / 1		
OTHER MATERIALS			n/a	JAUOK	
BLACKLIGHT METER:			n/a		
BLACKLIGHT:	n/a		11/ 4	READING:	n/a μW/cm2
BLACKLIGHT:	n/a			READING:	n/a μW/cm2
WHITELIGHT METER:	Spectroline AccuMAX	XRP-3000	S/N: 1913223/4		06/13/2020
WHITELIGHT:	Flashlight: Fenix			READING:	485 fc.
WHITELIGHT: n/a		READING:	n/a fc.		
PROCESS: X Co.	lor Contrast Fluoresc	cent X	Solvent Remova	ble	ater Washable
	INSPECT	TION RESUL	TS		
Description of the Cale	Dalama Cama Walana I /C Cama W	14.	1.5	. 1	
Penetrant inspection of the	Reheat Stop Valves L/S Stem Ke	eyways resulte	a in no reportable	indications.	
R/S Stem will be replaced a	and was not inspected.				
NDT Technician: Joop	o Kraijesteijn MT/PT/VT III, UT	<u>II</u>		n/a	
	n/a			n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

3-Angles NDE Report 2020-CF-5862 ... Page 624 of 719

<	3	a NDT.	n (gl	e de Cons	S	3angles Inc. 2 Access Road Albany, NY 1220 P: (518) 640-3000 F: (518) 218-0490
---	---	-----------	-----	----	-----------	---	--

Project:	CF-5862				
Site:	te: Comanche Generating Station				
Date:	7-Mar-20	Page	234	of	264

	MAGNETIC PAR	RTICLE INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	: In Service / Cleaned
PROCEDURE/SPEC	: KT-NDE-2000 REV. 11	ACCEPTANCE STD:	Report Findings
MATERIAL DESCR		Stop Valves R/S L/S Disk A S / EQUIPMENT	Arm Connections
PARTICLES: X W			n/a
	Magnaflux 14AM / 18K20K	<u> </u>	·
	NER MFG. / BATCH:		
	CLE BATH CONCENTRATION:		n/a
BLACKLIGHT MET	ER: Spectroline AccuMAX	XRP-3000 S/N: 1913223	3/4 Cal Due: 06/13/2020
BLACKLIGHT:	Magnaflux EV6000	S/N: 2421	READING: 2547 μW/cm2
BLACKLIGHT:	n/a		READING: n/a μW/cm2
WHITELIGHT MET	ER: Spectroline AccuMAX		
WHITELIGHT:	At surface of	part	READING: 0.36 fc.
WHITELIGHT:	n/a		READING: n/a fc.
MAGNETIZATION:	Yoke OUTP	UT: DC Longitu	dinal Amps n/a TURN
MAGNETIZATION:	n/a OUTP	UT: n/a	n/a TURN
MAGNETIZATION:	·	UT: n/a	n/a TURN
FIELD VERIFICATI	ON INDICATOR:	QQI: KSC 4-230 M	finiature QQI
MFG:	Parker DA-400 S/N		
MFG:		n/a	
	INSPECT	ION RESULTS	
Manustin mentials ins			manufacility des fallessings
Magnetic particle ins	pection of the Reheat Stop Valves R/S I	JS Disk Arm Connections	resulted in the following:
	ations circular for 360 degrees - see pic		
- L/S Cracklike indica	ations circular for 180 degrees - see pict	ures next page	
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, UT I	т	
NDI Technician:	Joop Kraijesieijii WH/PH/VH III, UH		
<u></u>			

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

Project: CF-5862

Site: Comanche Generating Station

Date: 7-Mar-20 Page 235 of 264

CUSTOMER: FCSS

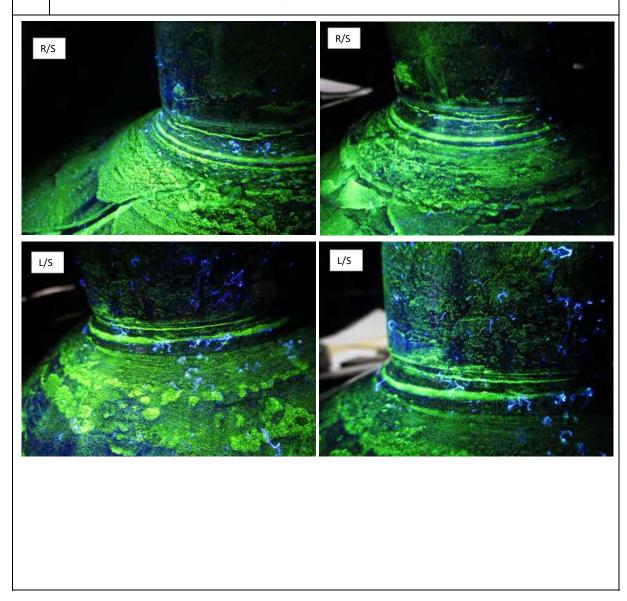
PO #: 4900073380 SURFACE CONDITION:

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	

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 7-Mar-20 Proceeding N Pag Confidential Pag Pag Project: CF-5862 Site: Tomanche Generating Station Date: 7-Mar-20 Page Project: CF-5862



NDT,	Engineering and Consulting F: (518) 218-0490		
	LIQUID PENI	ETRANT INSPECTION	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC: 3A-NDE-3000 REV. 9		ACCEPTANCE STD:	Report Findings
MATERIAL DESC		op Valves Disk Yoke Keyways (4), Bushings, Nuts
CI EANED/DEMO		ALS / EQUIPMENT Magnaflux SKC-S /	10101 <i>V</i>
PENETRANT MF			
		Magnaflux SKL-SP2 /	
DEVELOPER MF		Magnaflux SKD-S2 /	19AU8K
OTHER MATERIA	-	n/a	
BLACKLIGHT MI	-	n/a	DE L DRIG
BLACKLIGHT:	n/a		READING: $\frac{n/a}{\mu W/cm^2}$
BLACKLIGHT:	n/a		READING: $\frac{n/a}{\mu W/cm^2}$
WHITELIGHT ME			Cal Due: 06/13/2020
WHITELIGHT:	Flashlight: Fenix	x UC35_JK	READING: 485 fc.
WHITELIGHT:	n/a		READING: n/a fc.
PROCESS: X	Color Contrast Fluores	scent X Solvent Remove	able Water Washable
	INSPEC	CTION RESULTS	
D	and the Delegation Wiles D'd Wiles	V (4) D .1 N	No. 1 to the Collection
Penetrant inspection	n of the Reheat Stop Valves Disk Yoke	Reyways (4), Bushings, Nuts les	uned in the following.
- Some bleadout in	keyways and bushings - see example pi	ictures	
1000			
1	The second second		
		The second	The state of the s
	The state of the s		
	1-2000		
Salt Salt	ART TO THE REST OF THE PARTY OF		As any
1	Constitution of the last		
		CARL LOS PRODUCTIONS	Marie Marie Alleria Salaria
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, U	<u>Г II</u>	n/a
<u>-</u>	n/a		n/a
-	· · · · · · · · · · · · · · · · · · ·	·	

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 3-Mar-20 Proceeding N Page Page Page 227 of 201



Project:	CF-5862				
Site:	Comanche Ge	enerating Stat	tion		
Date:	3-Mar-20	Page	237	of	264

ND I, E	ngineering and Consulting F: (518)	218-0490			_	
	LIQU	ID PENETRA	NT INS	PECTION		
CUSTOMER:			FCS	S		
PO #:	4900073380	SU	JRFACE	CONDITION:	In Serv	ice / Cleaned
PROCEDURE/SPE	C: 3A-NDE-3000 RE	EV. 9 A0	ССЕРТА	NCE STD:	Repo	rt Findings
MATERIAL DESC	RIPTION: Intercept Valves	R/S and L/S Ou			Swirl Dams, a	and Strainer Grooves
CLEANER/REMOV	VER MFG / BATCH:			agnaflux SKC-S / 1	9I01K	
PENETRANT MFG				naflux SKL-SP2/		
DEVELOPER MFG	·			gnaflux SKD-S2 / 1		
OTHER MATERIA				n/a	<u> </u>	
BLACKLIGHT ME	-			n/a		
BLACKLIGHT:		n/a			READING	i: n/a μW/cm2
BLACKLIGHT:		n/a			READING	i: n/a μW/cm2
WHITELIGHT ME	ΓΕR: Spectroline A	ccuMAX XR	P-3000	S/N: 1913223/4	Cal Due	e: 06/13/2020
WHITELIGHT:				READING	381.3 fc.	
WHITELIGHT:	IGHT: Flashlight: Fenix UC35_JK		READING	i: 410.8 fc.		
PROCESS: X	Color Contrast	Fluorescent	X	Solvent Remova	ble	Water Washable
		INSPECTION	N RESU	LTS		
resulted in the follow R/S Outbound Sea: R/S Outbound Swi R/S Outbound Stra R/S Intbound Seat: R/S Inbound Swirl R/S Inbound Strain L/S Outbound Seat: L/S Outbound Swi L/S Outbound Strain L/S Outbound Swi L/S Outbound Swi	of the Intercept Valves R/S aving: t: No reportable indications rl Dam: some bleedout on the iner Groove: 8" linear indications porosity spots - see pictures Dam - bleedout on the botto her Groove: linear indication are Groove: linear indication rl Dam: No reportable indicationer Groove: No reportable indications Dam: No reportable indications Dam: No reportable indications reportable indications Dam: No reportable indications reportable reportable reportable reportable reportable reportable reporta	e bottom - see ption under swirtnext pages m - see pictures covering ~270 dout - see picture tions endications	oictures n I dam and next pag degree of	ext pages d spots of porosity - ges f the circumference	see pictures	next pages
NDT Technician:	Joop Kraijesteijn MT/PT/	VT III, UT II	_	Lawren	ce Craig MT	C/PT/VT II
_	n/a		_		n/a	

of

264

3-Angles NDE Report 2020-CF-5862 ...



Project: CF-5862

Site: Comanche Generating Station

Date: 3-Mar-20 Page 238

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet

264

3-Angles NDE Report 2020-CF-5862 ...



Project: CF-5862

Site: Comanche Generating Station

Date: 3-Mar-20 Page 239 of

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



Project: CF-5862

Site: Comanche Generating Station

240

of 264

Date: 3-Mar-20 Page

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

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Continuation Sheet



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

	1			
<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 122
	NDT, Engir	eering and	i Consultin	P: (518) 640-30 F: (518) 218-04

Project: CF-5862
Site: Comanche Generating Station
Date: 4-Mar-20 Page 242 of 264

banks ag item	VISUAL IN	SPECTION REPORT		
CUSTOMER:		FCSS		
PO #:	4900073380	SURFACE CONDITION:	Oxide Blaste	d
PROCEDURE/SPEC	: KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findin	gs
MATERIAL DESCR		ept Valves R/S L/S Outbound Inb	ound Strainers	
WHITELIGHT MET		CTION RESULTS X XRP-3000 S/N: 1913223/4	Cal Due: 06/13/	/2020
WHITELIGHT MET WHITELIGHT:	Flashlight: Fen		READING:	408 fc.
WHITELIGHT:	n/a		READING:	n/a fc.
- R/S Outbound: No re-	eign object in one location; screen mireportable indications ign object in 2 locations - see picture n eroded in one corner and foreign of	es next pages		
NDT Technician:	Joop Kraijesteijn MT/PT/VT III, U	T II	n/a	
	n/a	NT. TO 14 Conffee Trades:	n/a	

264

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

243 of

Date: 4-Mar-20 Page

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

264

3-Angles NDE Report 2020-CF-5862 ... Page 634 of 719

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 4-Mar-20 Page 244 of

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

3-Angles NDE Report 2020-CF-5862 ... Page 635 of 719

<3	an	gl	es	3angles Inc. 2 Access Road Albany, NY 1220: P: (518) 640-3000 F: (518) 218-0490
	ND I, ENGI	reering and	a consulting	F: (518) 218-0490

Project:	CF-5862				
Site:	Comanche Ge	nerating Sta	tion		
Date:	4-Mar-20	Page	245	of	264

NDT, E	ngineering and Consulting F: (518) 218-0490 MAGNETIC	рарти	TEING	PECTION		
	MAGNETIC	TAKIII	a a vi INS			
CUSTOMER:			FCSS			
PO #:	4900073380	SU	RFACE	CONDITION:	Oxide l	Blasted
PROCEDURE/SPE	C: KT-NDE-2000 REV. 11	AC	CEPTAN	NCE STD:	Report I	Findings
MATERIAL DESC	RIPTION: In	ntercept V	'alves Plu	ugs (4) Pins and ID	transitions	
		RIALS / I				
	VET DRY X FLU			•		/a
MFG. / BATCH:	Magnaflux 14AM / 18K20	K	MFG. /	ВАТСН:	n/a	
WATER CONDITION	ONER MFG. / BATCH:			n/a		
MAGNETIC PART	ICLE BATH CONCENTRATION			n/	a	
BLACKLIGHT ME	TER: Spectroline AccuMa	AX XRI	P-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 ME	ΓΕR: Spectroline AccuM	AX XRI	P-3000	S/N: 1913223/4	Cal Due:	06/13/2020
WHITELIGHT:	At surfa	ce of part			READING:	0.4 fc
WHITELIGHT:	n	/a			READING:	fc
MAGNETIZATION	I: Yoke C	UTPUT:	DC	Longitudinal	Amps n/a	TURN
MAGNETIZATION	I:O	UTPUT:	n/a		n/a	TURN
MAGNETIZATION	J: n/a C	UTPUT:	n/a		n/a	TURN
FIELD VERIFICAT	TION INDICATOR:		QQI:	KSC 4-230 Miniat	ture QQI	
MFG:	Parker DA-400	S/N: 2:	5009	CAL. DUE: 06/0	06/2020	
MFG:			n/a			
	INSP	ECTION	RESUL	TS		
Manuatia matiala in		D:	1	ID 4iti	4-1:	
Magnetic particle in	spection of the Intercept Valves Plu	igs Pins ai	reas and	ID transitions resul	tea in no report	table indications.
NDT Technician:	Joop Kraijesteijn MT/PT/VT III,	UT II	-			
-			_			

 $Member\ of\ ASNT\ *SNT\ -TC\ -1A\ Certified\ Technicians$ $3A-NDE-0000P_R9_040419\ _Components\ Report_Magnetic\ Particle\ Testing$

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Communication of the communication of



< 5 and	2 Access Road Albany, NY 12205	Site: Comanche Ge	
NDT, Engineerin	P: (518) 640-3000 ag and Consulting F: (518) 218-0490	Date: <u>7-Mar-20</u>	Page <u>246</u> of <u>264</u>
	VISUAL IN	SPECTION REPORT	
CUSTOMER:		FCSS	
PO #:	4900073380	SURFACE CONDITION:	In Service / Cleaned
PROCEDURE/SPEC:	KT-NDE-4005 REV. 1	ACCEPTANCE STD:	Report Findings
MATERIAL DESCRIPTIO	ON:	Intercept Valves Plugs Was	hers
		CTION RESULTS	
WHITELIGHT METER:	Spectroline AccuMAX		Cal Due: 06/13/2020
WHITELIGHT: WHITELIGHT:	Flashlight: Fenix	x UC35_JK	READING: 408 f READING: n/a f
	T. WI DI WII	rs (2 per plug) resulted in no repo	. 11 . 1

n/a

<3	angles
	NDT, Engineering and Consulting

3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862
Site: Comanche Generating Station
Date: 29-Feb-20 Page 247 of 264

NDT, Engi	neering and C		(518) 640-3000		Date. <u>27-100</u>	-20	1 ag		01
		_		ONIC INSI	PECTION				
CUSTOMER:				F	FCSS				
PO #:	490	0073380		SURFA	ACE CONDITION	ON:	Ir	Service / Cle	eaned
PROCEDURE/SPEC:		n/a		ACCEI	PTANCE STD:			Report Findi	ngs
	AATERIAL DESCRIPTION								
MATERIAL DESCRII	MATERIAL DESCRIPTION: MATERIALS / EQUIPMENT								
UT SCOPE:								COUPLA	NT
MFG: GEIT FRANSDUCER: LO	USMGO NGITUDN		1100358	CAL D	UE: 01/06/21			SAE 3	0
MFG: GEIT Gamm TRANSDUCER: SHI	na .500 EAR)" Round		equency: 5M EDGE:	1Hz. S/N	: 14A00)10A	DELAY:	
MFG:			n/a					DELAY:	0.293
CAL BLOCK:	IIV	W: B06111		LINEA	RITY PERFOR	RMED:		OK	
			INSPE	CTION RE	SULTS				
COMPONENT/ LOCATION	REFERENCE dB	SCANNING dB	NUMBER	LENGTH(in)	DIAMETER(in)	DATE TESTE	D	FINDI	
LPA Crossover Studs	29.4	41.4	27	13.637	2	29-Fe	eb No	o reportable in missing/not	ndications. 17 inspected.
LPB Crossover Studs	29.4	41.4	40	13.637	2	29-Fe		No reportable ind inspected mecha	
HP-IP Crossover Studs	35.4	47.4	47	11.11	1.5	29-Fe	eb No	reportable indica not inspected m	tions. 1 missing. 4 nech damage.
IP/LPA Crossover Studs	40	52	52	20.058	1.5	2-Ma	ır l	No reportable	indications.
LPA/LPB Crossover Studs	40	52	44	18.5	1.5	2-Ma	ır l	No reportable	indications.
R/S L/S Crossover Studs Main Steam Inlet	40.8	52.8	32	24.399	2	2-Ma	ır l	No reportable	indications.
R/S L/S Crossover Studs Reheat Steam Inlet	43.6	55.6	38	19.308	2	2-Ma	ır l	No reportable	indications.
NDT Technician:	Joop Kraije	esteijn MT/P	T/VT III, U	T II					

Member of ASNT * SNT - TC - 1A Certified Technicians 3A-NDE-0000P_R9_040419 _Components Report_Bolting

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Date: 4-Mar-20 Page 249 of 261



Project:	CF-5862				
Site:	Comanche Ge	enerating Sta	tion		
Date:	4-Mar-20	Page	248	of	264

ND I,	Engineering and Consulting	F: (518) 218-0490				
]	LIQUID PENE	TRANT INS	PECTION		
CUSTOMER:			FCS	S		
PO #:	4900073380		SURFACE	CONDITION:	In Servi	ce / Cleaned
PROCEDURE/SPI	EC: 3A-NDE-30	00 REV. 9	ACCEPTA	NCE STD:	Repor	t Findings
			1		•	
MATERIAL DESC	CRIPTION:	Gene	rator Blower	Fan Blades Stationa	ary in Shell	
		MATERIA	LS / EQUIP	MENT		
CLEANER/REMC	OVER MFG / BATCH: _		M	agnaflux SKC-S / 1	9J01K	
PENETRANT MF	G / BATCH:		Mag	naflux SKL-WP2/	18A044	
DEVELOPER MF	G / BATCH:		Ma	gnaflux SKD-S2 / 1	19A08K	
OTHER MATERI	ALS			n/a		
BLACKLIGHT M	ETER:			n/a		
BLACKLIGHT:		n/a			READING:	n/a μ W/cm2
BLACKLIGHT:		n/a			READING:	n/a μ W/cm2
WHITELIGHT MI	ETER: Spectrol	ine AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due	: 06/13/2020
WHITELIGHT:	F	lashlight: Coast	HX5_LC		READING:	260 fc.
WHITELIGHT:		n/a			READING:	n/a fc.
PROCESS: 2	Color Contrast	Fluoreso	cent	Solvent Remova	ble X V	Vater Washable
		INSPECT	TION RESU	LTS		
D	C (504) C	E DI I	g: :	C1 11 1, 1, 1, 1	. 11 1	1'
Penetrant inspectio	n of (504) Generator Blo	ower Fan Blades	Stationary in	Shell resulted in no	reportable in	dications.
NDT Technician:	Lawrence Craig	MT/PT/VT II			n/a	
	n/a	ì			n/a	

Member of ASNT * SNT - TC - 1A Certified Technicians $3A\text{-}NDE\text{-}0000P_R9_040419_Components\ Report_Liquid\ Penetrant\ Testing$

< 7	a	ng Engineering	le:	5	3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490
-----	---	-------------------	-----	---	---

Project Site

roject:	CF-5862				
Site:	Comanche Ge	enerating Stat	ion		
Date:	6-Mar-20	Page	249	of	264

name all manifers	MAGNETIC PAR	TICLE IN	SPECTION			
CUSTOMER:		FCSS	S			
PO #:	4900073380	SURFACE	CONDITION:	In Service	e / Cleaned	
PROCEDURE/SPEC:	KT-NDE-2000 REV. 11	АССЕРТА	NCE STD:	Report l	Findings	
MATERIAL DESCRIP	PTION: G MATERIAL		wer Fan Blades Ro	tating		
PARTICLES: X WE				n	/a	
<u> </u>	Magnaflux 14AM / 18K20K			n/a		
WATER CONDITION			n/a			
MAGNETIC PARTICI	LE BATH CONCENTRATION:		n/	'a		
BLACKLIGHT METE	R: Spectroline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020	
	Magnaflux EV6000			READING:	3149 μW/cm2	
BLACKLIGHT:	n/a		_	READING:	n/a μW/cm2	
WHITELIGHT METE	R: Spectroline AccuMAX	XRP-3000	S/N: 1913223/4	Cal Due:	06/13/2020	
WHITELIGHT:	At surface of 1	part		READING:	0.42 fc.	
WHITELIGHT:	n/a			READING:	n/a fc.	
MAGNETIZATION:	Coil OUTP	UT: HWDC	Longitudinal	Amps 600	3 TURN	
MAGNETIZATION:	n/a OUTP	UT: n/a		n/a	TURN	
MAGNETIZATION:	n/a OUTP	UT: n/a		n/a	TURN	
FIELD VERIFICATIO	N INDICATOR:	QQI:	KSC 4-230 Miniat	ture QQI		
MFG:	Magnaflux M-500 s/	n: 82127	Cal Due: 06/09/	2020		
MFG:		n/a				
	INSPECT	ION RESUI	LTS			
Magnetic particle inspe	ection of (683) Generator Blower Fan	Blades Rota	ting resulted in no r	eportable indic	ations.	
		Blades Rota	ing resulted in no r	eportuoie maie	ations.	
Demagnetized +/- 3 Ga	uss.					
NDT Technician: J	Joop Kraijesteijn MT/PT/VT III, UT I	<u> </u>	Lawrence	ce Craig MT/P	T/VT II	

Member of ASNT * SNT - TC - 1A Certified Technicians
3A-NDE-0000P_R9_040419 _Components Report_Magnetic Particle Testing

3-Angles NDE Report 2020-CF-5862 Page 640 of 719



Project: CF-5862

Site: Comanche Generating Station

Date: 2/3/2020 Page 250 of 264

ND I, E	igineering and Consulting	F: (518) 218-0490				
ULTRASONIC INSTRUMENT LINEARITY RECORD						
TIE GGODE	CEIR	BOTTE IT BIRE		icone		
UT SCOPE:						
MFG:	GEIT U	JSMGO S/I	N: 11100358 CAL I	OUE: 01/06/21		
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Frequency: 5MH	z. S/N: 14A0010A		
CALIBRATION STA	ANDARD:					
IIW: B06111						
	IIW: B00111					

AMPLITUDE CONTROL LINEARITY						
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE			
AMPLITUDE	FUNCTION	RESULT	RANGE			
80%	-6db	40%	32-48%			
0070	040	4070	32 4070			
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

3-Angles NDE Report 2020-CF-5862 ... Page 641 of 719



Project: <u>CF-5862</u> Site: Comanch

Site: Comanche Generating Station

Date: 2/4/2020 Page 251 of 264

1467 19 1821	igineering and sociations	1. (316) 216-0490				
	ULTR	ASONIC INSTRU	IMENT LINEA	RITY RECO	RD	
UT SCOPE:	0.51.4.	25 01 12 0 21 15 2 21 0				
OT SCOLE.						
MFG:	GEIT	USMGO S/I	N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Frequer	ncy: 5MHz.	S/N: 14A0010A	
CALIBRATION STA	ANDARD:					
		IIV	V: B06111			

AMPLITUDE CONTROL LINEARITY				
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE	
AMPLITUDE	FUNCTION	RESULT	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%	

n/a

	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%		

n/a

Inspector(s):	Stephen Renkavinsky MT/PT/VT III, UT II	n/a	

Comments:

3-Angles NDE Report 2020-CF-5862 ... Page 642 of 719



Project:

ad Site:
12205
3000 Date:

oject:	CF-5862				
Site:	Comanche Gen	erating Sta	ition		
Date:	2/8/2020	Page	252	of	264

IIW: B06111				

AMPLITUDE CONTROL LINEARITY				
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE	
AMPLITUDE	FUNCTION	RESULT	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



es Inc. cess Road sy, NY 12205 8) 640-3000

Project:	CF-5862				
Site:	Comanche Gen	erating Sta	tion		
Date:	2/10/2020	Page	253	of	264

tropy To-0456							
ULTRASONIC INSTRUMENT LINEARITY RECORD							
	02120	2001120211022					
UT SCOPE:							
MFG:	GEIT U	JSMGO S	S/N: 11100358	CAL DUE:	01/06/21		
TRANSDUCER:							
MFG:	GEIT Gamma	.500" Round	Frequer	ncy: 5MHz.	S/N: 14A0010A		
CALIBRATION STA	NDARD:						
	IIW: B06111						

AMPLITUDE CONTROL LINEARITY							
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE				
AMPLITUDE	FUNCTION	RESULT	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%			

Inspector(s):	Stephen Renkavinsky MT/PT/VT III, UT II	n/a
	n/a	n/a

Comments:

3-Angles NDE Report 2020-CF-5862 Page 644 of 719



Project: CF-5862 Site: Comanche Generating Station

Date: 2/14/2020 Page of 264

the space of the second						
	ULTRA	ASONIC INSTR	UMENT LINEA	RITY RECO	RD	
UT SCOPE:						
MFG:	GEIT 1	USMGO S	/N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Frequen	cy: 5MHz.	S/N: 14A0010A	
CALIBRATION STA	ANDARD:					
		П	W: B06111			

AMPLITUDE CONTROL LINEARITY							
ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE				
AMPLITUDE	FUNCTION	RESULI	KANGE				
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
D 1 - 11	

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

3-Angles NDE Report 2020-CF-5862 ... Page 645 of 719



Site: Comanche Generating Station

Date: 2/15/2020 Page of 264

ULTRASONIC INSTRUMENT LINEARITY RECORD						
	ULTRASONIC INSTRUMENT LINEARITY RECORD					
UT SCOPE:						
MFG:	GEIT USMGO	S/N: 11100358	CAL DUE: 01/06/21			
TRANSDUCER:						
MFG:		Round Freque	ncy: 5MHz. S/N: 14A0010A			
CALIBRATION STANDARD:						
IIW: B06111						

AMPLITUDE CONTROL LINEARITY				
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE	
AMPLITUDE	FUNCTION	RESULT	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 ACCEPTABL 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%		

Inspector(s):	Stephen Renkavinsky MT/PT/VT III, UT II	n/a	
	n/a	n/a	

3-Angles NDE Report 2020-CF-5862 Site: Comanche Generating Statistics Project: CF-5862 Site: Comanche Generating Statistics Page 646 of 719



Date: 2/17/2020 Page 256 of 264

The it might be in a water that I follows the interest of the						
ULTRASONIC INSTRUMENT LINEARITY RECORD						
	CEII	ibortic ir tbii	CONTENT ELICE	THE THEOU		
UT SCOPE:						
MFG:	GEIT U	JSMGO S	S/N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Freque	ncy: 5MHz.	S/N: 14A0010A	
CALIBRATION STANDARD:						
IIW: B06111						

AMPLITUDE CONTROL LINEARITY				
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE	
AMPLITUDE	FUNCTION	RESULT	RANGE	
80%	-6db	40%	32-48%	
80%	-12db	20%	16-24%	
40%	+6db	80%	64-96%	
20%	+12db	80%	64-96%	

	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	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%		

Inspector(s):	Stephen Renkavinsky MT/PT/VT III, UT II	n/a
	n/a	n/a

Comments:

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station Page 647 of 719



Date: 2/19/2020 Page 257 of 264

ND I, Engineeri	ng and Consulting	F: (518) 218-0490			
	TILTRAS	ONIC INSTI	RUMENT LINEAL	RITY RECOR	D
	CLIMA		KONIEKT EIKIBA	MIII KECOK	
UT SCOPE:					
MFG:	GEIT US	SMGO S	S/N: 11100358	CAL DUE:	01/06/21
TRANSDUCER:					
	EIT Gamma	.500" Round	Frequen	ey: 5MHz.	S/N: 14A0010A
CALIBRATION STANDA	ARD:				
IIW: B06111					

AMPLITUDE CONTROL LINEARITY				
ORIGINAL CONTROL AMPLITUDE 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%			

Inspector(s):	Stephen Renkavinsky MT/PT/VT III, UT II	n/a
	n/a	n/a

Comments:

3-Angles NDE Report 2020-CF-5862 ... Page 648 of 719



Project:	CF-5862

Site: Comanche Generating Station

Date: 2/25/2020 Page of 264

	ULTRA	SONIC INST	RUMENT LINEA	RITY RECOI	RD	
	CEII	1001110 11101	ROWELVI BILLE	Herri Red Co.		
UT SCOPE:						
MFG:	GEIT U	JSMGO	S/N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Freque	ncy: 5MHz.	S/N: 14A0010A	
CALIBRATION STANDARD:						
IIW: B06111						

AMPLITUDE CONTROL LINEARITY			
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE
AMPLITUDE	FUNCTION	RESULT	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

	_
e:	
e:	

Acceptable:

	SCREEN HEIGHT LINEARITY					
	UPPER SIGNAL	ACCEPTABLE	ACTUAL LOWER			
		RANGE	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	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

264

3-Angles NDE Report 2020-CF-5862 ... Page 649 of 719



Project: CF-5862

Site: Comanche Generating Station

Date: 2/27/2020 Page 259 of

1. (310) 210-0490							
	III.TR	SONIC INSTI	RUMENT LINEA	RITY RECO	RD		
	CETR		NGATE AT TENED	INITI RECO			
UT SCOPE:							
MFG:	GEIT U	JSMGO	S/N: 11100358	CAL DUE:	01/06/21		
TRANSDUCER:							
MFG:	GEIT Gamma	.500" Round	Freque	ncy: 5MHz.	S/N: 14A0010A		
CALIBRATION STA	NDARD:			-			
	IIW: B06111						

AMPLITUDE CONTROL LINEARITY							
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE				
AMPLITUDE	FUNCTION	RESULT	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

3-Angles NDE Report 2020-CF-5862 ... Page 650 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 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:						
MEC.	CEITI	TCMCO	C/NJ. 11100250	CAL DUE.	01/06/21	
MFG:	GEIT	JSMGO	S/N: 11100358	CAL DUE:	01/00/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Fragua	ncy: 5MHz.	S/N: 14A0010A	
		.500 Kound	i rreque	ncy. Jivii iz.	5/N. 14A0010A	
CALIBRATION STANDARD:						
IIW: B06111						
			22 200111			

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	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

3-Angles NDE Report 2020-CF-5862 ... Page 651 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: CF-5862

Site: Comanche Generating Station

Date: 2/29/2020 Page 261 of 264

The system of th	ig and constituing	F: (316) 216-0490				
	ULTRAS	ONIC INSTRI	UMENT LINEAI	RITY RECOR	PD .	
	CLIMID	or the interior		ATT RECOR		
UT SCOPE:						
MFG:	GEIT US	MGO S/	N: 11100358	CAL DUE:	01/06/21	
	GEII US	MOO 3/	N. 11100336	CAL DUE.	01/00/21	
TRANSDUCER:						
MFG: GE	IT Gamma	500" Round	Eraguan	ey: 5MHz.	S/N: 14A0010A	
		.500 Kouliu	Frequenc	y. Jivinz.	3/N. 14A0010A	
CALIBRATION STANDA	.RD:					
HW. D0(111						
	IIW: B06111					

AMPLITUDE CONTROL LINEARITY				
ORIGINAL AMPLITUDE	CONTROL FUNCTION	ACTUAL RESULT	ACCEPTABLE RANGE	
AMPLITUDE	FUNCTION	RESULT	KANGE	
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

3-Angles NDE Report 2020-CF-5862 Project: CF-5862 Project: CF-5862 Site: Comanche Generating Station



Project: 0	CF-5862				
Site: 0	Comanche Gen	erating Sta	tion		
Date:	3/2/2020	Page	262	of	264

PILST, ESTE	imeaning and consuming	F: (518) 218-0490			
	ULTRA	ASONIC INSTI	RUMENT LINEA	RITY RECOI	RD
UT SCOPE:					
MFG:	GEIT U	USMGO	S/N: 11100358	CAL DUE:	01/06/21
TRANSDUCER:					
MFG:	GEIT Gamma	.500" Round	Freque	ncy: 5MHz.	S/N: 14A0010A
CALIBRATION STA	NDARD:				
]	IIW: B06111		

AMPLITUDE CONTROL LINEARITY					
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE		
AMPLITUDE	FUNCTION	RESULT	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	

3-Angles NDE Report 2020-CF-5862 Page 653 of 719



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

Project: C	CF-5862
------------	---------

Site: Comanche Generating Station

Date: 3/4/2020 Page 263 of 264

the shared meaning come waterestering C. (210) 210-0430						
ULTRASONIC INSTRUMENT LINEARITY RECORD						
UT SCOPE:						
MFG:	GEIT I	USMGO S/N	N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	Freque	ncy: 5MHz.	S/N: 14A0010A	
CALIBRATION STA	ANDARD:					
		IIW	7: B06111			

AMPLITUDE CONTROL LINEARITY					
ORIGINAL	CONTROL	ACTUAL	ACCEPTABLE		
AMPLITUDE	FUNCTION	RESULT	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

Daia stable.	
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

3-Angles NDE Report 2020-CF-5862 ... Page 654 of 719



3angles Inc. 2 Access Road Albany, NY 12205 P: (518) 640-3000 F: (518) 218-0490 Project: <u>CF-5862</u>
Site: Comanche Generating Station

Date: 3/5/2020 Page

100 19 001	gineaning time serialities	1.(210)210-0420				
	ULTRA	ASONIC INST	TRUMENT LINE	ARITY RECO	RD	
UT SCOPE:						
MFG:	GEIT	USMGO	S/N: 11100358	CAL DUE:	01/06/21	
TRANSDUCER:						
MFG:	GEIT Gamma	.500" Round	l Freque	ency: 5MHz.	S/N: 14A0010A	
CALIBRATION STA	ANDARD:					
			HW: 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

264

of

264

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	



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

3angles, Inc. 2 Access Road Albany, NY 12205 T +1 518 640 3000 C +1 781 738 8150

e-mail joop.kraijesteijn@3anglesndt.com

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

Confidential Attachment CPUC2-2b.A4
Proceeding No. 20I-0437E
Page 657 of 719

Com3 RR Shear Wave Report

MTI-2809875.52

© DEKRA Solutions B.V., Arnhem, The Netherlands. All rights reserved.

It is prohibited to change any and all versions of this document in any manner whatsoever, including but not limited to dividing it into parts. In case of a conflict between the electronic version (e.g. PDF file) and the original paper version provided by DEKRA, the latter will prevail.

DEKRA Solutions B.V. and/or its associated companies disclaim liability for any direct, indirect, consequential or incidental damages that may result from the use of the information or data, or from the inability to use the information or data contained in this document.

The contents of this report may only be transmitted to third parties in its entirety and provided with the copyright notice, prohibition to change, electronic versions' validity notice and disclaimer.

Products may only be provided with a quality mark or put on the market as approved if DEKRA Solutions B.V. has explicitly granted the right to carry a quality mark.

MTI-2809875.52

CONTENTS

		Page
Summary		5
1	Introduction	6
2	Generator specifications	6
3	Equipment	7
4	Personnel	7
5	Calibration	7
5.1	Wall thickness calibration	7
5.2	Pulse echo 65° calibration	8
5.3	TRL 65° with 15° squint angle calibration for the nose area	8
5.4	TOFD technique calibration	8
5.5	Eddy current calibration	9
6	Procedure and execution	9
6.1	Wall thickness measurement	10
6.2	TRL inspection	10
6.3	TOFD technique inspection – shrink fit area	10
6.4	Eddy current inspection	10
7	Results	11
7.1	Wall thickness measurement	11
7.2	TRL 65° inspection	11
7.3	TOFD technique inspection	11
7.4	Eddy current inspection	11
8	Conclusion and recommendations	12
Appendix A	A - Calibration ring	13
Appendix I	B - Calibration piece for nose area	14
Appendix (C - TRL calibration scans	15
Annendiy I	D. TPL calibration scan of the squint probes	16

	MTI-2809875.52
Appendix E - TOFD calibration scan	17
Appendix F - Eddy current calibration	18
Appendix G - KIRR Mk3 manipulator on the retaining ring	19
Appendix H - Retaining ring geometry	20
Appendix I - Example of ultrasonic scans	22

MTI-2809875.52

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.

MTI-2809875.52

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

MTI-2809875.52

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)

65° TRL 2 MHz probe

65° TRL 2 MHz probes with 15° 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.

MTI-2809875.52

5.2 Pulse echo 65° calibration

The ultrasonic TRL inspection with the 65° 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 65° with 15° squint angle calibration for the nose area

The ultrasonic TRL inspection for axially orientated defects in the nose area, performed with two 15° squint 65° 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 mm². 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

MTI-2809875.52

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.

MTI-2809875.52

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 65° TRL 2 MHz PE probes with a 15° 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 65° 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.

MTI-2809875.52

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 65° 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.

MTI-2809875.52

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.

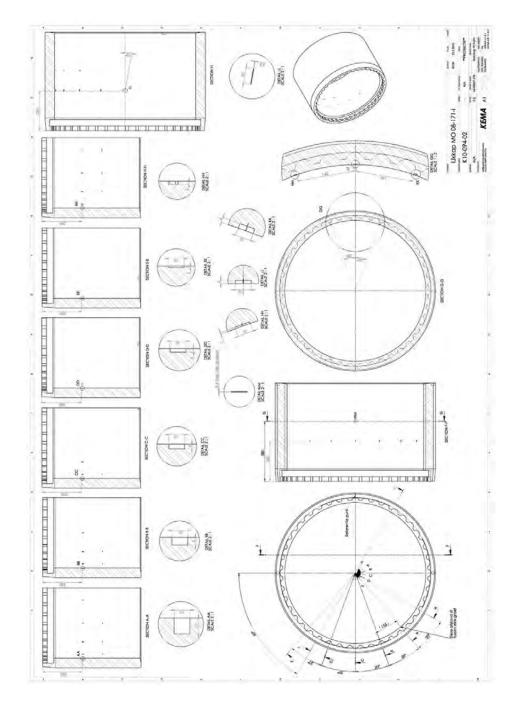
Also with the eddy current inspection of the outer surfaces of both rings, no flaw indications exceeding the detection threshold have been observed.

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.

MTI-2809875.52

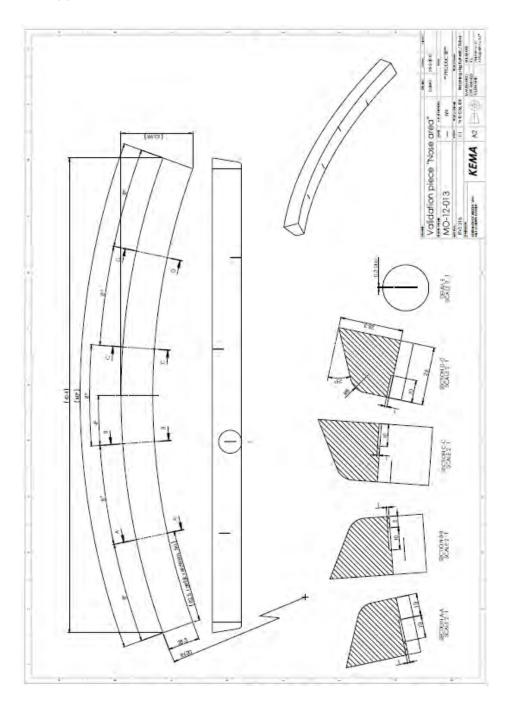
Appendix A - CALIBRATION RING



Sketch with the specifications of calibration ring MO-08-171-I.

MTI-2809875.52

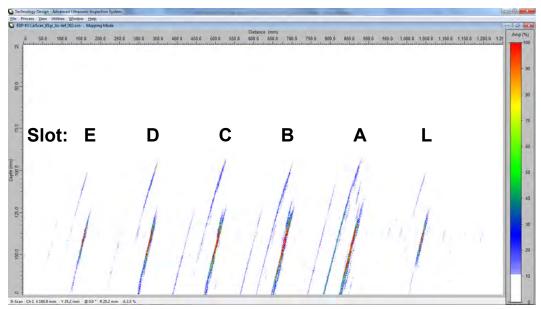
Appendix B - CALIBRATION PIECE FOR NOSE AREA



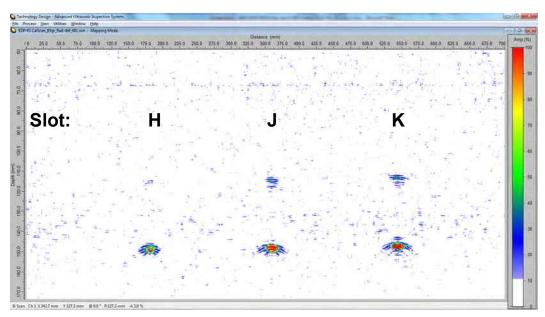
Sketch with the specifications of calibration piece MO-12-013.

MTI-2809875.52

Appendix C - TRL CALIBRATION SCANS



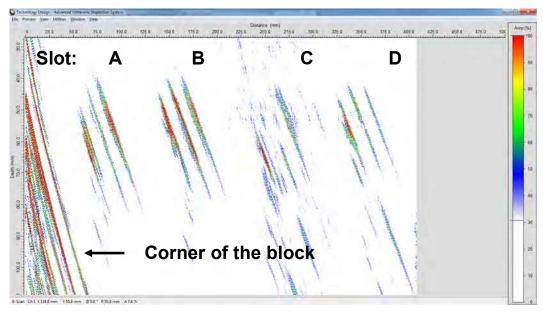
Calibration with 65° TRL probe for axial orientated defects: slots E, D, C, B, A and L of calibration ring MO-08-171-I are visible.



Calibration with 65° TRL probe for circumferentially orientated defects: slots H, J, and K of calibration ring MO-08-171-I are visible.

MTI-2809875.52

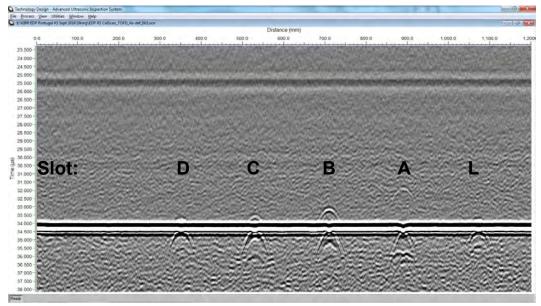
Appendix D - TRL CALIBRATION SCAN OF THE SQUINT PROBES



Calibration with 65° TRL 15° squint probe for axially orientated defects: slots A, B, C and D of calibration piece MO-12-013 are visible.

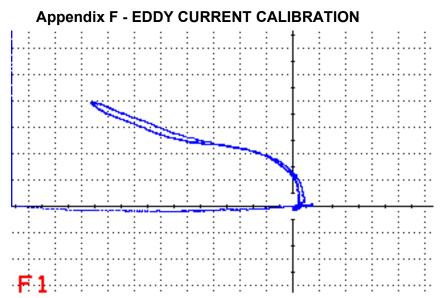
MTI-2809875.52

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.

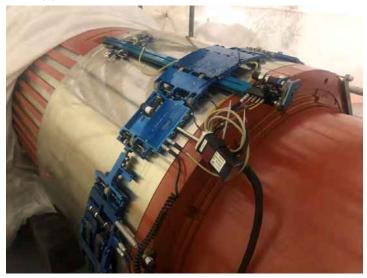
MTI-2809875.52



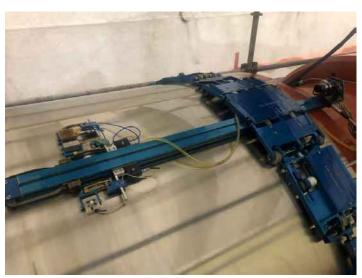
Calibration for the eddy current inspection performed at calibration ring MO 95-002-II.

MTI-2809875.52

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.

MTI-2809875.52

Appendix H - RETAINING RING GEOMETRY

Turbine side

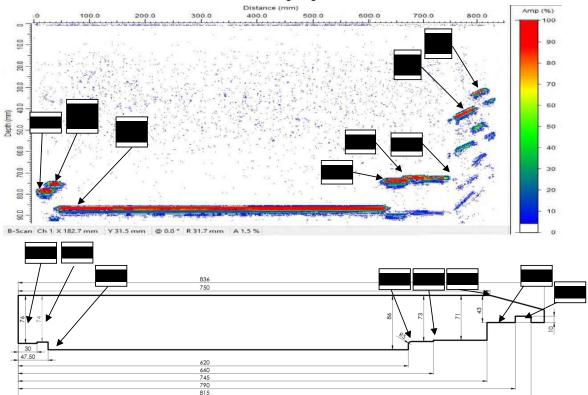
Total length of the ring : 836 mm

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)
Α	Start of retaining ring	76	0
В	Start of Groove	76-74	30
С	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
Н	Groove	~10 (depth)	790 / 815

MTI-2809875.52

Exciter side

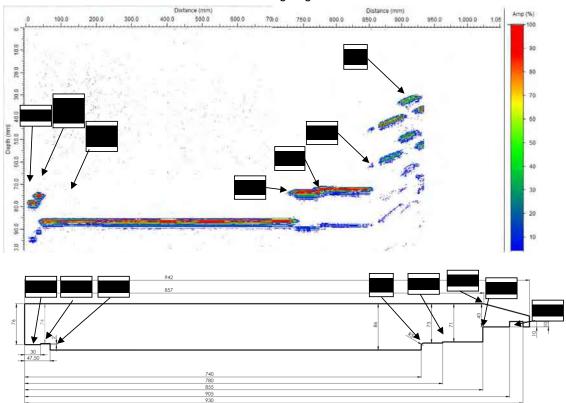
Total length of the rings : 942 mm

Diameter of the rings : 1261 mm

Circumference : 3960 mm

Thickness : 86 mm (maximum)

Wall thickness scan from the exciter side retaining ring:

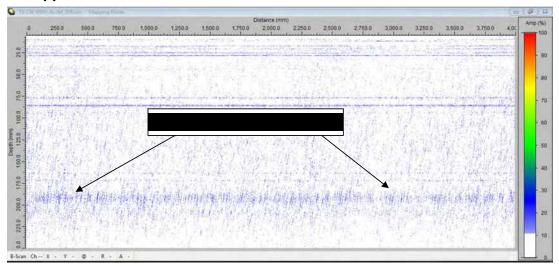


Description of wall thickness steps as per drawing above, exciter side.

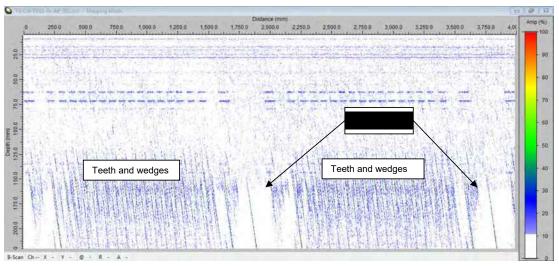
Section	Description	Thickness (mm)	Axial position (mm)
Α	Start of retaining ring	76	0
В	Start of Groove	76-74	30
С	Wall thickness step	74-86	47,5
D	Wall thickness step	86-73	740
E	Wall thickness step	73-71	780
F	Start of sloping area	43	857
G	Wall thickness step	71-43 sloping	
Н	Groove	~10 (depth)	806 - 830

MTI-2809875.52

Appendix I - EXAMPLE OF ULTRASONIC SCANS

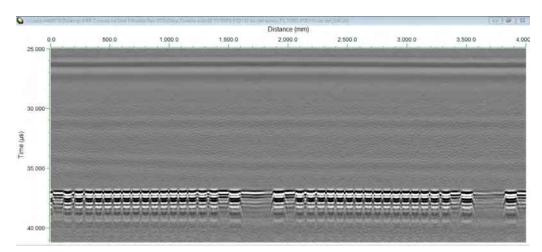


TRL 65° scan on the TS retaining ring for detection of axial defects in the straight area.

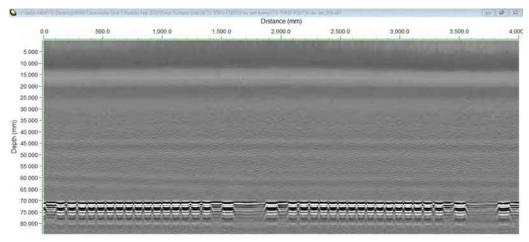


TRL 65° scan on the TS retaining ring for detection of axial defects in the shrink fit area (sloped part), regular pattern of geometrical echoes from the teeth and the wedges is visible.

MTI-2809875.52

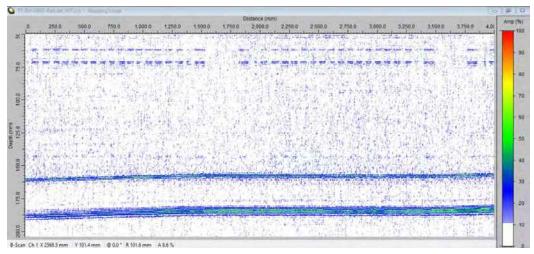


Non- Linearized TOFD scan in the shrink fit area of the TS retaining ring (sloped area), regular pattern of geometrical echoes from the teeth and the wedges is visible.

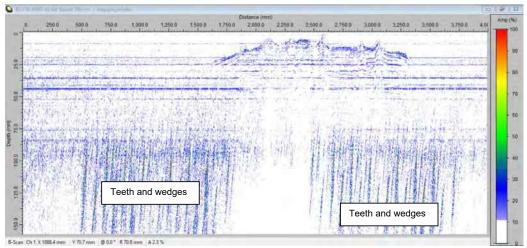


Linearized TOFD scan in the start of the shrink fit area of the TS retaining ring, echo of backwall F is visible.

MTI-2809875.52



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.

Confidential Attachment CPUC2-2b.A4
Proceeding No. 20I-0437E
Page 680 of 719

Comanche 3 2020 Opening Alignment...

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.

Turbine Laser Alignment, LLC

1 of 35

R. Scott Doughty

Comanche 3 Opening Alignment Report

- 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		_		C Ideal
TE Rim	Face			TE Rim	Face
High 9.0	Top Open	0.50	Vert	Fair	Fair
Left 1.0	Left Open	1.00	Horz	Fair	Fair
			-		
	B As Found		_		B Ideal
TE Rim	Face			TE Rim	Face
Low 3.0	Top Open	3.00	Vert	Fair	Fair
Fair	Right Open	3.00	Horz	Fair	Fair
			-		
	A As Found		_		A Ideal
TE Rim	Face			TE Rim	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:

ı	T1	T2	Т3	T4	T5	T6
	U10	U3	D11	D5	D6	U6
	LO	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"

Turbine Laser Alignment, LLC

3 of 35

R. Scott Doughty

Comanche 3 Opening Alignment Report

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:

- 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:

- 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:

- 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 2020 Opening Alignment...

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:

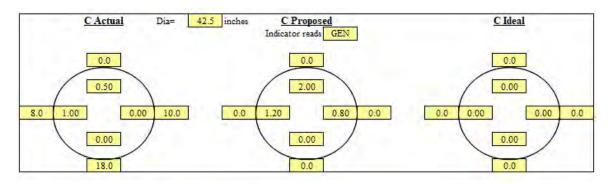
- 1. Disassembly rotor positions were taken at T1 through T6 oil bores and the N1 through N7 packing casings.
- 2. Horizontal joint feeler checks were taken on the HP-IP, LPA and LPB outer and inner cylinders...
- 3. 16 point coupling checks were made at the A, B, and C couplings.
- The HP-IP, LPA and LPB Inner and Outer Cylinders were installed and bolted down for Tops-On alignment measurements.

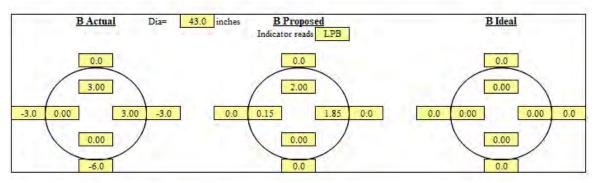
Turbine Laser Alignment, LLC

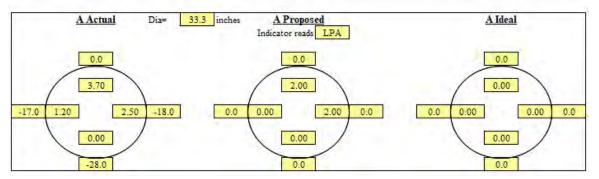
Comanche 3 Opening Alignment Report

TABLE 1

COUPLING ALIGNMENTS







Comanche 3 Opening Alignment Report

TABLE 2

ROTOR POSITIONS

Location		As Found		Ex	pected Clos	ing
	Left	Bottom	Right	Left	Bottom	Right
Т6 ТЕ ОВ	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

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

TABLE 3

HP-IP INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical			
N3 Outer Gland	Left 2, Down 4	No C	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 (10 th stage)	Not Installed	Prep for closi	ng 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 ch	nange.			
N1 Outer Gland	Right 9, Up 9	No change				

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

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.

Comanche 3 Opening Alignment Report

TABLE 5 HP-IP AS FOUND AND PROPOSED ALIGNMENT

Component	Id		Ideal Line			AS FOUND AND PROPOSED ALIGNN As Found Alignment						Proposed Alignment					
				As F	As Found Line at Moves Required to				Proposed Line at Moves Required to								
							Align Components to Ideal Line			New Rotor Positions			Align Components to Ideal Line				
	L	В	R	L	Position B	s R	1	H		V	L	B	R		o idea		V
T2 OB (set point)	L	Б	IX	0	63	74	,	.1		<u> </u>	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 i	nstall	ed				Prep fo	or clo	sing	alignı	nent.	
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

Turbine Laser Alignment, LLC

10 of 35

R. Scott Doughty

Comanche 3 Opening Alignment Report

TABLE 6

HP-IP IDEAL LINE

Location	Shel	l Move	ment	Round	Rotor	Ther-		Ideal Line	
	L	В	R	-ness	Sag	mal	L	В	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

Comanche 3 Opening Alignment Report

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

Turbine Laser Alignment, LLC

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

TABLE 8

LPA INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical	
N5 Gland	Left 12, Down 19	Packing case must be mo alignment to la	oved. Unbolt and prep for aser at closing.	
6 GE	Left 4, Down 1	No cl	nange	
5 GE	Left 5, Up 3	No cl	nange	
4th-2nd Dual Flow BR	Left 4, Up 9	No change	Add .009" to all 4 support keys.	
1 st 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 cl	nange	
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.		

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

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.

Comanche 3 Opening Alignment Report

TABLE 10

LPA AS FOUND AND PROPOSED ALIGNMENT

Component	Id	deal Lir	1e		As	Foun	d Aliş	gnmei	nt		Proposed Alignment						
					ound Li				es Required to Components to			osed Li			ves Re	1	
					As Found Rotor Positions				ipone Line	nts to	New Rotor Positions			Aligi	n Com Ideal	ipone Line	nts to
	L	В	R	L	В	R	I	Н	7	V	L	В	R	I	ł	,	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

Comanche 3 Opening Alignment Report

TABLE 11

LPA IDEAL LINE

Location	Shell	Move	ment	Round-	Rotor Sag	Ideal Line			
	L	В	R	ness		L	В	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	

Comanche 3 Opening Alignment Report

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

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

TABLE 13

LPB INITIAL COMPONENT MOVES

Component	Initial Move	Horizontal	Vertical		
N7 Gland	Left 12, Up 4	If packing is not replace	ed, 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 fo alignment to laser at closing.			

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

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.

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

LPB AS FOUND AND PROPOSED ALIGNMENT

TABLE 15

Component	I	deal Lir	ne		As	Foun	d Ali	gnmeı	nt		Proposed Alignment						
				As Found Line at As Found Rotor Positions				ves Ro n Com Ideal	pone		Proposed Line at New Rotor Positions			Moves Required to Align Components to Ideal Line			
	L	В	R	L	В	R]	Н	,	V	L	В	R	I	ł	7	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

Comanche 3 Opening Alignment Report

TABLE 16

LPB IDEAL LINE

Location	Shell	Move	ment	Round-	Rotor Sag	Ideal Line				
	L	В	R	ness		L	В	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		

Comanche 3 Opening Alignment Report

TABLE 17

LPB COMPONENT ROUNDNESS

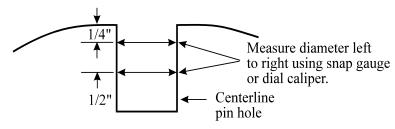
Location	LH Horizontal Diameter	LH Vertical Radius	UH Horizontal Diameter	UH Vertical Radius	Vertical Diameter	Bore Roundness Correction (V-H)/2
No 7 Gln Gr 5GE	30.854	15.437	30.854	15.437	30.874	0.010
No 7 Gln Gr 1TE	30.846	15.438	30.857	15.431	30.869	0.011
6 GE	27.484	27.491	27.484	0.000	27.491	0.003
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 2020 Opening Alignment... Page 702 of 719

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"

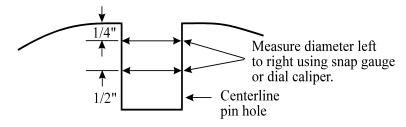
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 703 of 719

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"		

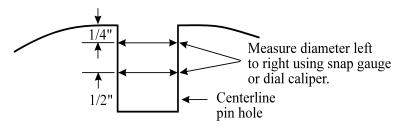
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2''			

Comanche 3 2020 Opening Alignment... Page 704 of 719

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"

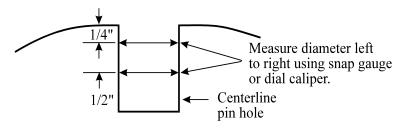
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 705 of 719

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE: **WORK DONE BY: COMPONENT: HP #1 Blade Ring 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"

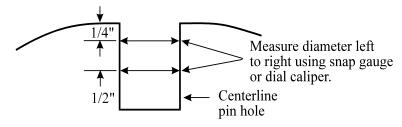
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 706 of 719

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"

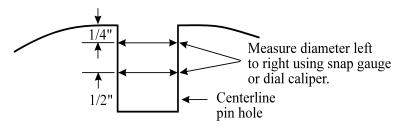
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 707 of 719

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"			

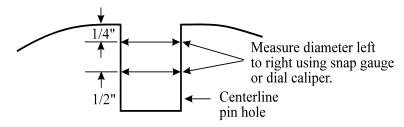
Comanche 3 2020 Opening Alignment Page 708 of 719

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE: **WORK DONE BY: COMPONENT: LPA 1st Stage Center Flow**

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"**

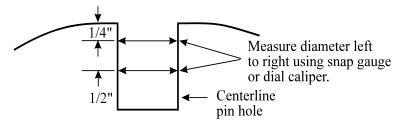
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 709 of 719

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"

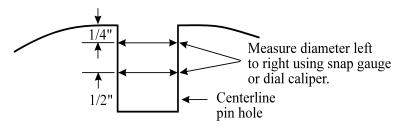
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2"			

Comanche 3 2020 Opening Alignment... Page 710 of 719

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''				

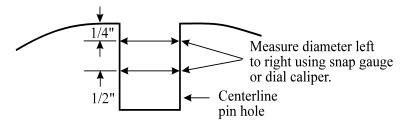
Comanche 3 2020 Opening Alignment Page 711 of 719

Comanche 3 Opening Alignment Report

TLA CENTERLINE PIN HOLE REPAIR

DATE: COMPONENT: LPB 4th-2nd Double **WORK DONE BY:** Flow Blade Ring

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"				

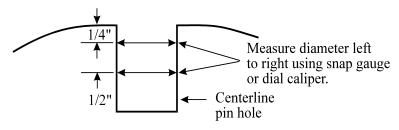
Comanche 3 2020 Opening Alignment... Page 712 of 719

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"**

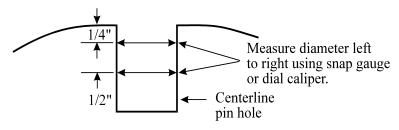
Reading Location	As Found Before Repairs	After Working Left Side	After Working Right Side
1/4"			
1/2''			

Comanche 3 2020 Opening Alignment... Page 713 of 719

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.	
RICHT SIDE. Remove 0 000"	

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''				

Comanche 3 2020 Opening Alignment...

Comanche 3 Opening Alignment Report

TLA LOOSE BOLT - TIGHT BOLT BORE ROUNDNESS

	Data
	Date
A-A	Prepared By
	Unit
Right Joint Gap	Component
C-C C-C	Comments
Left Joint Gap	

Viewed Looking Downstream

Bolting	Read Point	A-A	В-В	C-C	Left Joint	Right Joint
Condition		(vertical)	(upper horizontal)	(lower horizontal)	Gap	Joint
		,	horizontal)	horizontal)	•	Gap
			,	,		

Turbine Laser Alignment, LLC

35 of 35

R. Scott Doughty

Comanche 3 2020 closing component ... Page 715 of 719

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					ected Clo Uncoupled		Actual Closing				
	Left	Bottom	Right		Left	Bottom	Right		Left	Bottom	Right	
T6 OB TE	0		+3	Ī	0		+4					
		+8	Te+6.5			+12	Te+10.0					
T5 OB GE	0		+33		0		+43					
		+10	Te-6.5			+3	Te-18.5					
T4 OB TE	0		+15		0		+27					
		+15	Te+7.5			+13	Te-0.5					
T3 OB GE	0		+30	Ī	0		+35					
		+26	Te+11.0			+25	Te+7.5					
T2 OB TE	0		+74		0		+83					
		+63	Te+26.0	-		+67	Te+25.5					
T1 OB GE	0		+1		0		+3					
		-3	Te-3.5	-		+7	Te+5.5					

Comanche 3 HP-IP, LPA and LPB Closing Component Positions

${\it TABLE~2} \\ {\it HP-IP~FINAL~COMPONENT~POSITIONS~COMPARED~TO~IDEAL} \\$

Location	Idea	Ideal Laser Line			As Left Laser Line				Position Compared to Ideal			
	Left	Bot	Right	Left	Bot	Right	nt Horz		Ve	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		Ve	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 HP-IP, LPA and LPB Closing Component Positions

TABLE 4 LPB FINAL COMPONENT POSITIONS COMPARED TO IDEAL

Location	Ideal Laser Line			Lá	Position Compared to Ideal						
	Left	Bot	Right	Left	Bot	Right	Horz V		Ve	/ert	
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)		3	43	0	3	43					