BEFORE THE OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE
MINNESOTA PUBLIC UTILITIES COMMISSION
STATE OF MINNESOTA

IN THE MATTER OF AN APPLICATION OF NORTHERN STATES POWER COMPANY FOR AUTHORITY TO INCREASE RATES FOR ELECTRIC SERVICE IN THE STATE OF MINNESOTA	MPUC Docket Nos. E002/GR-12-961 E002/GR-13-868
IN THE MATTER OF THE REVIEW OF THE ANNUAL AUTOMATIC ADJUSTMENT REPORTS FOR ALL ELECTRIC UTILITIES	E999/AA-13-599 E999/AA-16-523 E999/AA-17-492 E999/AA-18-373

OAH Docket No. 65-2500-38476

SURREBUTTAL TESTIMONY OF

TIMOTHY P. MURRAY

On Behalf of

NORTHERN STATES POWER COMPANY

October 30, 2023

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. I respond to rebuttal testimony filed by Mr. Richard Polich, stating that the Company should have performed a "bucket lift check" or "wheel gap check" in 2011 and, had it done so, would have led to the Company finding excessive cracking on the finger dovetails and would have avoided the Event.

Q DO YOU AGREE WITH MR. POLICH AND IF NOT, WHY NOT?

A. No, I do not agree. As an initial matter, bucket lift checks are an accepted means of detecting distress or deformation of ***tangential entry wheel dovetails*** at or near the "notch opening," which is the gap in the rotor wheel dovetail. On a tangential entry wheel dovetail design, if the rotor wheel started to deform you would not necessarily see any blade distortion. Rather, you would see a "gap" or "lifting" develop between the top outside edge of the rotor wheel and the very bottom and outside edge of the "notch block" or "notch blade" and/or the blades adjacent to the notch block or notch blade. Notch blocks and notch blades essentially perform the same function: they are components that are inserted into the notch opening/gap in the rotor wheel dovetail and lock everything together.

The problem, however, is that the notch block or notch blade is not directly attached to the rotor wheel. As a result, load from this component (the notch block or notch blade) is shared by the adjacent blades, which in turn create higher stresses in the wheel dovetail at or near the notch opening. The presence of higher stresses in this location on the rotor wheel can cause deformation of the rotor wheel dovetail due to stress corrosion cracking (or other mechanisms) and causes the notch block, notch blade and/or adjacent blades to move out of position and create the gap or lift, which can be easily inspected (and measured) on tangentially loaded blades.

Figure 1

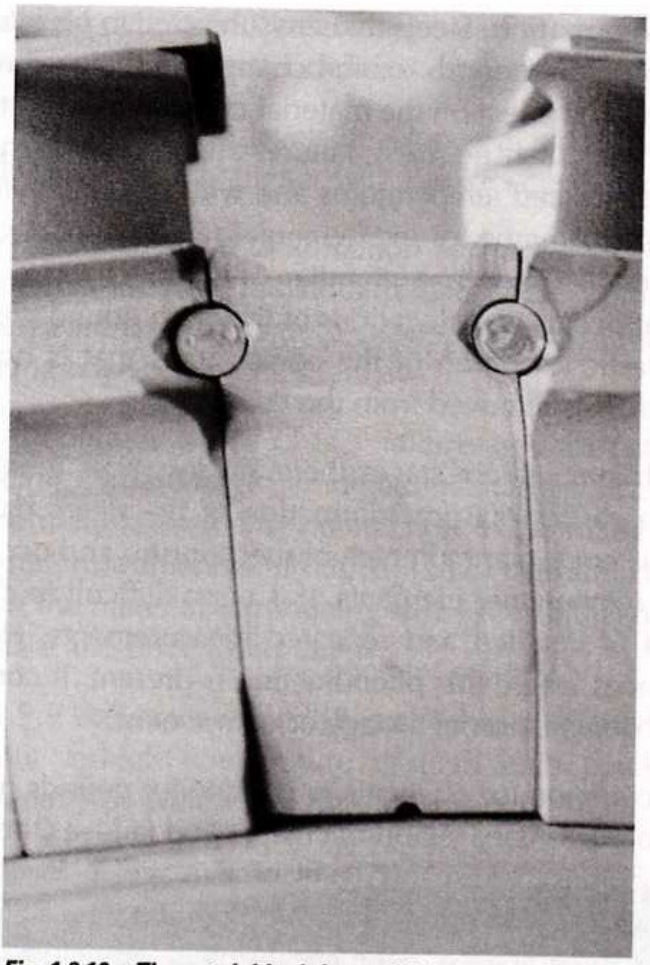

Fig. 1.9.10—The notch block from a high temperature stage which has crept out radially under the influence of centrifugal loading.

In contrast, the ***finger-pinned dovetail*** design of the L-1 stage of the Sherco 3 Unit ***does not have such a "notch opening"—or gap—in the rotor wheel dovetail***. Rather, each blade is held individually to the rotor wheel with pins—essentially providing a uniform loading of the rotor wheel dovetail around the entire circumference. In other words, in the finger-pinned design, there is no particular location where stresses in the dovetail would be higher—and thus more susceptible to stress corrosion cracking or other failure mechanisms. Thus, it is critically

important to understand the distinction of whether a bucket lift check *could have* been performed on the L-1 stage of the Sherco 3 Unit (*i.e.*, feasibility) and whether such an inspection *would have* provided any meaningful information that, in turn, would have revealed the presence or evidence of the latent stress corrosion cracking in the internal fingers of the dovetail (*i.e.*, practicality).

I have, in prior proceedings, acknowledged that a bucket lift check *could* be performed on the L-1 finger-pinned stage of the Sherco 3 Unit. It is true that the bucket lift check can be performed on both tangential entry and finger-pinned dovetails. But as to whether a bucket lift check is/was a recommended industry practice for inspecting *finger-pinned dovetails* to gain any meaningful information or evidence of cracking, the answer to that question is "no."

To be sure, performing a "bucket lift check" is *far less* costly and invasive than removing the blades of the turbine and performing a TIL 1121-3AR1 magnetic particle inspection. If, as Mr. Polich appears to suggest, this bucket lift check *should* have been performed or was an "industry practice" for detecting latent stress corrosion cracking in the L-1 finger-pinned stage of the Sherco 3 Unit, General Electric (GE) would certainly have included a recommendation for this inspection in TIL 1121-3AR1—or in *any* of its guidance documents. TIL 1121-3AR1 expressly states that the purpose of the document is to "[p]rovide ***complete*** instruction for nondestructive testing of rotor wheel finger dovetails." If there was a meaningful, cost-effective inspection—such as the bucket lift test—for rotor wheel finger dovetails that could be deployed as a precursor to performing a multi-million dollar, blades-off magnetic particle inspection, it would not only be reasonable but also probable that GE would have included this inspection as a recommendation in their protocols. Yet GE does not include the bucket lift test as part of *any* inspection

protocol or recommendation for rotor wheel *finger* dovetails. Importantly, neither GE nor any other vendor has—formally or informally—recommended this inspection for the rotor wheel finger dovetails as part of any major inspection.

For example, in the Mechanical Dynamics & Analysis (MD&A) 2005 Outage Report,[1] the "notch lifting" measurement column for the finger dovetail rows is listed as "NA" (*i.e.*, not applicable); whereas where the attachments have a notch opening, such as with the tangential entry dovetails, the notch lifting measurements are recorded. This is why it is important for witnesses to be precise about what types of inspections they are talking about in their testimony—and for which components such inspections are appropriate. Mr. Polich's lack of precision regarding appropriate inspections for specific components (*e.g.*, suggesting a bucket lift check should have been performed on the finger-pinned dovetail attachments) is further evidence of his lack of expertise with fossil steam turbines and lack of background to offer opinions related to maintenance decisions associated with Sherco Unit 3.

As has been discussed throughout my testimony, there are *significant* differences between the tangential entry and finger dovetail designs—and unique risks and benefits associated with each design. For tangential entry attachments, the design allows for full examination of the rotor attachment area and can be easily inspected. However, that easily inspected design has some challenges, particularly with susceptibility to stress corrosion cracking. In contrast, the finger-style attachment is more difficult to inspect as there are internal fingers that are hidden and not visible when the turbine is assembled. Yet, prior to the 2011 Event at Sherco Unit 3, the finger-style attachment did not present the same issues for cracking

[1] See Murray Surrebuttal, Exhibit___(TPM-3), Schedule 1 at pages 248-258.

susceptibility. Indeed, prior to the 2011 Event at Sherco 3, we were not aware of a single incident of a finger-pinned dovetail failure on a drum-boiler unit.

Major inspections of a utility-size steam turbine generator involve thousands of components. The MD&A Outage Report is instructive as it demonstrates the complexities associated with these inspections. But as that Report reveals, there are numerous checks, inspections, evaluations, measurements, and recordings of thousands of components incorporated into these inspections. Mr. Polich's latest supposition that a bucket lift check would have discovered an "excessive bucket lift gap" that "would have indicated a need for further investigation"[2] is nothing more than pure speculation and ignores the realities and complexities associated with major turbine inspections—especially as it relates to the L-1 finger-pinned dovetails. I am not aware of any engineering analysis that would support Mr. Polich's conclusions.

When it comes to checking the integrity of the L-1 finger-pinned stage of this rotor and blade attachment, GE's recommendations are clear: follow the guidance set forth in TIL 1121-3AR1. In 2011, at the time when maintenance and operations decisions were being made about Sherco Unit 3, this was the industry guidance that the Company utilized and followed when making its inspection decision—and consistent with what the Company's experienced vendors both recommended and performed as part of the major inspection process. Mr. Polich's recommendations to the contrary are well outside the range of reasonable utility practices and industry trends as they existed at the time of the November 2011 Event. As detailed in my prior testimony, the Company operated and maintained Unit 3 in a reasonable manner consistent with industry practices at that time.

[2] Polich Rebuttal at 13-14.

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XCEL ENERGY
SHERBURNE COUNTY
UNIT #3

INSPECTION REPORT

October - December, 2005

John Toohey
Field Service Engineer
Mechanical Dyanamics and Analysis, LTD

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DIAPHRAGM REPAIRS

PHOTOGRAPHS

JOB SUMMARY

Customer:	XCEL ENRGY		
Station:	Sherburne County		
Unit #	Unit # 3		
Equipment Serial #	170X819	Rating	809643 KW
Turbine Type:	G3	Service Year	1987
Generator Code	4G4W	Control System	EHC Mk2
LSB length	33.5	Generator Cooling:	HYd-H20
Steam Conditions:			
Inlet Pressure:	2400psi	Inlet Temp.	1000DegF
Job Start Date;	10/10/05	Completion Date:	12/6/05
Job Type:	Major		
Work Scope:	[Y} Turbine [Y] Generator [Y] Valves		

JOB SUMMARY

MD&A was contracted to perform the major overhaul to Xcel's, Sherburne County Generating Station unit # 3. The overhaul commenced on Oct 10, 2005 and was finished on 11/26/2005. Work was performed during 2 ten hour shifts, six days per week. Labor was supplied by MD&A Outage Services and consisted of 15 men per shift. Generator testing was performed by GE. All steam path recommendations and repairs were made and supervised by Steam Path Consultants. Outage machining services were performed by MD&A, including generator collector ring grinding. Outage support was supplied by Xcel Energy. Significant work performed this outage included the following:

- HP, IP, and LP inner and outer shells and rotors were mapped by outside vendors for uprate proposals in the future.
- New buckets and covers were installed on stages 8TE and GE
- New covers were installed on LP A and B stages L-0 TE and GE
- LP A and LP B rotor clearances and Generator field clearances were corrected.
- New spill strips were installed in all HP diaphragms.

REPAIR and MAINTENANCE RECOMMENDATIONS

RECOMMENDATIONS

Recommended and completed during the outage.

High Presssure Turbine

1. First stage nozzle SPE. Partitions found eroded during NDE were weld repaired on site.
2. First stage nozzle lower half TE spill strip. The spill strip was found rubbed and was replaced.
3. High pressure turbine inner shell horizontal joint and diaphragm seal face erosion. These surfaces were weld repaired and contoured.
4. Diaphragm joint bolts. Multiple disassemblies from heating, loosening and tightening had bent the bolts and damaged the bolt hex heads. All diaphragm joint bolts were replaced.
5. Diaphragm ledge keys. The keys interfered with the upper half inner shell. The keys were ground to 5 mils clearance.
6. N2 packing. The first four rows of the N2 packing were found with excessive clearance. These rows were repaired to establish the correct clearance.
7. New spill strips were installed on all HP diaphragms.

Reheat Turbine

1. Eighth stage diaphragm.
   a. The first reheat double stage diaphragm was found eroded at the outer corner of all trailing edge partitions. These were weld repaired, contoured and area checked on site.
   b. The TE thermocouple probe pipe that extends through the outer shell was bent during disassembly. The pipe was straightened and seal welded.
   c. The spill strip appendages at the TE and GE were found eroded and were weld repaired and remachined. New spill strips were replaced.
2. Ninth stage diaphragm. The spill stripe appendages were found eroded and were weld repaired and remachined. New spill strips were replaced.
3. Diaphragm joint bolts. Multiple disassemblies from heating, loosening and tightening had bent the bolts and damaged the bolt hex heads. All diaphragm joint bolts were replaced.
4. N3 outer packing casing. Removed one broken bolt. Replaced bolt.
5. Reheat heating steam block valve. Three retainer bolts broke off during disassembly. The bolts were removed and replaced.
6. Reheat heating steam inlet seal ring lock welds were found cracked. These were ground out and rewelded with Inco 82.
7. Reheat outlet (crossover) connection. Removed 22 crossover studs that were cut off during disassembly. New studs were installed.
8. Repositioned the axial thrust keys between the reheat and LP A to reposition the LP rotors 0.230 inches toward the generator.
9. Replaced the shell operating keys. These were found undersized at disassembly.

LP A Turbine

1. Crossover studs. Removed 5 horizontal flange studs that were cut off during disassembly. New studs were installed.
2. Inner casing.
   a. Horizontal joint bolting. Seven tapped holes were found with damaged threads. These were repaired using inserts.
   b. The upper transverse keys and bolts were found bent. The keys were straightened and the bolts replaced.
   c. Horizontal joint shield. Two bolts were found broken. The holes were drilled out, tapped and the bolts replaced.
   d. GE upper alignment keys were found bent. One hole was repaired, the key straightened and the bolt replaced. The radial fits galled areas cleaned and dressed.

LP B Turbine

1. Inner casing.
   a. GE upper alignment keys were found bent. One hole was repaired, the key straightened and the bolt replaced. The radial fits galled areas cleaned and dressed.
   b. Horizontal joint bolting. Eight tapped holes had damaged threads. These were repaired using inserts.
2. "D" coupling bolts. The bull gear doweled to the LP B rotor had slipped which caused excessive friction and galling during removal of the studs. Two studs were stuck and were machined out. The balance of studs and holes were cleaned of galls and reinstalled. The bull gear was removed; realigned and larger dowels were machined and installed.

Turbine rotors.

1. Reheat rotor. Replaced two rows of 8th stage buckets and slow speed balanced.
2. LP A rotor. Replaced TE and GE L-0 side entry covers and slow speed balanced.
3. LP B rotor. Replaced TE and GE L-0 side entry covers and slow speed balanced.
4. Reference MDA steam path report by Jeff Newton for additional turbine rotor work.

Generator.

1. Hydrogen seals.
   a. The hydrogen seal rings were found with pitting do to electrolysis on the babbitted surface. These were replaced with new seals which required lapping required to achieve and good contact at the seal surface.
   b. The CE hydrogen seal casing was found with the insulation cut back from the edge at the horizontal joint. This created a path for oil to escape and for possible shaft grounding. Replacement insulation was installed.
2. The TE lower half end shied right side inner dowel was found with damaged threads. This was repaired using an insert.
3. Reference GE generator inspection for report for additional generator work.
4. Resurfaced the generator collector rings.
5. Exciter

a. Elongated base bolt holes to reposition exciter. Axial position blocks were re-welded. The centerline gib keys were machined to compensate for the move.
b. New consolidated shims were installed to compensate for the alignment changes.

Bearings and oil deflectors.

1. T1 bearing
   a. Replaced three bottom anti-rotation pins, two cap screw for bottom puck and one upper anti-rotation pin.
   b. Enlarged the vibration probe hold to correct a tight fit on the pickup shaft.
   c. Scraped the bearing support pads to achieve an acceptable contact in the standard fit.
2. T2 bearing
   a. The bearing pads were found wiped and was rebuilt by RPM.
   b. Enlarged the vibration probe hold to correct a tight fit on the pickup shaft.
3. T3 bearing
   a. Repaired bottom pad.
   b. Enlarged the vibration probe hold to correct a tight fit on the pickup shaft.
   c. Scraped the bearing support pads to achieve an acceptable contact in the standard fit.
4. T4 bearing
   a. The bottom puck had raised spot on the pivot surface. This was removed and the contour blended.
   b. Enlarged the vibration probe hold to correct a tight fit on the pickup shaft.
   c. Scraped the bearing support pads to achieve an acceptable contact in the standard fit.
5. T5 through T10 bearings were found with babbitt damage and were rebuilt by RPM.
6. The following oil deflectors were rebuilt by RPM do to excessive radial clearance: T1, T3, T4, T6 and T7 (inner and outer), "D" coupling, T11 and T12.

Control valves.

1. Linkages. Replaced worn linkage pins.
2. CV #1
   a. Replaced the inner valve. Actual lift less than design.
   b. Rebuilt valve disk to correct excessive clearance to balance chamber.
   c. Replaced lower stem bushings to correct excessive clearance.
   d. Removed minor indication in the casing steam dam.
3. CV #2
   a. Replaced cross head guide to correct excessive run out.
   b. Replaced the inner valve. Actual lift less than design.
   c. Replaced cross head guide bushing to correct excessive clearance.
4. CV #3
   a. Rebuilt valve disk to correct excessive clearance to balance chamber.
   b. Replaced lower stem bushings to correct excessive clearance.
   c. Replaced the inner valve. Actual lift less than design.

5. CV #4
    a. Replaced cross head guide to correct excessive run out.
    b. Replaced the inner valve. Actual lift less than design.
    c. Rebuilt valve disk to correct excessive clearance to balance chamber.
    d. Replaced lower stem bushings to correct excessive clearance.
    e. Removed minor indication in the casing steam dam.

Main stop valves.

1. MSV #1
    a. Removed damaged seat bolts and replaced.
    b. Repaired two indications in the top of the anti-swirl dam.

Combined reheat valves.

1. Intercept valve #1 and #2
    a. Replaced valve stems.
    b. Removed broken stem retaining bolts and replaced with new bolts.
2. Reheat stop valve #1 and #2.
    a. Replaced valve stems.

Recommended for future outages.

Combined reheat valves.

1. Remove fine mesh screen (steam strainer) and replace with running steam strainer. Reference the Turbine Generator Instruction Book for recommended timing.

Equalizer valve.

1. Re-inspect the indication located in the valve seat inlay. Replace as required.

Main stop valves.

1. MSV #1 and #2
    a. Replace the valve stems. Existing stems have marginal runout.
2. MSV #3
    a. Replace the valve disk bushings. Excessive wear noted in the anti-rotation pin cut out.

LP Turbine.

1. Replace the spill strips for LP stages 15GA, 15TA and 14GB. These were recommended but not replaced during the 2005 outage.

PARTS USED AND RECOMMENDED

Component	Part Description	GE P/N	Old Xcel Stock #	New Xcel Stock #	Qty Used	Comments/recommended
PMG	PMG Bearing DE	186C5267G0001	268932	196559	1	
PMG	PMG Bearing FE Thrust	186C5266G0001	268889	196533	1	would not fit, replace next outage
PMG	PMG Labyrinth Seal	133D6442P0009	TGAABZ	172817	2	
PMG	PMG O-ring Basic Size #18 Viton	U473X000BS018	TGAARR		1	
PMG	PMG O-ring Basic Size #47 Viton	U473X000BS047	TGAAQH		1	
PMG	PMG O-ring Basic Size #169 Viton	U473X000BS169	TGAAQQ		1	
PMG	PMG O-ring Basic Size #115 Viton	U473X000BS115	TGAAQO		1	
FR STD	Overspeed Trip Piston Rod	174B3273P0001	268882	196527	1	
FR STD	Overspeed Trip Stem	174B3274P0001	267749	118389	1	
FR STD	Overspeed Trip, Trip Finger	161C8773P0001	268864	196505	1	
FR STD	Overspeed Trip Guide Pin	U408A206L0275	300620	119894	1	
FR STD	Overspeed Trip Finger Insert	264A3588P0001	-		1	
FR STD	Overspeed Trip Finger Shim	264A3589P0001	-		1	
FR STD	Mech Trip Valve Seal Kit	0824E647G0002	TGAAEP	38127	1	
FR STD	Air Relay Dump Valve Seal Kit	0892E851G0002	TGAAEQ	172489	1	
HP	"A" Coupling Nut	234A5410P0004	TGAAAI	38047	2	
HP	"A" Coupling Nut Lockplate	234A6376P0005	TGAC84	38049	14	
HP	T-1 Brg Pad Lock Pin	U727P002L0350	253304	112977	6	
HP	T-1 Brg Hold Down Bolt Lockplate	03666789P0014	TGALDQ	173493	4	
HP	T-2 Brg Pad Lock Pin	U727P002L0600	253305	112978	6	
HP	T-2 Brg Hold Down Bolt Lockplate	03666789P0014	TGALDQ	173493	4	
HP	Main Steam Inlet Flange Gasket	341A2967P0066	256236	113907	2	
HP	Main Steam Inlet Flange Thru Stud	U605P318L1912	TGAANF	173015	8	
HP	Main Steam Inlet Flange Nut	U615X000P0218	TGAA92	172774	16	
HP	1st Stage Lower TC Flange Gasket	106A9400P0001	370791	121684	1	
HP	Outer Upper Gib Key Cover Gasket	106A9400P0035	TGAA52	172749	1	
HP	Inspection Cover Gasket	341A2968P0028	TGASDR	NO RECORD	1	
HP	Mid-Span Balance Cover Gasket	106A9401P0159	TGAAEI	172845	1	
HP	1st Stage Pressure Tap Flange Gasket	106A9401P0052	-		1	
HP	Tops On Running Keys	182A1261P0001	TGABDJ	38367		required for next outage
HP	N1/N2 Outer Gland Vertical Joint Bolt	U627P110L0250	TGAAUR	173123	2	
HP	Rotor Balance Weight Mid Span Plug	182A2150-1	TGAACG	172821	0	
HP	Rotor Balance Weight Mid Span Slot	323B7413G0001	TGAACU	172830	0	
HP	Rotor Balance Weight End Plane Plug	163A8650-4	TGAAUP	173121	0	
HP	Rotor Balance Weight End Plane Slot	323B7413G0001	TGAACU	172830	0	
HP	Rotor Balance Weight Coupling	234A3367-1	-		0	
HP	HP Diaphragm Support Shims	142C5824P0009	TGAAXN	173156	0	
HP	Diaphragm Shim Screw	244A2827P0001	TGAACL	172824	8	
HP	HP Diaphragm Bolts Stages 2,3,4, & 7	U624P210L0700	TGAC81	173391	16	

HP	HP Diaphragm Bolts Stages 5 & 6	U624P210L0750	TGAC82	173392	8	
HP	Diaphragm Support Shim Screw	U625P203L0087	269015	196477	8	
IP	"B" Coupling Nut Lockplate	234A6376P0007	TGAAFI	NO-REC	16	
IP	T-3 Brg Pad Lock Pin	U727P002L0650	261979	38069	6	
IP	T-3 Brg Hold Down Bolt Lockplate	03666789P0014	TGALDQ	173493	4	
IP	T-4 Brg Pad Lock Pin	U727P003L0550	268880	196509	6	
IP	T-4 Brg Hold Down Bolt Lockplate	03666789P0014	TGALDQ	173493	4	
IP	TC Cover Gasket	106A9400P0022	300714	119936	1	
IP	Inspection Cover Gasket	341A2968P0028	TGASDR	NO-REC	1	
IP	Mid-Span Balance Cover Gasket	106A9400P0002	TGAC59	173384	1	
IP	Mid-Span Balance Pipe Asm Gasket	341A2967P0016	268911	196543	1	
IP	End Plane Balance Access Gasket	U336W037D0181	TGAAEL	172847	1	
IP	Axial Thrust Key Outboard	106A5775P0001	TGAARZ	173071	2	
IP	Axial Thrust Key Inboard	106A9712P0001	TGAARY	173070	0	
IP	N3/N4 Outer Gland Vertical Joint Bolt	U627P106L0175	TGAATU	173107	2	
IP	N3/N4 Outer Gland Horizontal Joint Bolt	U627P106L0275	-		1	
IP	Rotor Balance Weight Mid Span Plug	182A2150P0001	TGAACG	172821	0	
IP	Rotor Balance Weight Mid Span Slot	01439419P0001	TGAAVS	173142	0	
IP	Rotor Balance Weight End Plane Plug	163A8660P0005	TGAATI	172818	0	
IP	Rotor Balance Weight End Plane Slot	243A8649	TGAACB	NO-REC	0	
IP	Rotor Balance Weight Coupling	234A3367	-		0	
IP	IP Diaphragm Support Shims	142C5824P0005	TGABEH	173317	0	
IP	IP Diaphragm Support Shim Screw	U625P203L0087	269015	196477	6	
IP	Diaphragm Shim Screw	244A2827P0001	TGAACL	172824	3	
IP	IP Diaphragm Bolts Stage 8 Inner	U624P314L0425	TGAAAK	172784	4	
IP	IP Diaphragm Bolts Stage 8 Outer	U624P310L0700	TGAAGG	172877	4	
IP	IP Diaphragm Bolts Stage 9 TE	U624P210L0700	TGAC81	173391	4	
IP	IP Diaphragm Bolts Stages 9 GE, 10 - 13	U624P210L0750	TGAC82	173392	32	
IP	IP Diaphragm Bolts Stage 10 GE	U624P210L0650	TGAAGA	172871	4	
IP	8th Stage Buckets and Covers TE				1 row	
IP	8th Stage Buckets and Covers GE				1 row	
XVR	54" Flange 1,2,4,5,& 6 Gasket	341A2968P0060	TGAA56	172752	5	
XVR	62" Flange 4 & 6 Gasket	341A2968P0064	256387	113983	2	
XVR	72" Flange 5 Gasket	341A2968P0092	TGAA59	172754	1	
XVR	54" Flange 1,2,4,& 6 Tap Stud	U606P216L1000	TGAC48	37716	64	
XVR	54" Flange 5 Thru Stud	U605P216L1325	TGAA23	172732	48	
XVR	72" Flange 3 Thru Stud	U605P216L1625	TGABBE	173254	60	
XVR	Nut	U614X000P0216	TGAA91	172773	45	
XVR	Washer	181A7376P0005	TGAA25	172733	45	
LP	"C" Coupling Nut Lockplate	234A6376P0008	TGAC86	173395	16	
LP	"D" Coupling Stud	U671P220L3125	TGAAMB	172991	2	

LP	"D" Coupling Nut	234A3336P0002	TGAAHD	172898	4	
LP	"D" Coupling Washer	234A6320P0006	TGAANW	173027	0	
LP	"D" Coupling Nut Lockplate	234A6376P0009	TGAAFJ	N/A	16	
LP	T5-T8 Brg Hold Down Bolt Lockplate	03666789P0016	268931	196558	16	
LP	Inner Cyl Handhole Cover Gasket 12x16	303A3566P0001	TGAAEJ	172846	16	
LP	Inner Cylinder Bolt Shield Lockplates	199A7160P0003	-		2	
LP	Inner Cylinder Bolt Shield Lockplates	199A7160P0008	-		2	
LP	Joint Shield Bolts				2	
LP	Inner Cylinder Bolt	U962P212L0325	268905	196540	14	
LP	Inner Cylinder Bolt	U623P112L0325	-		14	
LP	Inner Cylinder Nut	U614X000P0212	TGAA90	172772	0	
LP	Inner Cylinder Nut	U614X000P0216	TGAA91	172773	0	
LP	Inner Cylinder Washer	09119299P0005	268928	196555	2	
LP	Inner Cylinder Washer	09119299P0003	268930	196557	2	
LP	Exhaust Cone Bolt	U627P208L0250	268991	196468	2	
LP	Atmospheric Relief Diaphragm Shield Outer	143A6604P0013	TGAALL	172978	4	
LP	Atmospheric Relief Diaphragm Shield Inner	143A6604P0014	TGAALM	172979	4	
LP	Atmospheric Relief Diaphragm	297A2370P0005	TGAAVH	173134	4	
LP	Rotor Balance Weight Mid Span Slot	323B7413G0001	TGAACU	172830	0	
LP	Rotor Balance Weight End Plane Slot	182A9860P0001	TGABFA	173334	0	
LP	Rotor Balance Weight Coupling	234A3367	-		0	
LP	LP Diaphragm Support Shims	142C5824P0005	TGABEH	173317	0	
LP	LP Diaphragm Support Shims Stage 19	142C5824P0009	TGAAXN	173156	0	
LP	Diaphragm Shim Screw	244A2827P0001	TGAACL	172824	0	
LP	Diaphragm Bolt A 14GE/TE, A/B 16GE/TE	U624P210L0850	TGAAGB	172872	0	
LP	Diaphragm Bolt A 18TE, A/B 17GE	U624P210L0900	-		0	
LP	Diaphragm Bolt B 14GE/TE, B 18GE	U624P210L0950	-		0	
LP	Diaphragm Bolt B 18TE, A/B 15GE/TE	U624P210L1000	TGAAGC	172873	0	
LP	Diaphragm Bolt A/B 19GE/TE	U624P210L1100	TGAAGD	172874	0	
LP	Diaphragm Bolt A 18GE	U624P210L1150	TGAAGE	172875	0	
LP	Diaphragm Bolt A/B 17TE	U624P210L1350	TGAAGF	172876	0	
LP	LP A & B Stage 19 TE Bucket Covers				1 row	
LP	LP A & B Stage 19 GE Bucket Covers				1 row	
GEN	"E" Coupling Lockplate	199A2822P0001	TGAC90	173399	12	
GEN	Fan Blade Bolt Lockplates TE	199A6645P0001	TGAAOI	208846	30	
GEN	Fan Blade Bolt Lockplates CE	295A1162P0001	TGABEF	-	30	

GEN	Inner End Shield Bolt Lockplates TE & CE	03666789P0007	TGAA78	172764	120		
GEN	Inner End Shield Dowel Lockplates TE & CE	02671505P0003	TGAA77	37644	8		
GEN	Inner End Shield Access Cover Bolt Lplts TE & CE	03666789P0005	371068	137282	24		
GEN	Fan Nozzle Ring Bolt Lockplates TE & CE	03666789P0007	TGAA78	172764	48		
GEN	Fan Nozzle Ring Dowel Lockplates TE & CE	02671505P0002	TGAA76	38108	4		
GEN	Fan Nozzle Plate Bolt Lockwashers TE & CE	0248A245P0010	TGAA84	38255	32		
GEN	Gas Gap Baffle Locknut	182A7017P0002	TGAA75	172763	56		
GEN	End Shield Access Cover Gasket	0383B858P0003	TGAA46	300470	4		
GEN	Extension Box Access Cover Gasket	0877A201P0002	TGAA50	38001	2		
GEN	H2 Seal Insulation Kit CE	0506L542G0001	TGAAOH	N/A	1		
GEN	H2 Seal Casing Dowel CE	09184668P0007	TGAANZ	173030	2		
GEN	H2 Seal Casing Bolt Insulating Washer CE	0144V863P0001	TGAAOQ	173037	15		
GEN	H2 Seal Oil Deflector TE	111B7598P0011	-	-	1	Note, had to re-manufacture	
GEN	H2 Seal Oil Deflector CE	111B7598P0009	-	-	1	Note, had to re-manufacture	
GEN	H2 Seal Air Side CE	145D1496G0009	-	-	1		
GEN	H2 Seal Gas Side CE	145D1496G0010	-	-	1		
GEN	H2 Seal Air Side TE	145D1496G0013	-	-	1		
GEN	H2 Seal Gas Side TE	145D1496G0014	-	-	1		
GEN	Field Shim Protective Paper	164A2630P0035	TGAAXB	173148	1		
GEN	Dow Corning Sealant Q4-2805, 7.5oz Tubes	164A7383P0009	261668	115860	12		
GEN	Exciter Oil Deflector T11 Inner				1	Repaired at RPM	
GEN	Exciter Oil Deflector T11 Outer				1	Repaired at RPM	
GEN	Stator Cooling Y Strainer YST-1 Gasket				1		
SV	Lower Head Gasket	U336W075D1050	TGAA71	37995	3		
SV	Lower Head Bolt Lockplates	107A8327P0025	TGAAFE	172855	6		
SV	Coupling Lock Plates	03666789P0006	TGALDP	173492	6		
SV	Coupling Bolts	199A1553P0007	264160	116699	0		
SV	Stem Valve #1 & #3	207B2532P0001	TGAALX	172987	2	Replace next outage	
SV	Stem Valve #2	176C4929P0001	TGAALU	172984	1	Replace next outage	
SV	Stem Pin Valve #1 & #3	294A3524P0030	TGAAHR	172910	2	Replace next outage	
SV	Stem Pin Valve #2	294A3524P0019	TGAAHQ	172909	1	Replace next outage	
SV	Valve Stem Collar Valve #1 & #3	284A1875P0001	TGABEK	173320	1		
SV	Bypass Valve Valve #2	176C3437P0001	TGAANR	173025	0		

SV	Valve Disk Bushing Vlv #1 & #3	284A1877P0001	TGABEU	173328	0	Replace next outage	
SV	Valve Disk Bushing Vlv #2	207B3594P0001	TGAAGR	172888	0		
SV	Disk Bushing Keeper Ring Vlv #2	207B2528P0001	TGAALC	172972	0		
SV	Disk Bushing Keeper Ring Key Vlv #2	293A9388P0001	TGAAHB	172896	0		
SV	Disk Cap Bolts Valve #1 & #3	U810P310L0487	TGAAGI	172879	0	Replace next outage	
SV	Disk Cap Bolts Valve #2	U810P310L0525	TGAAGJ	172880	0	Replace next outage	
SV	Strainer	0993D812G0001	TGAA20	172731	0		
SV	Main Seat Gasket	341A2968P0053	TGAA74	172762	1	Replaced on Valve # 1	
SV	Seat Bolts	U624P308L0375	TGAA39	172740	24	Replaced on Valve # 1	
CV	Lock Plate (Bar Lock)	03666789P0007	TGAA78	172764	0		
CV	Lock Plate (Pivot Bracket)	03666789P0011	-		0		
CV	Bushing, Upper Lever	U450X000P0016	TGAAOT	173040	0		
CV	Bushing, Lower Lever	U450X000P0011	TGAA12	172730	0		
CV	Pin, Upper Lever	196B4853P0001	-		2		
CV	Bushing	271A8245P0001	-		0		
CV	Thrust Ring	264A1041P0001	-		0		
CV	Pin	271A8255P0001	TGAAVC	173130	0		
CV	Push Rod Upper Pin	254A6656P0002			0		
CV	Stand Gasket	106A9401P0126	TGAA61	172756	4		
CV	Stand Stud	U606P319L1975	TGAAMV	173006	0		
CV	Stand Nut	U615X000P0219	TGAAHI	172901	0		
CV	Outer Stand Bushing	254A9724P0101	TGAAGU		0		
CV	Inner Stand Bushing	207B1173P0101	TGAAGQ	172887	0		
CV	Outer Stand Bushing Retainer	254A7798P0001	TGAAHU	172913	0		
CV	Stand Bushing Retainer Bolts	N24BP35022	-		0		
CV	Lock Plate (Retainer Bolts)	03666789P0007	TGAA78	172764	0		
CV	Stand Bolts	U627P214L0625	264187	116722	0		
CV	Lock Plate (Stand Bolts)	03666789P0009	TGALDR	173494	0		
CV	1st Leak Off Flange Stud	06913435P0006	TGAAMF	172993	16	all replaced at shop	
CV	1st Leak Off Flange Nut	U613X000P0206	TGAA88	172771	16	all replaced at shop	
CV	2nd Leak Off Flange Stud	06915956P0003	TGAAMG	37673	16	all replaced at shop	
CV	2nd Leak Off Flange Nut	U613X000P0204	TGAA87	172770	16	all replaced at shop	
CV	1st Leak Off Flange Gasket	1/2" 600# CG	EMXAEY	147262	4		
CV	2nd Leak Off Flange Gasket	1 1/2" 150# CG	EMXADB	147213	4		
CV	Valve Stem	169C2414P0001	TGAALT	172983	4		
CV	Pilot Valve	222A6358P0002	TGAB63	173205	1		
CV	Pilot Valve Pin	272A1796P0002	TGAAHP	172908	1		
CV	Main Plug	162C3286P0001	TGAANQ	173024	2		
CV	Outer Valve Screw	182A2017P0010	TGAALD	173253	16		
CV	Sleeve	207B1160P0001	-	-	0		
CV	Sleeve Pins	09119588P0003	264163	116702	0		
CV	Valve Seat	207B3524P0001	TGAALI	172975	0		
CV	Seat Pin	254A7796P0001	TGAAHN	172906	0		

CV	X-Head Assembly	133D4196G0001	TGAANX	173028	0	
CV	X-head Pins	271A8257P0101	TGAAHO	172907	4	
CV	X-Head Guide	254A9745P0101	TGAAGX	38008	2	
CV	X-Head Guide Bushing	222A2928P0101	TGAAGS	172889	2	
CV	Push Rod Assembly	254A6664G0010	-	-	0	
CV	Limit Switch Arms	208B8907P0001	-		4	
CV	Limit Switch Pins	U408A208L0225	-		4	
CV	Sealing Ring	183A4635P0001	-		0	
CV	Sealing Ring Bolts	U623P205L0450	-		0	
CV	Sealing Ring Bolt Lockplates	03666789P0006	TGALDP	173492	0	
CV	Cotter Pins	N503	-		4	
CV	Limit Switch Rod End Bearing	272A1783P0001	TGABFE	173338	4	
CRV	Upper Head Gasket	341A2968P0134	TGAAEH	172844	2	
CRV	Lower Head Gasket	U336W125D1950	TGAA72	172761	2	
CRV	Lower Head Bolt	U623P310L0500	TGAAFY	172869	0	
CRV	Lower Head Backseat	163A8987P0002	TGAALG	172973	0	
CRV	Coupling Bolts	199A1553P0006	264161	116700	0	
CRV	Coupling Lock Plates	03666789P0006	TGALDP	173492	12	
CRV	Lower Valve Stem	181B5532P0001	TGAALW	172896	2	
CRV	Lower Valve Stem Nut Pin	U408A310L0437	TGAB20	173178	2	
CRV	Lower Valve Stem Nut	163A8493P0001	TGAB01	173170	2	
CRV	Lower Valve Stem Key	163A9252P0001	TGAAHA	172895	2	
CRV	Upper Valve Stem	181B5531P0001	TGAALV	172895	1	
CRV	Upper Valve Stem to X-head Pin	U409A308L0918	TGAB21	173179	2	
CRV	Upper Stem to Disc Split Ring	244A1571P0001	TGAALB	172971	1	
CRV	Upper Valve Stem Key	182A2965P0001	-		2	
CRV	Upper Stem Split Ring Bolts	U623P310L0450	TGAAFX	172868	20	
CRV	Upper Stem Split Ring Bolt Lplate	107A8327P0034	-		10	
CRV	Seal Ring Keeper Ring Bolt	U623P306L0275	TGAAFW	172867	0	
CRV	Keeper Ring Bolt Lock Plate	107A8324P0038	TGAAOU	173041	0	
CRV	X-head Guide Bushing	163A8487P0010	TGABER	38038	0	
CRV	Upper Head Mid Bushing	199A3085P0101	TGAAGP	172886	0	
CRV	Upper Inner Bushing	244A1570P0101	TGAAGT	172890	0	
CRV	Upper Head Backseat	243A8782P0001	TGAALJ	172976	0	
CRV	Upper Stem Guide Bolts	U623P312L0475	TGAAFZ	172870	24	
CRV	Upper Stem Guide Bolt Lock Plates	107A8328P0012	TGAAVT	173143	12	
CRV	Upper Stem Guide Gasket	106A9400P0026	370793	121686	2	
CRV	Strainer With Fine Mesh Screen	117D7090G0001	-		2	
CRV	Fine Mesh Screen Kit	117D7090G0002	TGAAEN	N/A		
EV	Bonnet Gasket	341A2967P0008	-		1	
EV	Casing Tap Stud	U606P313L1850	TGAAMS	173004	0	
EV	Casing Nut	U613X000P0213	TGAAUS	173124	0	
EV	Stem	187C4613P0001	TGAALS	38223	0	

EV	Stem Packing	U466X000P0034	-		1	
EV	Upper Stem Bushing	182A4314P0001	TGAAGN	172884	0	
EV	Lower Stem Bushing	182A4370P0001	TGAAGO	172885	0	
EV	Lever Pin	182A4382P0001	-		1	
EV	Lever Roller CYR-4	182A4384P0001	-		2	
EV	Lever Pin Bearing MR40N, Race MI32N	U457X000P0047	-		2	
EV	Air Cylinder Gasket	163A7844P0004	-		1	
EV	Allen Head Stand Bolts	U625P205L0300	-		0	
VV	Bonnet Gasket	341A2967P0022	TGAAUK	37399	1	
VV	Bonnet Tap Stud	U606P316L1193	-		0	
VV	Bonnet Nut	U614X000P0216	TGAA91	172773	0	
VV	Upper Stem Bushing	198A8823P0001	269108	196611	0	
VV	Lower Stem Bushing	293A7290P0001	-		0	
VV	Stem	213B5765P0001	-		0	
VV	Stem Antirotation Pin	0128Y404P0001	-		0	
VV	Stem Nut	N204P0035B	-		1	
VV	Stem Nut Pin	U408A304L0200	-		1	
VV	Seat Gasket	0857A724P0007	TGAA47	172746	0	
VV	Valve Disc	196B4186P0001	-		0	
VV	Ring	165A1948P0002	-		0	
VV	Outlet Flange Gasket	106A9400P0038	TGAA53	172750	1	
VV	Leakoff Flange Stud	U606P207L0375	-		0	
VV	Leakoff Flange Nut	U613X000P0207	-		0	
VV	Air Cylinder Gasket	165A3856P0003	TGAABH	NO-REC	1	
VV	Air Cylinder Gasket	297A1291P0001	-		1	
VV	Air Cylinder Piston Rings	05343739P0002	TGABCG	38329	2	
OIL	MSP Upper Motor Bearing	629A312FLP001	-	-	1	
OIL	MSP Lower Motor Bearing	629A312FLP001	-	-	1	
OIL	MSP Pump Thrust Bearing				1	
OIL	MSP Thrust Housing Gasket				1	
OIL	MSP Lower Pump Bearing				1	
OIL	MSP Impeller Nut				0	
OIL	MSP Pump Casing Seal Ring				0	
OIL	TGOP Upper Motor Bearing	629A210FZP001			1	
OIL	TGOP Lower Motor Bearing	629A312SLP001			1	
OIL	TGOP Pump Thrust Bearing				1	
OIL	TGOP Thrust Housing Gasket				1	
OIL	TGOP Lower Pump Bearing				1	
OIL	TGOP Impeller Nut				0	
OIL	TGOP Pump Casing Seal Ring				0	
OIL	EBOP Upper Motor Bearing				1	
OIL	EBOP Lower Motor Bearing				1	

OIL	EBOP Pump Thrust Bearing					1	
OIL	EBOP Thrust Housing Gasket					1	
OIL	EBOP Lower Pump Bearing					1	
OIL	EBOP Impeller Nut					0	
OIL	EBOP Pump Casing Seal Ring					0	
OIL	BSTR OP Shaft	0385B940P0001				1	
OIL	BSTR OP Driving Shaft Brg #1	0107C810P0001	TGAC08	173346		1	
OIL	BSTR OP Driving Shaft Brg #2	0514C850P0001	TGAAFR	172862		1	
OIL	BSTR OP O-Ring	U421X000P0149	TGAB03	173171		2	
OIL	BSTR OP O-Ring	U421X000P0154	TGAB04	38022		2	
OIL	BSTR OP Impeller Shim	0124V592P0001	TGCSDE			0	
OIL	BSTR OP Drive Impeller	0477D734G0002				0	
OIL	BSTR OP Pump Impeller	0601E290P0001				0	
OIL	BSTR OP Impeller Nut	Seq # 412F				0	
OIL	BSTR OP Impeller Nut Lockplate	Seq # 413U				2	

MAIN STOP VALVES

MAIN STOP VALVE # 1

The internals of main stop valve # 1 were disassembled, cleaned, and inspected. Before cleaning and after cleaning dimensions were recorded and reviewed. All clearances were acceptable after cleaning. The stem run out was .009 inch, located at the disk end of the stem. This stem should be replaced during the next major outage. The valve's stellite seat surface was NDE'd, no indications were noted. Valve lifts and cover clearances were checked and found acceptable. The valve was assembled following the OEM recommendations.

The valve body was blast cleaned and NDE'd no indications were noted. The valve body was vacuumed out and visually inspected. The valve seat was removed during this outage for an OEM recommended NDE inspection. No indications were noted. During seat removal, all seat bolts were broken off which required on site machining in order to drill the broken bolts out. The bolt holes were all tapped and visually inspected o.k. Seat bolts and the seat gasket were replaced during assembly. The seat o.d. and valve body i.d were dimensionally checked ok. The steam dam was visually and NDE inspected, no indications or defects were noted. Valve disk to seat contact checks were performed. Minimal lapping achieved 100% contact. The pressure seal head gasket surface was blued and lapped to the valve body, achieving 100% contact. The pressure seal head back seat was lapped and blue checked 100%. Opening and closing CEOT travel were found to be within the OEM tolerance.

The steam strainer was removed from the valve body and blast cleaned. No defects were noted.

MAIN STOP VALVE # 2

The internals of main stop valve # 2 were disassembled, cleaned, and inspected. Before cleaning and after cleaning dimensions were recorded and reviewed. All clearances were acceptable after cleaning. The stem run out was .013 inch, located at the disk end. This valve stem should be replaced during the next major outage. The valve's stellite seat surfaces were NDE'd, no indications were noted. Valve lifts and cover clearances were checked and found acceptable. The bypass valve lift was .234inch. The stem thread clearance was .110 inch, and the "Z" clearance was .068 inch, the valve was assembled following the OEM recommendations.

The valve body was blast cleaned and NDE'd no indications were noted. The valve body was vacuumed out and visually inspected. The steam dam was visually and NDE inspected, no indications or defects were noted. Valve disk to seat contact checks were performed. Minimal lapping achieved 100% contact. The pressure seal head gasket surface was blued and lapped to the valve body, achieving 100% contact. Opening and closing CEOT travel were found to be within the OEM tolerance.

The steam strainer was removed from the valve body and blast cleaned. No defects were noted.

MAIN STOP VALVE # 3

The internals of main stop valve # 3 were disassembled, cleaned, and inspected. Before cleaning and after cleaning dimensions were recorded and reviewed. All clearances were acceptable after cleaning. The stem run out was .004 inch. The valve's stellite seat surface was NDE'd, no indications were noted. Valve lifts and cover clearances were checked and found acceptable. The valve was assembled following the OEM recommendations.

The valve body was blast cleaned and NDE'd no indications were noted. The valve body was vacuumed out and visually inspected. The steam dam was visually and NDE inspected, no indications or defects were noted. Valve disk to seat contact checks were performed. Minimal lapping achieved 100% contact. The pressure seal head gasket surface was blued and lapped to the valve body, achieving 100% contact. Opening and closing CEOT travel were found to be within the OEM tolerance.

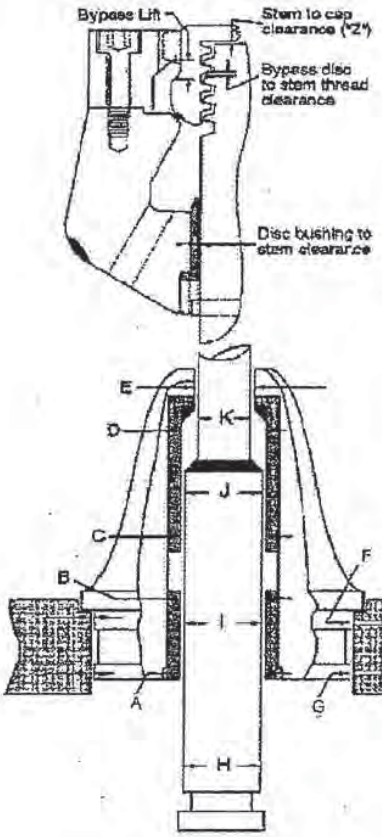
The steam strainer was removed from the valve body and blast cleaned. No defects were noted.

The bushings in the valve disks are experiencing wear in the anti rotation pin cut outs. These bushings need to be replaced during the next major outage.

MECHANICAL DYNAMICS and ANALYSIS, LLC

MAIN STEAM STOP VALVE DATA SHEET
(WITH INTERNAL BYPASS VALVE)

Customer	Xcel Energy	Rating	10/19/2005
Plant	Sherco Generating Station	Type	G3
Unit No.	3	Date	10/19/2005
Serial No.	170X819	Recorded By	
OEM	GE		

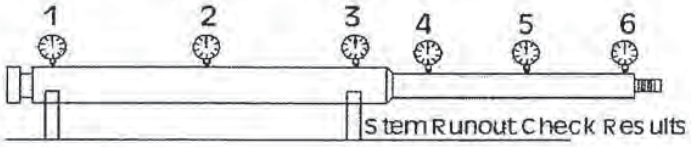


Main Stop Valve Location: MSV 2

ByPass Disc Measurements	Design Values	Actual Values
Stem End to Disc Clearance (2)	0.062	0.068
ByPass Disc Axial Thread Clearance	0.095-0.140	0.110
ByPass Valve Lift	0.150	0.234
Disc Bushing to Stem Clearance	0.022	0.023

Pressure Seal Head Inside Diameters				
A	B	C	D	E
3.819	3.818	3.818	3.818	3.296
Stem Outside Diameters (Bushing Area)				
H	I	J	K	
3.799	3.800	3.800	3.799	3.231
Stem to Bushing Clearances				
0.020	0.018	0.018	0.019	0.065

Pressure Seal Head to Valve Body Fit		
Valve	M	N
Body ID	10.379	9.997
Seal	F	G
Head OD	10.367	9.994
Clearance	0.012	0.003



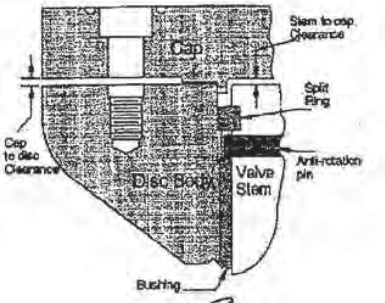
Position	1	2	3	4	5	6
Runout	0.000	0.000	0.000	0.002	0.006	0.013

Comments:

MECHANICAL DYNAMICS and ANALYSIS, LLC

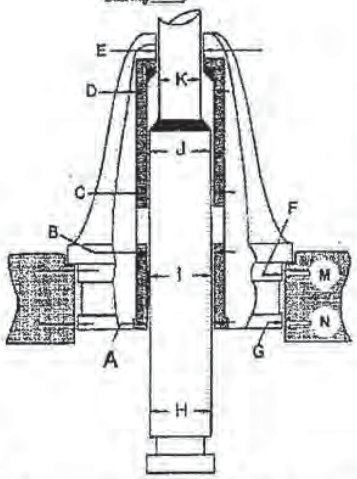
MAIN STEAM STOP VALVE DATA SHEET
(WITH INTERNAL PILOT OR BYPASS VALVE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	3	Date	10/19/2005
Serial No.	170X819	Recorded By	
OEM	GE		

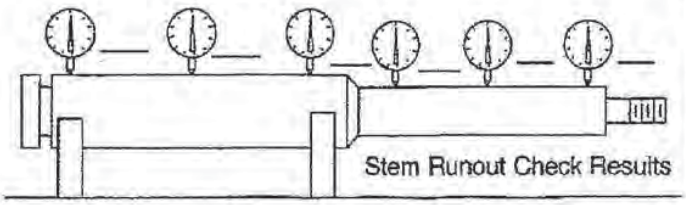


Main Stop Valve Location: MSV 1

Disc. & Stem Assy. Measurements	Design Values	Actual Values
Stem End to Disc Clearance (S)		0.083
Disc to Cap Clearance		0.056
Disc Bushing to Stem Clearance (V - U)		0.022



Pressure Seal Head Inside Diameters				
A	B	C	D	E
3.819	3.819	3.820	3.819	3.327
Stem Outside Diameters (Bushing Area)				
H	I	J	K	
3.799	3.800	3.800	3.801	3.230
Stem to Bushing Clearances				
0.020	0.019	0.020	0.018	0.097



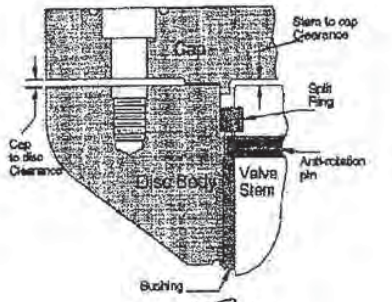
Pressure Seal Head to Valve Body Fit		
Valve	M	N
Body ID	10.380	10.000
Seal	F	G
Head OD	10.369	9.997
Clearance	0.011	0.003

Comments: _____

MECHANICAL DYNAMICS and ANALYSIS, LLC

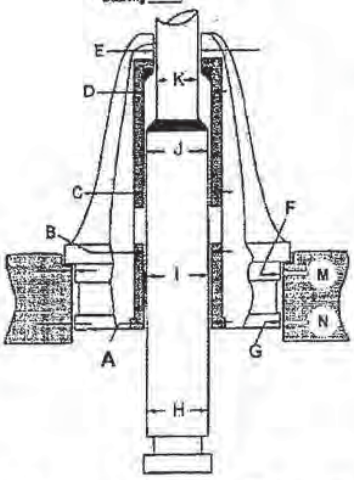
MAIN STEAM STOP VALVE DATA SHEET
(WITH INTERNAL PILOT OR BYPASS VALVE)

Customer	Xcel Energy	Rating	950MW
Plant	sherco Generating Station	Type	G3
Unit No.	3	Date	10/19/2005
Serial No.	170X819	Recorded By	
OEM	GE		

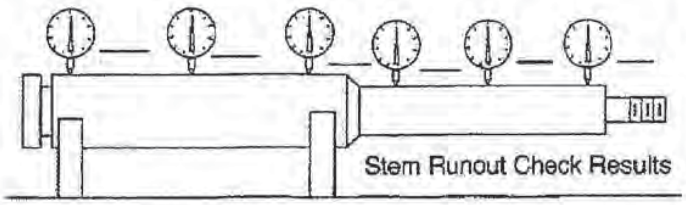


Main Stop Valve Location: MSV 3

Disc. & Stem Assy. Measurements	Design Values	Actual Values
Stem End to Disc Clearance (S)		0.064
Disc to Cap Clearance		0.060
Disc Bushing to Stem Clearance (V - U)		0.022



Pressure Seal Head Inside Diameters				
A	B	C	D	E
3.819	3.819	3.819	3.818	3.327
Stem Outside Diameters (Bushing Area)				
H	I	J	K	
3.799	3.800	3.800	3.800	3.230
Stem to Bushing Clearances				
0.020	0.019	0.019	0.018	0.097



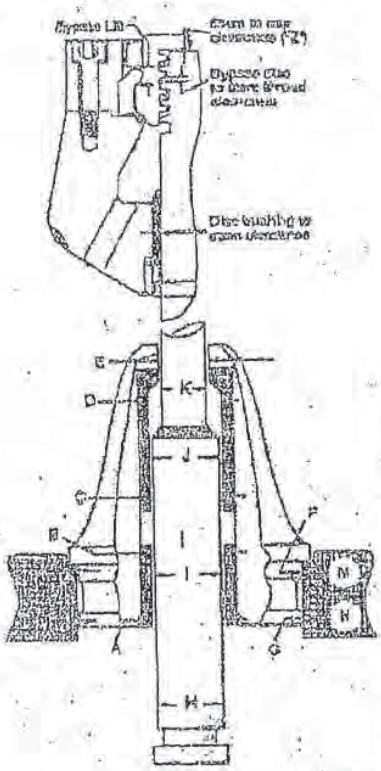
Pressure Seal Head to Valve Body Fit		
Valve	M	N
Body ID	10.382	9.999
Seal	F	G
Head OD	10.364	9.996
Clearance	0.018	0.003

Comments: _____

MAIN STEAM STOP VALVE
(WITH INTERNAL BYPASS VALVE)

Customer [redacted]
Plant Sherco
Unit No. 3
Serial No.
OEM

Rating
Type
Date 10-19-05
Recorded By Carl Jaff



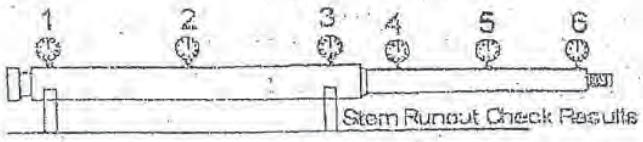
Main Stop Valve Location	1

ByPass Disc Measurement	Design Values	Actual Values
Stem End to Disc Clearance (Z)	.037 - .087	
ByPass Disc Axial Thread Clearance	.095 - .140	
ByPass Valve Lift		
Disc Bushing to Stem Clearance	.022 - .024	

Pressure Seal Head Inside Diameters				
A	B	C	D	E
3.819	3.819	3.817	3.814	3.809

Stem Guide Diameters (Bushing Area)				
H	I	J	J	K
3.799	3.802		3.840	3.830

Stem to Bushing Clearances					
	020	017		016	027
Design	0.020	0.020	0.015	0.015	0.028
Difference					



Pressure Seal Head to Valve Body Fit		
Valve	M	N
Body ID	10.380	10.000
Seal	F	G
Head OD	10.369	9.997
	011	003

Position	1	2	3	4	5	6
Runout	0	.0001	0	+.002	+.005	+.009

Allowable Run-Out .004/ft overall length

Comments:

MSV 2

MSV 2

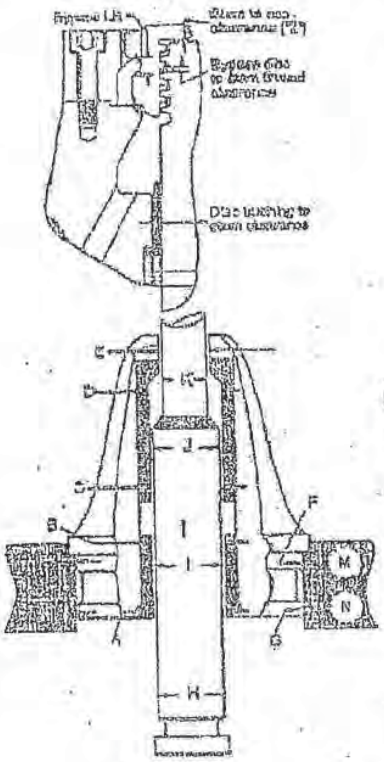
MAIN STEAM STOP VALVE
(WITH INTERNAL BYPASS VALVE)

Customer Xcel
Plant Sherco
Unit No. 3
Serial No.
OEM

Rating
Type
Date 10-19-05
Recorded By Carl - Jaff

Bypass Stop Valve

Main Stop Valve Location	2

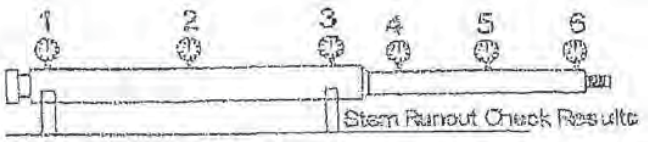


ByPass Disc Measurement	Design Value	Actual Value
Stem End to Disc Clearance (Z)	.037 - .087	
ByPass Disc Axial Thread Clearance	.095 - .140	.110
ByPass Valve Lift		
Disc Bushing to Stem Clearance	.022 - .024	.014

Disc Bush. 3.245
Stem 3.231
.014

Pressure Seal Stem Inside Diameters				
A	B	C	D	E
3.819	3.818	3.818	3.818	3.296
Stem Outside Diameters (Bushing Area)				
H	I	J	J	K
3.799	3.801	3.800		3.231
Stem to Bushing Clearance				
020	017	018		065
Design	0.020	0.020	0.015	0.015	0.088
Difference					

Pressure Seal Head to Valve Body I.D.		
Valve	M	N
Body ID	10.329	9.997
Seal	F	G
Head OD	10.317	9.994
Clearance	012	003



Position	1	2	3	4	5	6
Runout	0	0	0	-.002	-.006	-.013

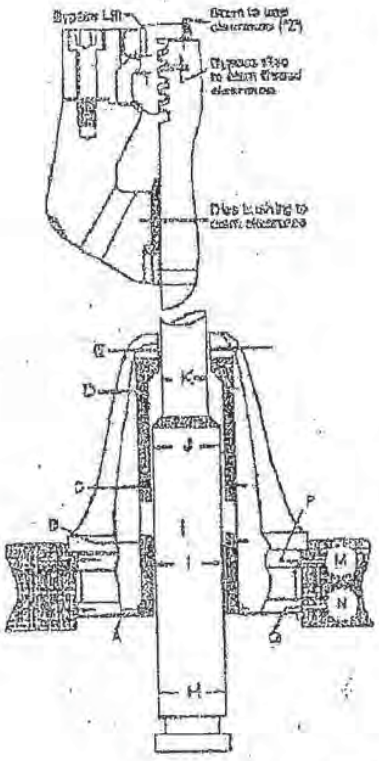
Allowable Run-Out: .004/ft overall length

Comments:

MAIN STEAM STOP VALVE (WITH INTERNAL BYPASS VALVE)

Customer: Xcel
Plant: Sherco
Unit No.: 3
Serial No.:
OEM:

Rating:
Type:
Date: 10-19-05
Recorded By: Col - JoFF



Main Steam Valve Location:	3

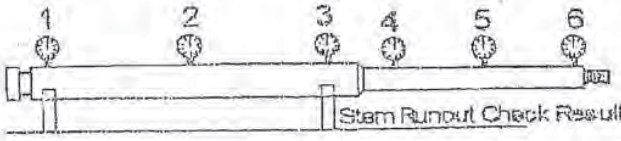
ByPass Disc Measurement	Design Values	Actual Values
Stem End to Disc Clearance (Z)	.037 - .087	
ByPass Disc Axial Thread Clearance	.095 - .140	
ByPass Valve Lift		
Disc Bushing to Stem Clearance	.022 - .024	

Pressure Seal Head Inside Diameters				
A	B	C	D	E
3.819	3.819	3.818	3.80?	3.322

Stem Outside Diameters (Bushing Area)				
H	I	J		K
3.799	3.800	3.800		3.230

Stem to Bushing Clearance				
020	019	018		097
Design 0.020	0.020	0.015	0.015	0.068
Difference				

Pressure Seal Head to Valve Body Fit		
Valve	M	N
Body ID	10.382	9.999
Seal	P	Q
Head OD	10.364	9.996
Difference	018	003



Position	1	2	3	4	5	6
Runout	.000	+.001	000	-.000	+.0005	-.0004

Allowable Run-Out: .004/ft overall length

Comments:

CONTROL VALVES

CONTROL VALVE ASSEMBLIES

CV # 1: CV # 1 was disassembled cleaned and inspected. Before cleaning and after cleaning stem, bushing, balance chamber and disk dimensions were recorded. NDE inspections were performed on the main disk and pilot valve disk/seat surfaces, no indications were noted. The bypass lift was recorded during disassembly and found to be significantly below the recommended value. The balance chamber clearances were also found to out of tolerance.

Upon assembly, bypass lifts were checked and adjusted to be within the OEM specification

Main disk to seat contact checks required minimal lapping in order to achieve 100% contact.

The crosshead guide to bushing clearance was checked and corrected.

The CV stand balance chamber was dimensionally checked and corrected.

CV # 2: CV # 2 was disassembled cleaned and inspected. Before cleaning and after cleaning stem, bushing, balance chamber and disk dimensions were recorded. NDE inspections were performed on the main disk and pilot valve disk/seat surfaces, no indications were noted. The bypass lift was recorded during disassembly and found to be significantly below the recommended value.

Upon assembly, bypass lifts were checked and adjusted to be within the OEM specification.

Main disk to seat contact checks required minimal lapping in order to achieve 100% contact.

The crosshead guide to bushing clearance was checked and corrected.

The CV stand balance chamber was dimensionally checked and corrected.

CV # 3: CV # 3 was disassembled cleaned and inspected. Before cleaning and after cleaning stem, bushing, balance chamber and disk dimensions were recorded. NDE inspections were performed on the main disk and pilot valve disk/seat surfaces, no indications were noted. The bypass lift was recorded during disassembly and found to be significantly below the recommended value.

Upon assembly, bypass lifts were checked and found to be within the OEM specification

Main disk to seat contact checks required minimal lapping in order to achieve 100% contact.

The crosshead guide to bushing clearance was checked and corrected.

The CV stand balance chamber was dimensionally checked corrected.

CV # 4: CV # 4 was disassembled cleaned and inspected. Before cleaning and after cleaning stem, bushing, balance chamber and disk dimensions were recorded. NDE inspections were performed on the main disk and pilot valve disk/seat surfaces, no indications were noted. The bypass lift was recorded during disassembly and found to be significantly below the recommended value.

Upon assembly, bypass lifts were checked and found to be within the OEM specification Main disk to seat contact checks required minimal lapping in order to achieve 100% contact.

The crosshead guide to bushing clearance was checked and corrected.

The CV stand balance chamber was dimensionally checked and corrected.

CONTROL VALVE BODIES

The valve chest internals were blast cleaned and NDE'd. Two indications were noted in the steam dams of valve bodies 1 and 4, no other indications were observed. The indication on valve body 1 was ground out and weld repaired. The indication on valve body 4 was ground out. Both indications were NDE'd after the repair. No defects were noted.

CONTROL VALVE LINKAGE 1-4

The control valve linkage for all 4 CV's were disassembled, cleaned and dimensionally inspected. A pre-outage recommendation for linkage pin replacement was carried out during the outage. In addition to the pre outage recommendations several linkage pins were also replaced.

All Heim joint bearings were visually checked for defects, none were noted, the old grease was washed out and new grease fittings were installed. Tension rods and spacers were visually checked o.k.

PUSH RODS 1-4

The push rods were cleaned and visually inspected. No defects were noted. No problems were noted during CEOT adjustments as the push rods turned freely allowing adjustments to be made.

CONTROL VALVE SEATS 1-4
CV seats were cleaned and NDE'd, no visual indications were observed. The valve seat pins on all four CV's were UT'd after polishing, no indications were noted.

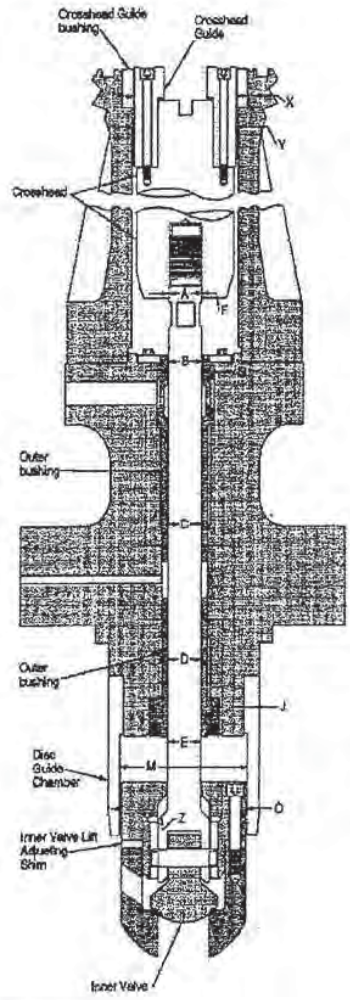
CONTROL VALVE SWITCH ARMS
All control valve switch arms, bolting, rod end bearings and pins were replaced as per the contract.

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 1

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.001
Crosshead Guide OD (X)		7.991
Clearance		0.010

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.738	F	2.740	0.002

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.735	G	2.754	0.019
C	2.737	H	2.752	0.015
D	2.737	I	2.752	0.015
E	2.741	J	2.769	0.028

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.496	O	9.461	0.035

Inner Valve Left (Z)	
Design	Actual
	0.026

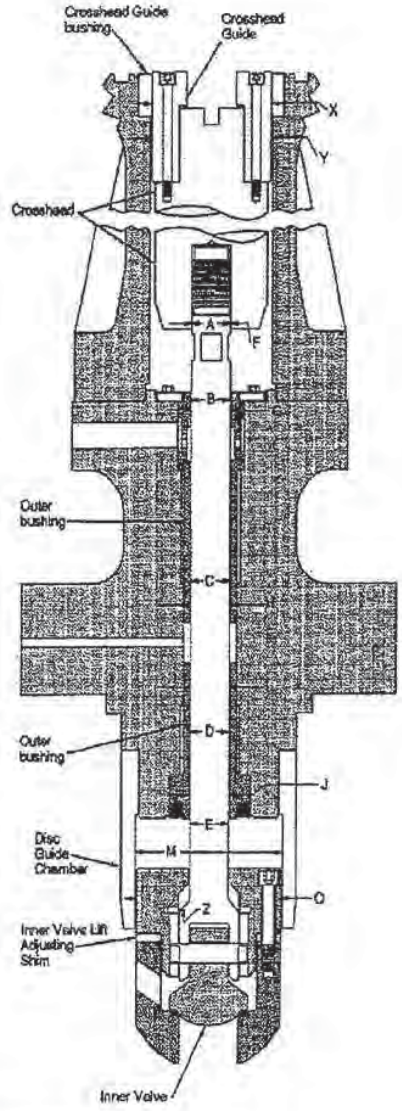
Comments: _____

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 2

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.000
Crosshead Guide OD (X)		7.985
Clearance		0.015

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.738	F	2.741	0.003

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.738	G	2.754	0.016
C	2.738	H	2.752	0.014
D	2.738	I	2.752	0.014
E	2.740	J	2.757	0.017

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.509	O	9.496	0.013

Inner Valve Left (Z)	
Design	Actual
	0.042

Comments:

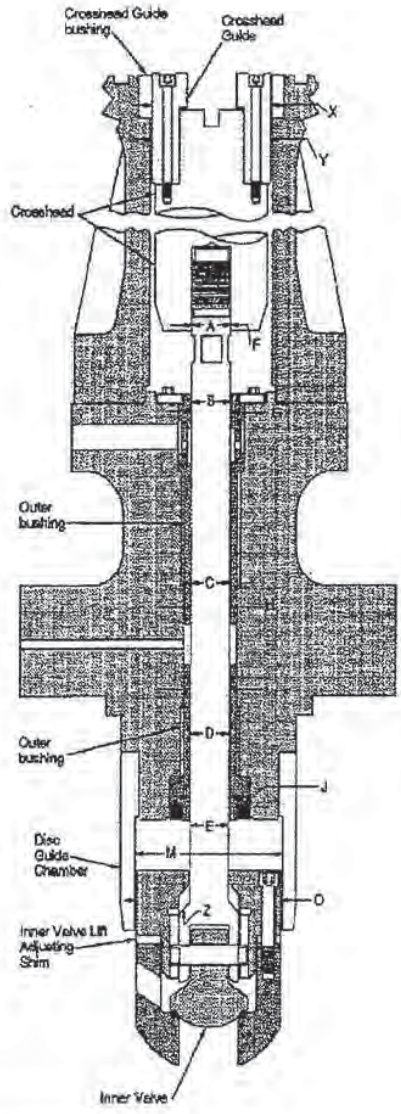
as found sherco cv's 8/17/2006 CV 2

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 3

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.000
Crosshead Guide OD (X)		7.988
Clearance		0.012

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.739	F	2.741	0.002

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.739	G	2.762	0.023
C	2.739	H	2.754	0.015
D	2.739	I	2.754	0.015
E	2.740	J	2.766	0.026

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.489	O	9.467	0.022

Inner Valve Left (Z)	
Design	Actual
	0.032

Comments: _____

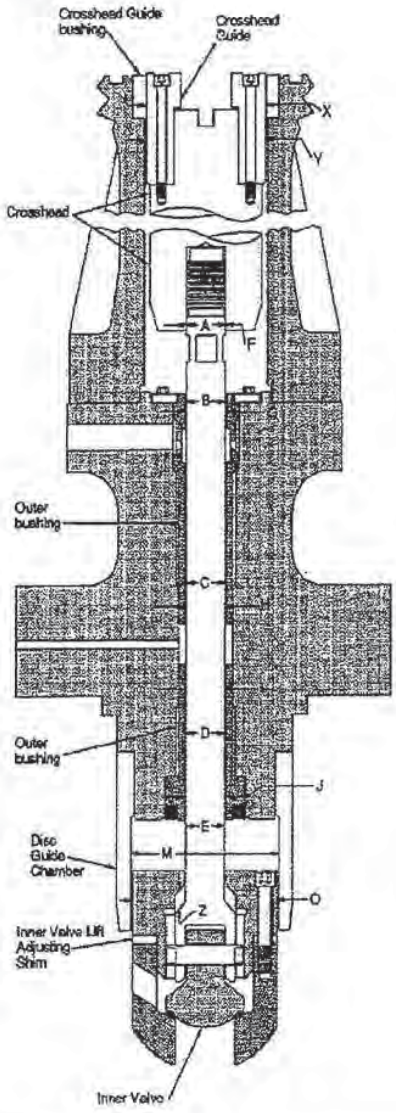
as found sherco cv's 8/17/2006 CV 3

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 4

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.002
Crosshead Guide OD (X)		7.991
Clearance		0.011

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.739	F	2.740	0.001

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.739	G	2.754	0.015
C	2.739	H	2.754	0.015
D	2.739	I	2.757	0.018
E	2.741	J	2.771	0.030

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.492	O	9.453	0.039

Inner Valve Left (Z)	
Design	Actual
	0.026

Comments: as found sherco cv's

8/17/2006

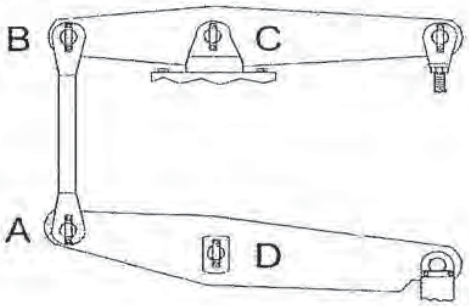
CV 4

MECHANICAL DYNAMICS and ANALYSIS, LLC

CONTROL VALVE LINKAGE

(PIN AND BUSHING DIMENSIONS)

Customer Xcel Energy
Plant Sherco Generating Station
Unit No. Unit #3
Serial No. 170X819
OEM GE
Rating 950MW
Type G3
Date Oct. 26, 2005
Recorded By J. Toohey



Condition As left

Control Valve No. 1	A (Left)	A (Right)	B (Left)	B (Right)	C (Left)	C (Right)	D (Left)	D (Right)
Pin OD	3.499	3.499	3.499	3.499	3.499	3.499	3.499	3.499
Top Arm Bushing ID			3.507	3.507	3.506	3.506		
Bottom Arm Bushing ID	3.502	3.502					3.506	3.506
Arm/Bushing Clearance	0.003	0.003	0.008	0.008	0.007	0.007	0.007	0.007
Crosshead Bushing ID							3.504	3.504
Top Pivot ID					3.504	3.504		
Link ID	3.506	3.506	3.506	3.506				
Clearance to Pin	0.007	0.007	0.007	0.007	0.005	0.005	0.005	0.005

Control Valve No. 2	A (Left)	A (Right)	B (Left)	B (Right)	C (Left)	C (Right)	D (Left)	D (Right)
Pin OD	3.496	3.496	3.499	3.499	3.499	3.499	3.497	3.497
Top Arm Bushing ID			3.505	3.505	3.506	3.506		
Bottom Arm Bushing ID	3.506	3.506					3.501	3.501
Arm/Bushing Clearance	0.010	0.010	0.006	0.006	0.007	0.007	0.004	0.004
Crosshead Bushing ID							3.500	3.500
Top Pivot ID					3.504	3.504		
Link ID	3.502	3.501	3.503	3.502				
Clearance to Pin	0.006	0.005	0.004	0.003	0.005	0.005	0.003	0.003

Control Valve No. 3	A (Left)	A (Right)	B (Left)	B (Right)	C (Left)	C (Right)	D (Left)	D (Right)
Pin OD	3.499	3.499	3.498	3.498	3.498	3.498	3.497	3.497
Top Arm Bushing ID			3.508	3.507	3.505	3.506		
Bottom Arm Bushing ID	3.504	3.504					3.506	3.505
Arm/Bushing Clearance	0.005	0.005	0.010	0.009	0.007	0.008	0.009	0.008
Crosshead Bushing ID							3.505	3.505
Top Pivot ID					3.502	3.502		
Link ID	3.502	3.502	3.503	3.501				
Clearance to Pin	0.003	0.003	0.005	0.003	0.004	0.004	0.008	0.008

Control Valve No. 4	A (Left)	A (Right)	B (Left)	B (Right)	C (Left)	C (Right)	D (Left)	D (Right)
Pin OD	3.499	3.499	3.499	3.499	3.499	3.499	3.494	3.494
Top Arm Bushing ID			3.505	3.505	3.505	3.505		
Bottom Arm Bushing ID	3.504	3.504					3.505	3.510
Arm/Bushing Clearance	0.005	0.005	0.006	0.006	0.006	0.006	0.011	0.016
Crosshead Bushing ID							3.500	3.500
Top Pivot ID					3.502	3.499		
Link ID	3.502	3.503	3.502	3.504				
Clearance to Pin	0.003	0.004	0.003	0.005	0.003	0.006	0.006	0.006

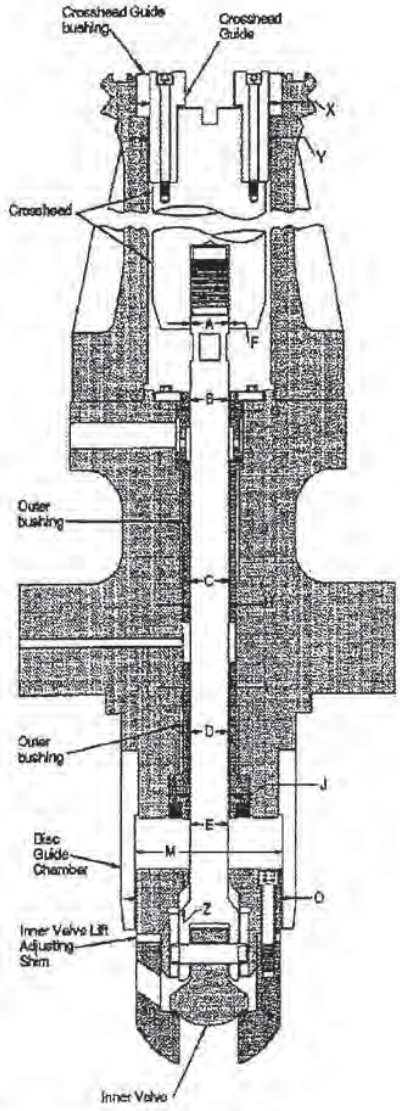
Comments:

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 1

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.001
Crosshead Guide OD (X)		7.991
Clearance		0.010

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.738	F	2.740	0.002

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.735	G	2.754	0.019
C	2.737	H	2.754	0.017
D	2.737	I	2.753	0.016
E	2.741	J	2.754	0.013

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.540	O	9.461	0.079

Inner Valve Left (Z)	
Design	Actual
0.083	0.085

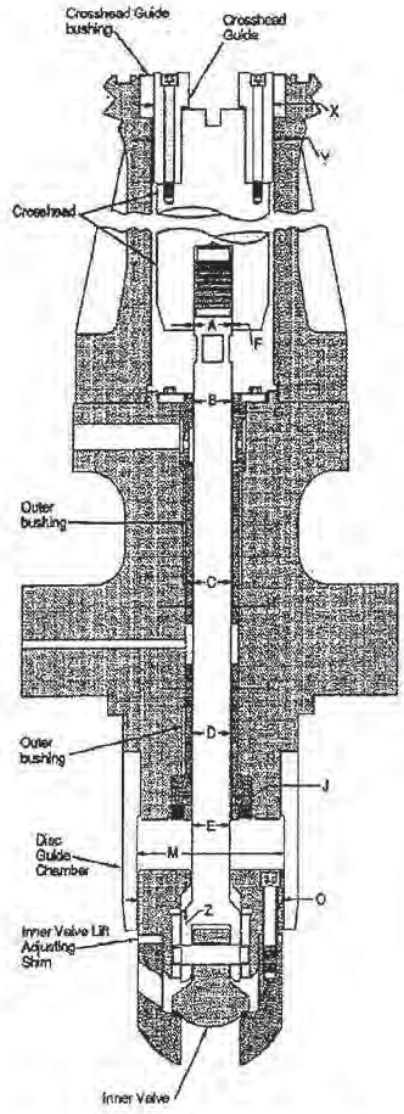
Comments: new disk pins

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 2

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.000
Crosshead Guide OD (X)		7.989
Clearance		0.011

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.738	F	2.741	0.003

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.738	G	2.754	0.016
C	2.738	H	2.752	0.014
D	2.738	I	2.752	0.014
E	2.740	J	2.757	0.017

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.509	O	9.496	0.013

Inner Valve Left (Z)	
Design	Actual
0.083	0.078

Comments: new disk, new disk pins

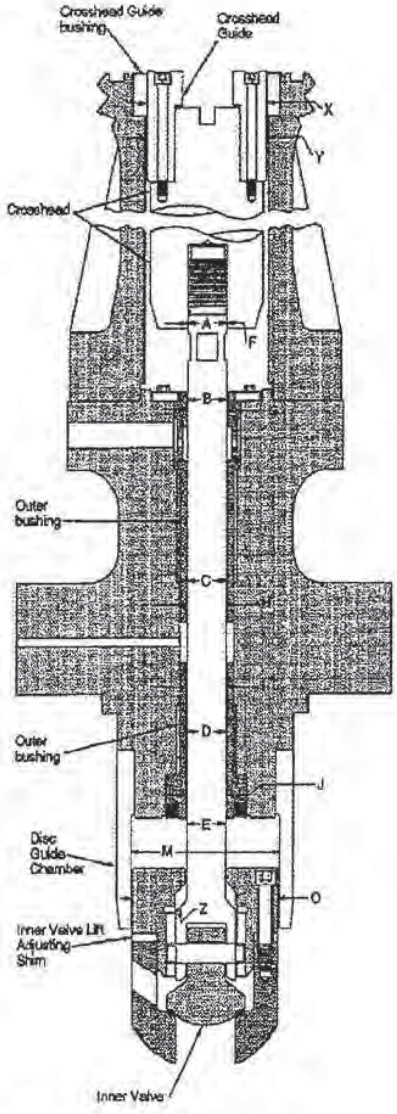
as left sherco cv's 8/17/2006 CV 2

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 3

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)	8.000	8.000
Crosshead Guide OD (X)	7.990	7.988
Clearance	0.010	0.012

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.739	F	2.741	0.002

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.741	G	2.754	0.013
C	2.742	H	2.754	0.012
D	2.742	I	2.754	0.012
E	2.742	J	2.754	0.012

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.540	O	9.527	0.013

Inner Valve Left (Z)	
Design	Actual
0.083	0.080

Comments: new disk pins

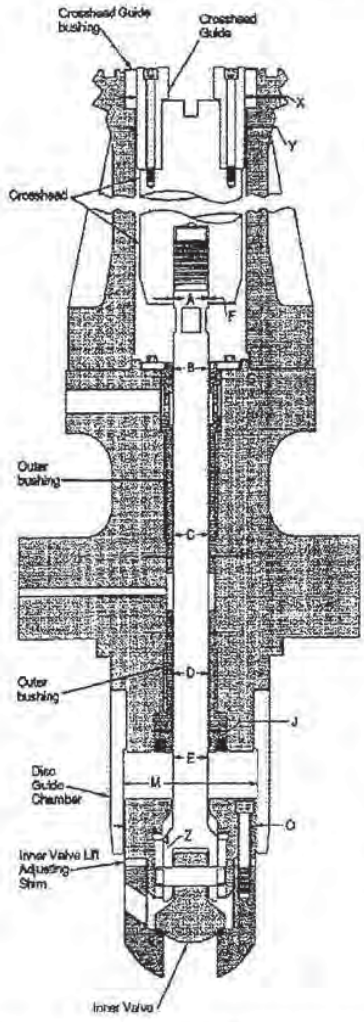
as left sherco cv's 8/17/2006 CV 3

MECHANICAL DYNAMICS and ANALYSIS, LLC

AS FOUND C.V. ASSEMBLY CLEARANCE DATA SHEET

(SEPARATELY MOUNTED, INNER VALVE SAMUELSON TYPE)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit # 3	Date	10/18/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Control Valve No. 4

Crosshead Guide & Bushing Dimensions		
	Design Values	Actual Values
Crosshead Guide Bushing ID (Y)		8.002
Crosshead Guide OD (X)		7.988
Clearance		0.014

Valve Stem to Crosshead Clearance				
Loc. Ltr.	Stem OD	Loc. Ltr.	Crosshead ID	**Clearance**
A	2.739	F	2.740	0.001

Valve Stem to Bushing Clearances				
Loc. Ltr.	Stem OD	Loc. Ltr.	Bushing ID	**Clearance**
B	2.739	G	2.754	0.015
C	2.739	H	2.754	0.015
D	2.739	I	2.755	0.016
E	2.741	J	2.754	0.013

Guide chamber to Disc Clearance				
Loc. Ltr.	Chamber ID	Loc. Ltr.	Disc OD	**Clearance**
M	9.540	O	9.496	0.044

Inner Valve Left (Z)	
Design	Actual
0.083	0.083

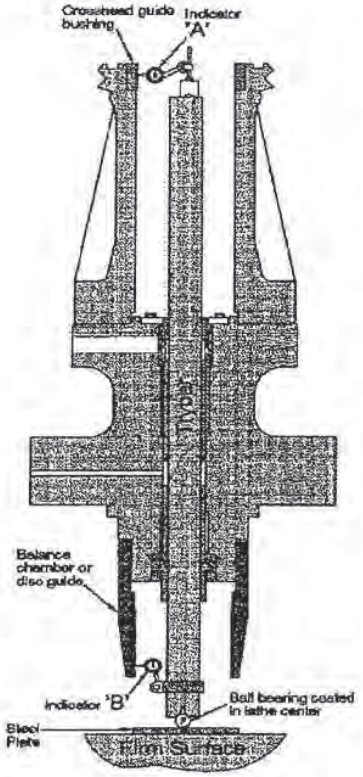
Comments: new disk, new disk pins, and rebuilt balance chamber

MECHANICAL DYNAMICS and ANALYSIS, LLC

FOUND CONTROL VALVE RUNOUT DATA SHEET
(FOR SEPARATELY MOUNTED CONTROL VALVES)

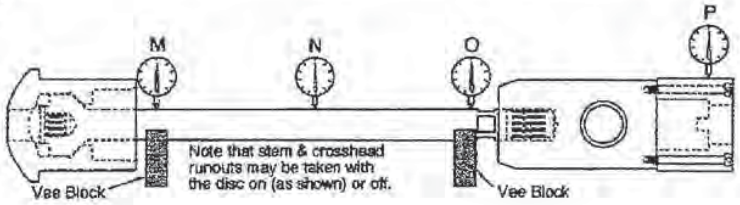
Customer Xcel Energy
Plant Sherco Generating Station
Unit No. Unit #3
Serial No. 170X819
OEM GE

Rating 950MW
Type G3
Date 10/19/2005
Recorded By J. Toohey



Valve Stand Runout to Stem Bushing Bore				
Valve No.	Crosshead Guide Bushing (Indicator "A")		Balance Chamber to Disc Guide Bore (Indicator "B")	
1				
2				
3				
4				

Stem & Crosshead Guide Runouts				
Valve No.	Stem Runouts			Crosshead Guide
	Indicator "M"	Indicator "N"	Indicator "O"	Indicator "P"
1	0.000	-0.001	-0.001	-0.002
2	0.000	0.000	0.000	0.002
3	0.000	0.000	0.000	-0.006
4	0.000	0.000	0.000	0.002



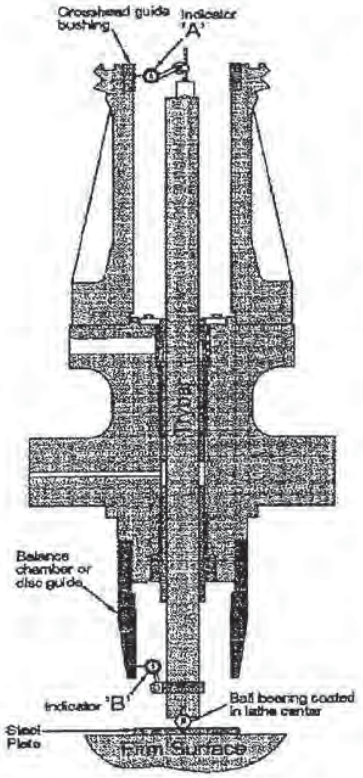
Comments:

MECHANICAL DYNAMICS and ANALYSIS, LLC

FOUND CONTROL VALVE RUNOUT DATA SHEET
(FOR SEPARATELY MOUNTED CONTROL VALVES)

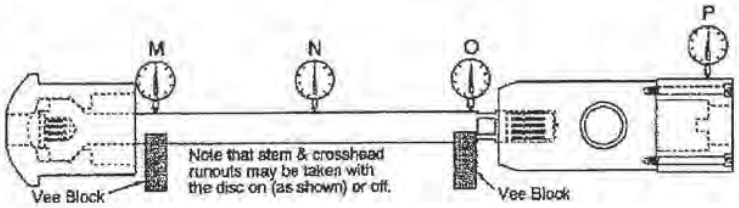
Customer Xcel Energy
Plant Sherco Generating Station
Unit No. Unit #3
Serial No. 170X819
OEM GE

Rating 950MW
Type G3
Date 10/19/2005
Recorded By J. Toohey



Valve Stand Runout to Stem Bushing Bore				
Valve No.	Crosshead Guide Bushing (Indicator "A")		Balance Chamber to Disc Guide Bore (Indicator "B")	
1				
2				
3				
4				

Stem & Crosshead Guide Runouts				
Valve No.	Stem Runouts			Crosshead Guide
	Indicator "M"	Indicator "N"	Indicator "O"	Indicator "P"
1	0.000	-0.001	-0.001	-0.002
2	0.000	0.000	0.000	-0.015
3	0.000	0.000	0.000	-0.006
4	0.000	0.000	0.000	-0.010



Comments:

JOB SUMMARY

REPAIR AND MAINT. RECOMMENDATIONS

PARTS USED AND RECOMMENDED

MAIN STOP VALVES

CONTROL VALVES

Title Page – Insert this sheet into title page holder back of binder

COMBINED REHEAT VALVES

The left side and right side combined reheat valves were removed, disassembled, cleaned, and inspected. Routine OEM inspections were carried out on all CRV components.

CRV Seat: L, R,
The left and right side CRV seating surface was extensively hand cleaned in order to remove the steam deposits and to achieve good disk to seat contact. After cleaning the seat, NDE testing was performed, no indications were noted. A blue contact check was performed on each seat and disk. The contact checks revealed 100% contact on both the stop and intercept valve seat surfaces.

CRV Strainer L, R,
The left and right CRV strainers were removed, blast cleaned and NDE'd. No indications were noted. Embedded particles were removed by hand.

New steam strainers with fine mesh screens attached were installed as directed by plant personnel. The old strainers were cleaned.

CRV: Intercept valves and stems L, R
The left and right intercept valves were disassembled from their stems and dimensionally inspected. While removing the stems from the IV's several bolts were broken on each valve, the bolts were drilled out and new bolts and lock tabs were used during assembly.

Valve stem run out and stem to bushing clearances were recorded before and after cleaning. Valve bushings were checked with plant supplied try bars after cleaning. Valve bushing o.d.'s were within the OEM tolerance. Stem to bushing clearances were left within the OEM tolerance. The disk balance chamber o.d.'s and I.D.'s were checked before and after cleaning. The left and right crosshead and guide bushing clearances were checked and found to be with in the OEM tolerance. The crossheads were sent out to have the pin hole repaired as it had been drilled oversize several times. The pin hole is now the standard diameter. The left and right valve disks were NDE'd no indications were noted. A new stem was installed on the right side I.V.

During reassembly, new disk retaining split collars were installed on the right side as wells as new bolts and lock tabs for the left and right valve.

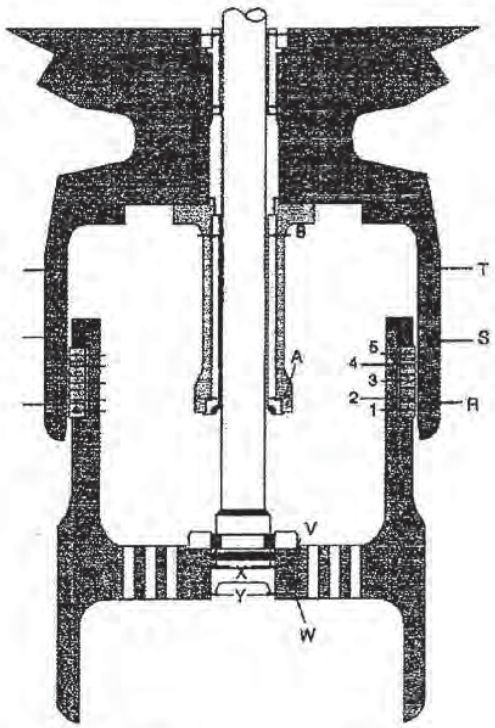
CRV; Stop valves and stems L, R,
The left and right reheat stop valves were disassembled from their stems and dimensionally inspected. During disassembly, the right side disk retaining nuts had to be burned off. The left side stem was found with galled threads. Both stems had been two holed. Both stems were replaced this outage. New nuts and pins were installed during the assembly. Bushing clearances were also checked with plant supplied try bars. New stem dimensions and as found bushing clearances were checked and are within the OEM tolerance. The stop valves were blue checked to their respective valve seats and left with 100% contact. Minimal lapping was required since the seats were extensively cleaned of blue blush. The stop valve stem back seats and pressure seal head seats were lapped and blue checked. Both left and right seal head back seats were found dented adjacent to the contact area. The backseats were extensively lapped, the backseats have 100% contact.

The left and right pressure seal head gasket fits were lapped for 100% contact, new gaskets were installed.

MECHANICAL DYNAMICS and ANALYSIS, LLC

INTERCEPT VALVE DATA SHEET
(SEAL RING ON DISC TYPE)

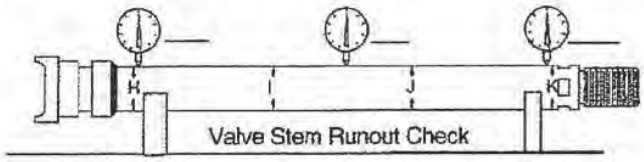
Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/28/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Conditions	As Found



Intercept Valve Location
Right Side (R2)

Pressure Seal Head Inside Diameters			
A	B	C	D
4.497			
Stem Outside Diameters			
H	I	J	K
4.485	4.483	4.484	4.486
Stem to Bushing Clearances			
0.012			

Disc to Stem Fits		
Disc	V	W
ID	5.624	5.624
Stem	X	Y
OD	5.611	5.609
Clearance	0.013	0.015



Position	H	I-J	K
Runout	0.000	0.000	0.000

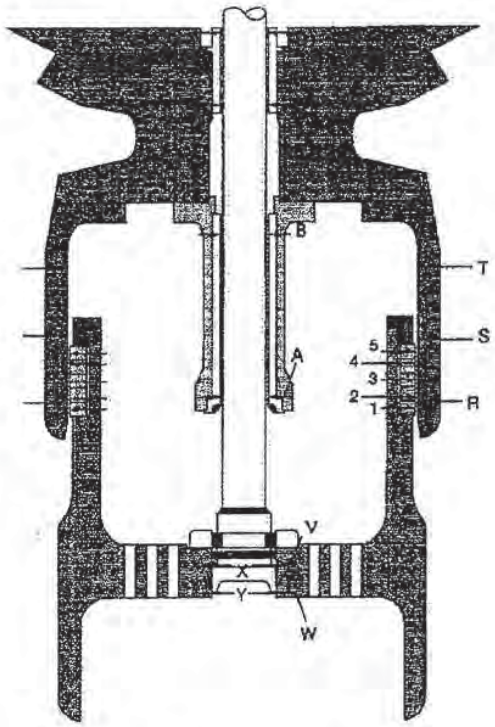
Balance Chamber ID's		
R	S	T
Disc OD (Single Ring)		
Clearance		

Comments:

MECHANICAL DYNAMICS and ANALYSIS, LLC

INTERCEPT VALVE DATA SHEET
(SEAL RING ON DISC TYPE)

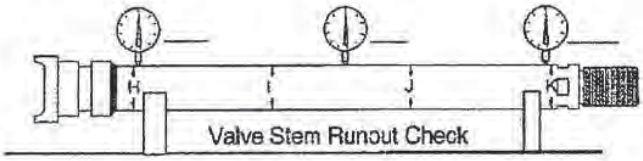
Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/28/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Conditions	As Found



Intercept Valve Location
Left Side (L1)

Pressure Seal Head Inside Diameters			
A	B	C	D
4.501	4.500	4.500	4.502
Stem Outside Diameters			
H	I	J	K
4.487	4.486	4.485	4.485
Stem to Bushing Clearances			
0.014	0.014	0.015	0.017

Disc to Stem Fits		
Disc	V	W
ID	5.624	5.624
Stem	X	Y
OD	5.615	5.617
Clearance	0.009	0.007



Position	H	I-J	K
Runout	0.000	0.000	0.000

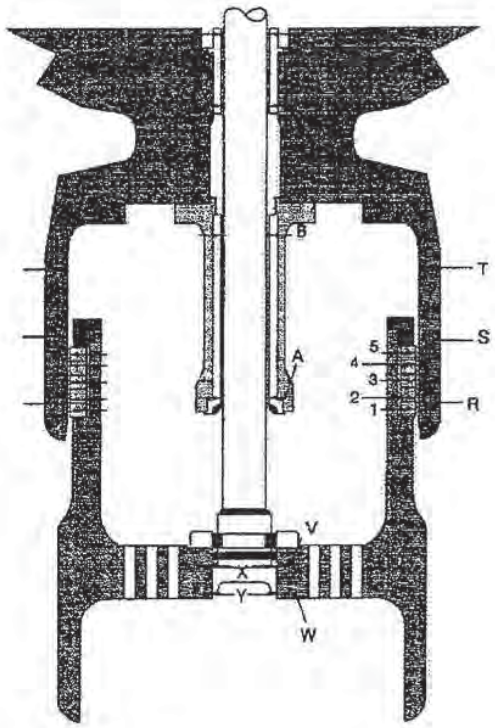
Balance Chamber ID's		
R	S	T
Disc OD (Single Ring)		
Clearance		

Comments:

MECHANICAL DYNAMICS and ANALYSIS, LLC

INTERCEPT VALVE DATA SHEET
(SEAL RING ON DISC TYPE)

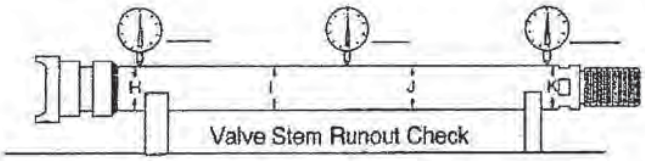
Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/28/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Conditions	As Left



Intercept Valve Location
Right Side (R2)

Pressure Seal Head Inside Diameters			
A	B	C	D
4.503	4.503	4.503	4.502
Stem Outside Diameters			
H	I	J	K
4.485	4.485	4.485	4.485
Stem to Bushing Clearances			
0.018	0.018	0.018	0.017

Disc to Stem Fits		
Disc	V	W
ID	5.624	5.624
Stem	X	Y
OD	5.611	5.612
Clearance	0.013	0.012



Position	H	I-J	K
Runout	0.000	0.000	0.000

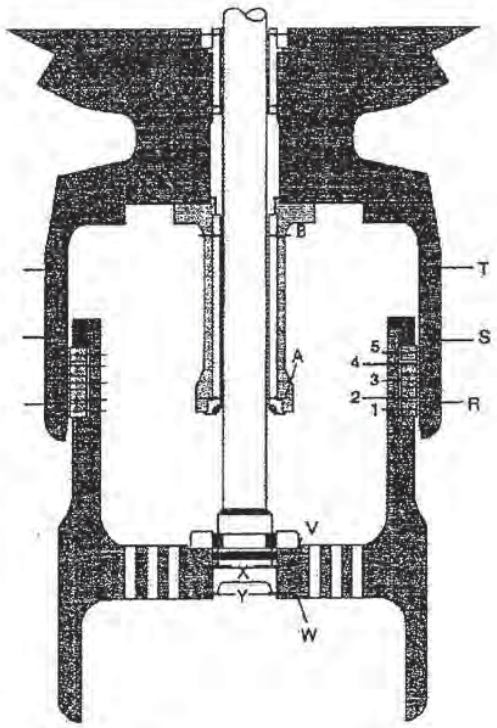
Balance Chamber ID's		
R	S	T
33.013	33.015	33.019
Disc OD (Single Ring)		
32.960	32.960	
Clearance		
0.053	0.055	

Comments: new stem

MECHANICAL DYNAMICS and ANALYSIS, LLC

INTERCEPT VALVE DATA SHEET
(SEAL RING ON DISC TYPE)

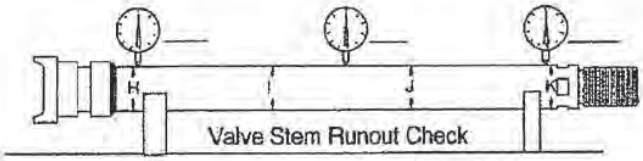
Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/28/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Conditions	As Left



Intercept Valve Location
Left Side (L1)

Pressure Seal Head Inside Diameters			
A	B	C	D
4.502	4.503	4.503	4.504
Stem Outside Diameters			
H	I	J	K
4.487	4.487	4.486	4.486
Stem to Bushing Clearances			
0.015	0.016	0.017	0.018

Disc to Stem Fits		
Disc	V	W
ID	5.624	5.624
Stem	X	Y
OD	5.615	5.617
Clearance	0.009	0.007



Valve Stem Runout Check

Position	H	I-J	K
Runout	0.000	0.000	0.000

Balance Chamber ID's		
R	S	T
32.994	32.990	32.991
Disc OD (Single Ring)		
32.960	32.960	
Clearance		
0.034	0.030	

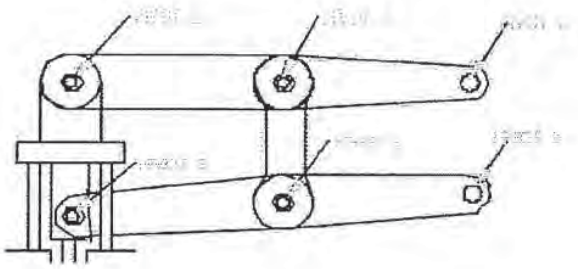
Comments: new stem

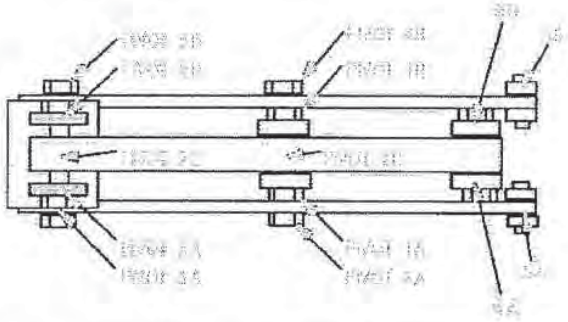
MECHANICAL DYNAMICS and ANALYSIS, LLC

COMBINED INTERCEPT VALVE
(INTERCEPT VALVE LINKAGE BUSHINGS)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/25/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Condition	As Left

Intercept Valve	Left





	Pivot 1			Pivot 2				Pivot 3			
	A	B	C		A	B	C		A	B	C
Bush ID	4.002	4.002	4.001	Bush ID	4.002	4.002	4.002	Bush ID	3.002	3.002	3.002
Pin OD	3.999	3.999	3.999	Pin OD	3.999	3.999	3.999	Pin OD	3.000	3.000	2.999
Clearance	0.003	0.003	0.002	Clearance	0.003	0.003	0.003	Clearance	0.002	0.002	0.003

	Pivot 4			Pivot 5				Pivot 6			
	A	B	C		A	B	C		A	B	C
Bush ID	3.378	3.378	4.503	Bush ID	1.500	1.500	N/A	Bush ID	2.501	2.501	2.501
Pin OD	3.372	3.372	4.499	Pin OD	1.498	1.498	N/A	Pin OD	2.499	2.499	2.499
Clearance	0.006	0.006	0.004	Clearance	0.002	0.002		Clearance	0.002	0.002	0.002

IV Cross Head/Guide Bushing Clearance	
Guide Bushing ID	5.732
Cross Head OD	5.718
Clearance	0.014

Comments: Re-built cross head pin hole

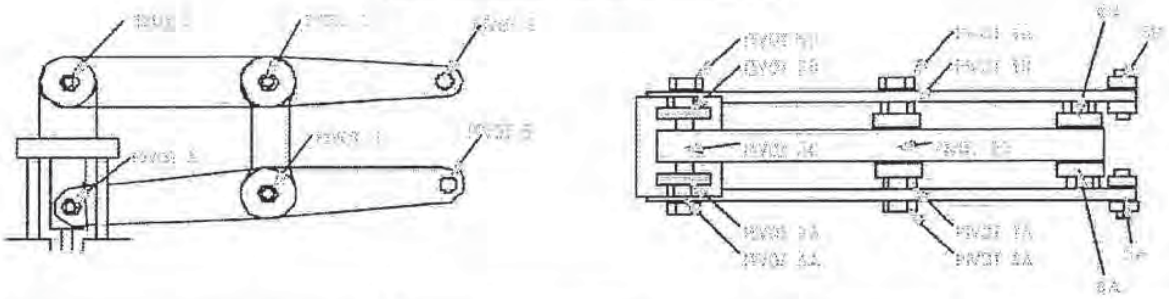
sherco iv linkage 8/17/2006 left side as left

MECHANICAL DYNAMICS and ANALYSIS, LLC

COMBINED INTERCEPT VALVE
(INTERCEPT VALVE LINKAGE BUSHINGS)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	10/25/2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE	Condition	As Left

Intercept Valve	Right



	Pivot 1			Pivot 2				Pivot 3			
	A	B	C		A	B	C		A	B	C
Bush ID	4.001	4.001	4.001	Bush ID	4.001	4.002	4.003	Bush ID	3.002	3.002	3.002
Pin OD	3.999	3.999	3.999	Pin OD	3.999	3.999	3.999	Pin OD	3.000	3.000	2.999
Clearance	0.002	0.002	0.002	Clearance	0.002	0.003	0.004	Clearance	0.002	0.002	0.003

	Pivot 4			Pivot 5				Pivot 6			
	A	B	C		A	B	C		A	B	C
Bush ID	3.378	3.378	4.503	Bush ID	1.500	1.500	N/A	Bush ID	2.501	2.501	2.501
Pin OD	3.372	3.372	4.499	Pin OD	1.498	1.498	N/A	Pin OD	2.499	2.499	2.499
Clearance	0.006	0.006	0.004	Clearance	0.002	0.002		Clearance	0.002	0.002	0.002

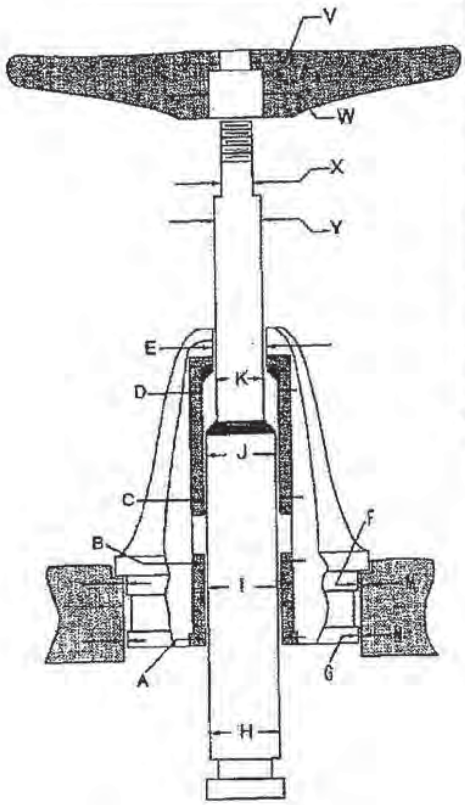
I V Cross Head/Guide Bushing Clearance	
Guide Bushing ID	5.732
Cross Head OD	5.719
Clearance	0.013

Comments: rebuilt cross head pin hole new pin in pivot 5

MECHANICAL DYNAMICS and ANALYSIS, LLC

POPPET STYLE REHEAT STOP
VALVE DATA SHEET

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	#3	Date	10/29/2005
Serial No.	170X819	Prepared By	
OEM	GE	Condition	As Left

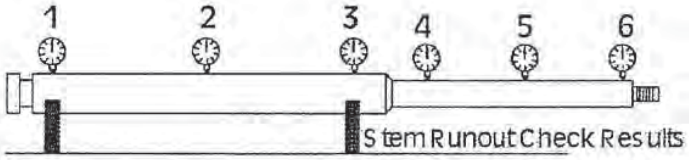


Reheat Stop Valve Location	LEFT SIDE

Pressure Seal Head Inside Diameters				
A	B	C	D	E
5.506	5.507	5.504	5.507	4.544
Stem Outside Diameters				
H	I	J		K
5.482	5.482	5.482	5.482	4.498
Stem to Bushing Clearances				
0.024	0.025	0.022	0.025	0.046

Disc to Stem Fits		
Upper Stem	X	Y
OD	2.998	4.495
Disc	V	W
ID	3.006	4.498
Clearance	0.008	0.003

Pressure Seal Head to Valve Body Fit		
	Upper Fit	Lower Fit
PSH	M	N
OD	18.999	18.996
Body	F	G
ID	19.089	19.000
Clearance	0.090	0.004



Position	1	2	3	4	5	6
Runout	0	0	0	0	0	0

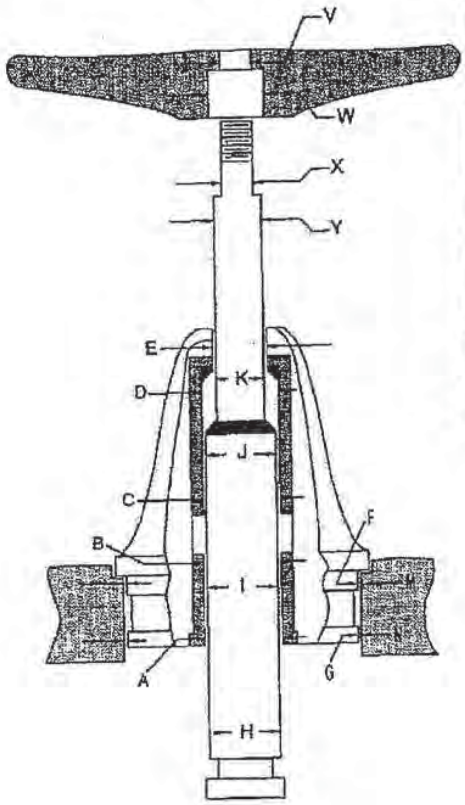
Comments: TRY BAR DIAMETER 5.500....NEW STEM

sherco reheat stop valve 8/17/2006 LEFT SIDE

MECHANICAL DYNAMICS and ANALYSIS, LLC

POPPET STYLE REHEAT STOP
VALVE DATA SHEET

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	#3	Date	10/28/2005
Serial No.	170X819	Prepared By	
OEM	GE	Condition	As Left

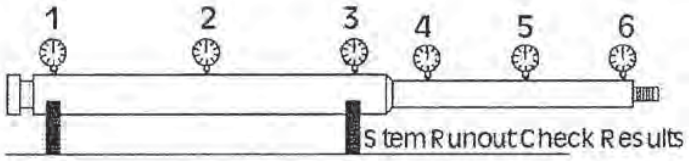


Reheat Stop Valve Location RIGHT SIDE

Pressure Seal Head Inside Diameters				
A	B	C	D	E
5.506	5.506	5.504	5.504	4.544
Stem Outside Diameters				
H	I	J		K
5.482	5.482	5.482	5.482	4.498
Stem to Bushing Clearances				
0.024	0.024	0.022	0.022	0.046

Disc to Stem Fits		
Upper Stem	X	Y
OD	2.998	4.497
Disc	V	W
ID	3.004	4.499
Clearance	0.006	0.002

Pressure Seal Head to Valve Body Fit		
	Upper Fit	Lower Fit
PSH	M	N
OD	18.995	18.996
Body	F	G
ID	19.127	18.998
Clearance	0.132	0.002



Position	1	2	3	4	5	6
Runout	0	0	0	0	0	0

Comments: NEW STEM TRY BAR DIAMETER 5.500

sherco reheat stop valve 8/17/2006 RIGHT SIDE

AUXILIARY VALVES

VENTILATOR VALVE

The ventilator valve was removed, disassembled and cleaned. Before and after cleaning dimensions were recorded. The valve stem to bushing clearances were left within the OEM tolerance. The disk was NDE'd, no indications were noted. The valve seat was NDE'd, one indication was noted but did not require corrective action this outage.
Valve to seat contact checks were performed with 100% contact achieved between seat and disk. The air cylinder was disassembled and dimensionally checked. The cylinder dimensions were left within the OEM tolerance. New cylinder gaskets were used during re-assembly.

EQUALIZER VALVE

The equalizer valve was disassembled and inspected. Before and after cleaning dimensions were recorded. The valve stem to bushing clearances were left within the OEM tolerance. The disk was NDE'd, no indications were noted. The valve seat was NDE'd, Valve to seat contact checks were performed with 100% contact achieved between seat and disk. The air cylinder was disassembled and dimensionally checked. The cylinder dimensions were left within the OEM tolerance. New cylinder gaskets were used during re-assembly.

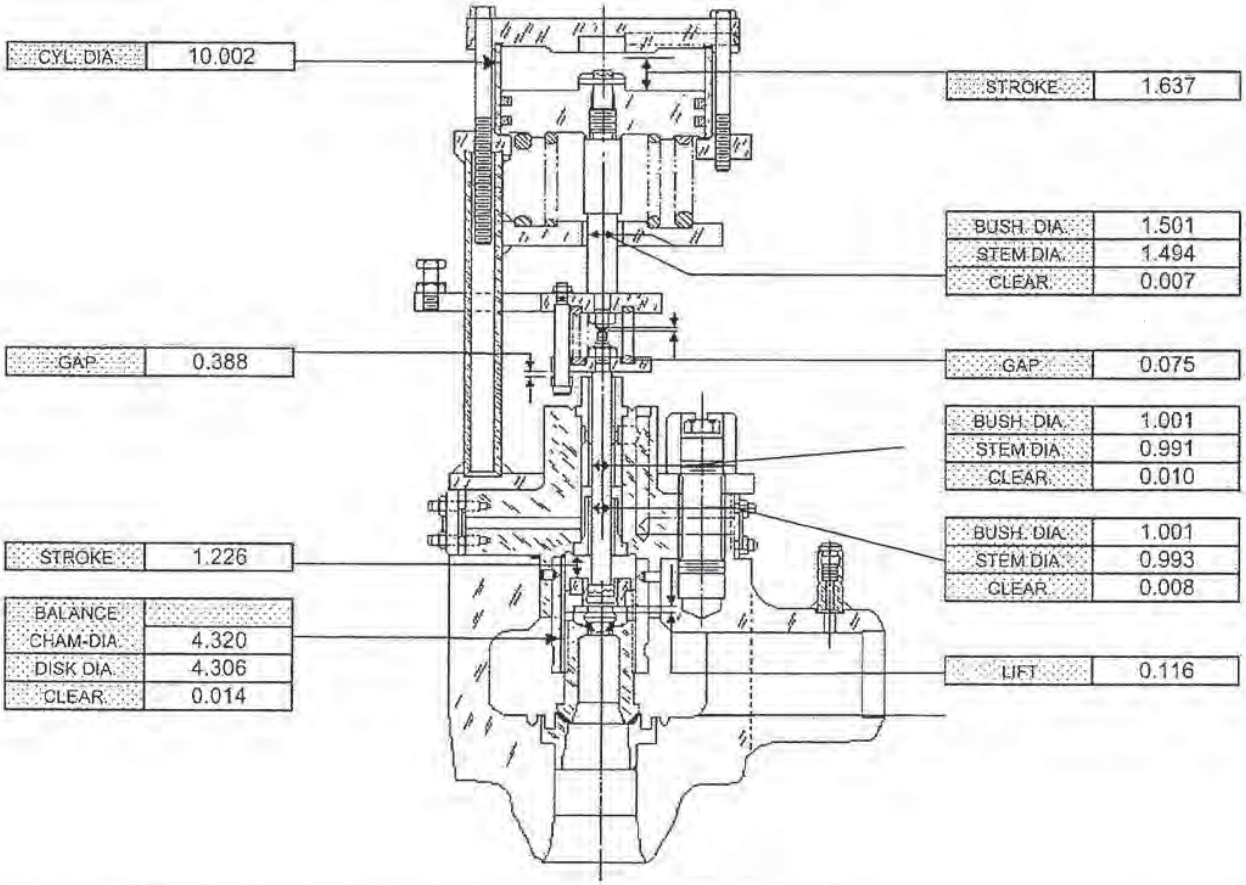
New stem packing was installed as well as new roller bearings.

Ventilator Valve

AS LEFT AFTER CLEANING

Date(m/d/y) 10/21/2005 Turbine S/N 170X819 Prepared by J. Toohey

INSPECTIONS & CHECKS				CODE	
Casing Inspection	V	Piston & Ring Inspection	V	X	Work Carried Out
Head Inspection	V	Air Cylinder Inspection	V	N	Not Done
Stud Inspection	V	Piston Rod Inspection	V	NA	Not Applicable
Nut Inspection	V	Piston Gasket Inspection	V	C	See Comments
Stem Inspection	V	Link. & Spring Inspection	X	V	Visual Inspection
Main Seat Inspection	PT			MP	Mag. Particle
Internal Seat Inspection	N			UT	Ultrasonic
Main Disc Inspection	PT			PT	Penetrant
Internal Disc Inspection	N				



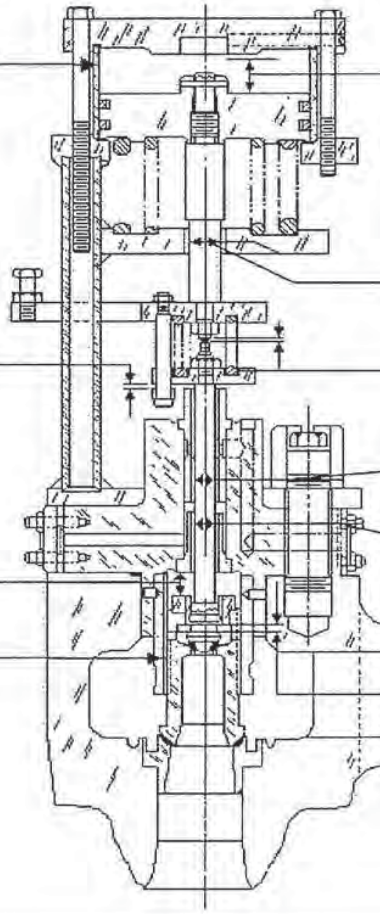
Comments
Air cyliner bushing design= .006cls. Design lift = .125 +/- .010 Design balance chamber = .010 Design stem to bushing cls. = .010 Replaced piston rings**

Ventilator Valve

BEFORE CLEANING

Date(m/d/y) 10/21/2005 Turbine S/N 170X819 Prepared by J. Toohey

INSPECTIONS & CHECKS				CODE	
Casing Inspection		Piston & Ring Inspection		X	Work Carried Out
Head Inspection		Air Cylinder Inspection		N	Not Done
Stud Inspection		Piston Rod Inspection		NA	Not Applicable
Nut Inspection		Piston Gasket Inspection		C	See Comments
Stem Inspection		Link. & Spring Inspection		V	Visual Inspection
Main Seat Inspection				MP	Mag. Particle
Internal Seat Inspection				UT	Ultrasonic
Main Disc Inspection				PT	Penetrant
Internal Disc Inspection					



CYL. DIA.	10.001
GAP	0.388
STROKE	1.226
BALANCE CHAM-DIA.	4.315
DISK DIA.	4.306
CLEAR.	0.009

STROKE	1.637
BUSH. DIA.	1.499
STEM DIA.	1.494
CLEAR.	0.005
GAP	0.075
BUSH. DIA.	0.997
STEM DIA.	0.991
CLEAR.	0.006
BUSH. DIA.	0.999
STEM DIA.	0.993
CLEAR.	0.006
LIFT	0.116

Comments

NOZZLES

The first stage nozzle was removed, blast cleaned and NDE'd. Numerous partitions were suffering from erosion and were repaired on site by MD&A. The nozzle spill strips were found rubbed on the lower half of the TE. The lower half spill strips were replaced this outage on the Turbine end only. The upper and lower nozzle snout seals were minimally cleaned and dimensionally inspected. The seals were left as is this outage.

TURBINE SHELLS

HP OUTER SHELL
The HP outer shell was cleaned and visually inspected. Outer shell inlet snout seals were minimally cleaned and dimensionally inspected. The seals were left as found.

The inlet flanges were cleaned and dimensionally inspected for flatness. The flanges were found to be within the OEM tolerance.

Prior to un-bolting the horizontal joint, the unit was transferred to the building keys, all required dimensions were taken prior to transfer.

N1 and N2 packing case vertical bolting flanges were cleaned; all holes were tapped with the exception of the heli-coiled holes. No defects were noted.

Lower half centerline keys were removed, cleaned and measured; the keys were re-installed as found.

The lower half pressure taps and TC flange was removed, cleaned and reinstalled.
Shell arm keys were removed and cleaned,
Axial keys on the GE were removed and cleaned.

Upper and lower shell horizontal joints were cleaned and stoned, no defects were noted.

All joint bolts were cleaned, all shell spot faces and nut threads were cleaned, three upper nuts (#230, 232, 24) were cut off and replaced during the cleaning process, and no other abnormal defects were noted.

Centerline circular keys were removed, cleaned and reinstalled.

All shell bolting was UT inspected, no indications were noted. The shell joint dowels and fits were strap lapped and cleaned.

During assembly, all steam seal vent and supply lines, all steam inlets, the nozzle box ports, and HP exhaust were bore scoped and visually inspected, the FME plugs were removed, and the unit was closed. All bolting was stretched as per the OEM recommendation.

HP INNER SHELL
The upper and lower HP inner shells were removed, blast cleaned and NDE'd, no indications were noted.

The horizontal joints were visually inspected and found to have erosion occurring at the diaphragm steam face area. The horizontal joint erosion was repaired by Steampath Consultants.

All diaphragm fits were cleaned and repaired where required. Diaphragms ledge's that were found dimpled by crush pins were repaired.

All inner shell centerline keys were cleaned. All inner shell bolting was UT'd, no indications were noted. The balance weight access pipe was removed and cleaned.
During assembly, all steam seal vent and supply lines, all steam inlets, the nozzle box ports, and HP exhaust were bore scoped and visually inspected, the FME plugs were removed, and the unit was closed. All bolting was stretched as per the OEM recommendation.

REHEAT OUTER SHELL
The upper half reheat outer shell was removed, cleaned and inspected. Exhaust centerline keys were removed and cleaned. The shell fit lubricators were filled with penetrant during disassembly.

N3 and N4 packing case vertical joint were stoned and all bolt holes tapped. One bolt broke off during disassembly and was drilled out, the hole was tapped clean.

Prior to unbolting the horizontal joint, the unit was transferred to the building keys; all required dimensions were taken prior to transfer.

The shell axial keys were removed and resized to accommodate a .230inch move of the HP and IP toward the generator; new IP generator end keys were sized and installed after internal clearances were checked. The pre-warming line keeper ring bolts were all broken during disassembly. The bolts were drilled out and tapped.

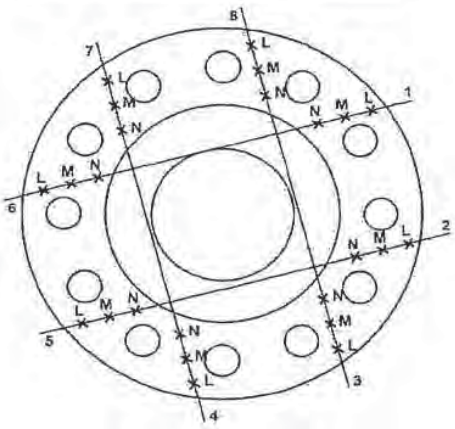
During crossover removal, 36 studs were damaged or cut from the exhaust flange; the studs were drilled out, the holes were tapped and repaired by MD&A.

REHEAT INNER SHELLS
The upper and lower reheat inner shells were removed, blast cleaned and NDE'd, no indications were noted. All shell fits and scored areas were dressed and stoned smooth. No other conditions were noted. The pre-warming line seal rings were minimally cleaned, and the clearances were checked ok. The snout pipe was fit to the rings prior to installing the outer shell. All inner shell hold down bolts and support pads were cleaned and visually inspected o.k.

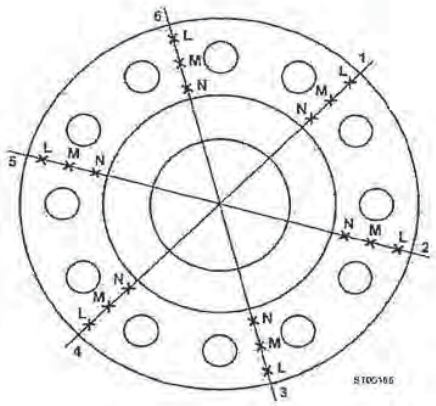
MECHANICAL DYNAMICS and ANALYSIS, LLC SM

STEAM LEAD FLANGE

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Gen Station	Type	G3
Unit No	unit #3	Date	10/26/2005
Serial No	170X819	Recorded By	J. Toohey
OEM	GE		



MALE RABBET



FEMALE RABBET

Location HP RS

Readings in mils using feeler gauge

	L	M	N
1			
2		0.001	0.001
3		0.001	0.002
4		0.001	0.001
5		0.001	0.002
6			
7		0.001	0.002
8		0.001	0.002
Average		0.001	0.001
Dished	0.001188		

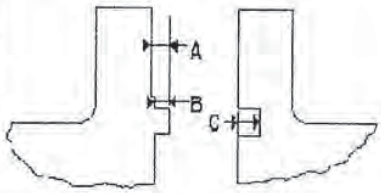
Location HP RS

Readings in mils using feeler gauge

	L	M	N
1		0.002	0.004
2		0.002	0.004
3		0.003	0.004
4		0.002	0.004
5		0.002	0.004
6		0.003	0.004
Average		0.002	0.004
Dished	0.004		

Total Distortion	0.005

RABBET DEPTH	Top	Bottom	Right	Left	Average
A	0.324	0.307	0.309	0.310	0.313
B	0.257	0.250	0.250	0.251	0.252
C	0.370	0.369	0.369	0.370	0.370
			Face Step		0.061
			Gasket Pocket		0.118



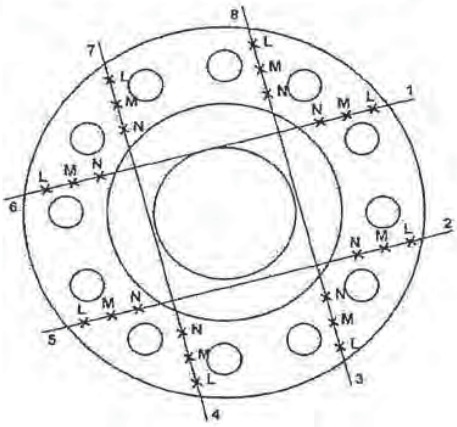
Comments:

Steam Lead Flange

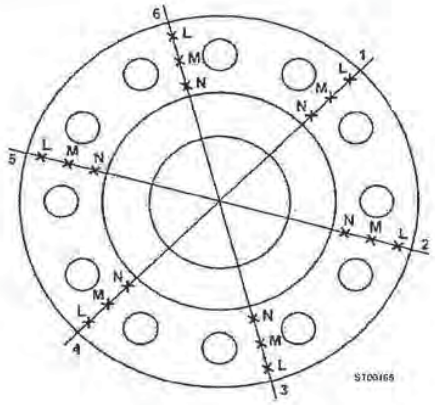
MECHANICAL DYNAMICS and ANALYSIS, LLC

STEAM LEAD FLANGE

Customer	Basin Electric	Rating	570 MW
Plant	Laramie River	Type	G2
Unit No	3	Date	5/2/2005
Serial No	270T107	Recorded By	MD&A
OEM	GE		



MALE RABBET



FEMALE RABBET

Location Right Side

Readings in mils using feeler gauge

	L	M	N
1	0.001	0.014	0.021
2	0.011	0.015	0.022
3	0.012	0.014	0.021
4	0.001	0.017	0.024
5	0.002	0.017	0.024
6	0.001	0.015	0.022
7	0.002	0.015	0.022
8	0.002	0.015	0.021
Average	0.004	0.015	0.022
Dished	0.018		

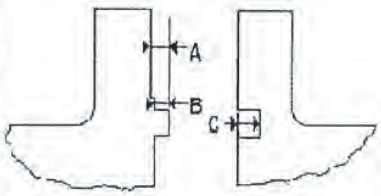
Location Right Side

Readings in mils using feeler gauge

	L	M	N
1	0.001	0.011	0.019
2		0.011	0.019
3	0.001	0.012	0.020
4	0.002	0.012	0.021
5	0.001	0.011	0.019
6	0.001	0.011	0.020
Average	0.001	0.011	0.020
Dished	0.019		

Total Distortion	0.037

RABBET DEPTH	Top	Bottom	Right	Left	Average
A	0.312	0.315	0.313	0.314	0.314
B	0.259	0.256	0.255	0.256	0.257
C	0.371	0.370	0.369	0.370	0.370
			Face Step		0.057
			Gasket Pocket		0.114



Comments:

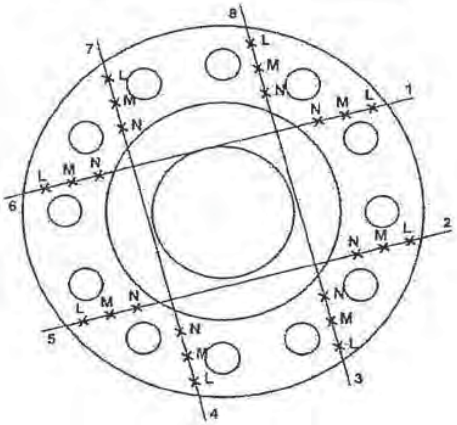
Faces are distorted. Require machining both faces.

Steam Lead Flange

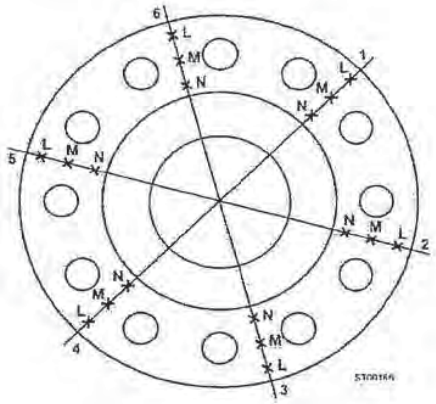
MECHANICAL DYNAMICS and ANALYSIS, LLC SM

STEAM LEAD FLANGE

Customer	Basin Electric	Rating	570 MW
Plant	Laramie River	Type	G2
Unit No	3	Date	5/2/2005
Serial No	270T107	Recorded By	MD&A
OEM	GE		



MALE RABBET



FEMALE RABBET

Location Left Side

Readings in mils using feeler gauge

	L	M	N
1			
2			
3			
4			
5			
6			
7			
8			
Average			
Dished			

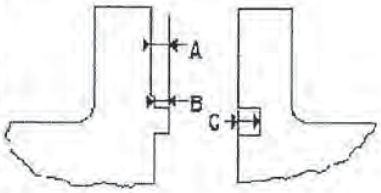
Location Left Side

Readings in mils using feeler gauge

	L	M	N
1			
2			
3			
4			
5			
6			
Average			
Dished			

Total Distortion	

RABBET DEPTH	Top	Bottom	Right	Left	Average
A	0.300	0.300	0.300	0.300	0.300
B	0.250	0.250	0.250	0.250	0.250
C	0.375	0.375	0.375	0.375	0.375
			Face Step		0.050
			Gasket Pocket		0.125



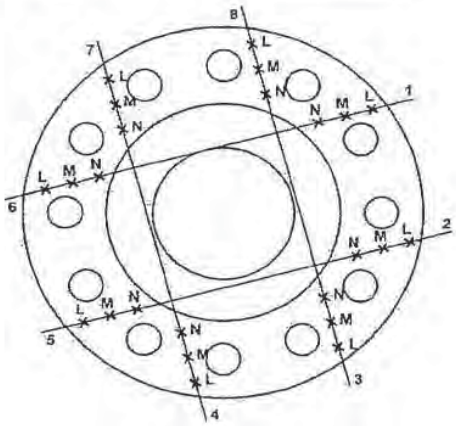
Comments:
Finish machined

Steam Lead Flange

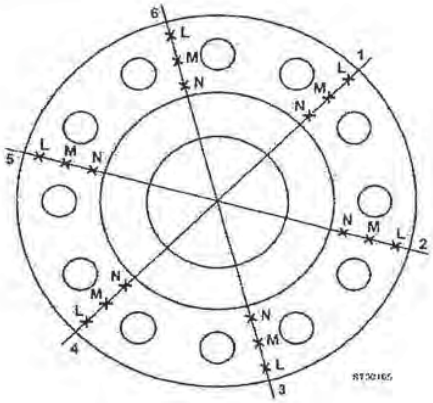
MECHANICAL DYNAMICS and ANALYSIS, LLC SM

STEAM LEAD FLANGE

Customer _____ Rating _____
Plant _____ Type _____
Unit No _____ Date _____
Serial No _____ Recorded By _____
OEM _____



MALE RABBET



FEMALE RABBET

Location _____

Readings in mils using feeler gauge

	L	M	N
1			
2			
3			
4			
5			
6			
7			
8			
Average			
Dished			

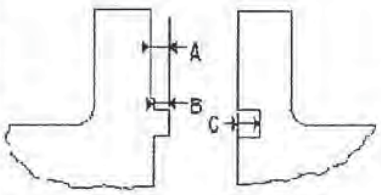
Location _____

Readings in mils using feeler gauge

	L	M	N
1			
2			
3			
4			
5			
6			
Average			
Dished			

Total Distortion	

RABBET DEPTH	Top	Bottom	Right	Left	Average
A					
B					
C					
			Face Step		
			Gasket Pocket		



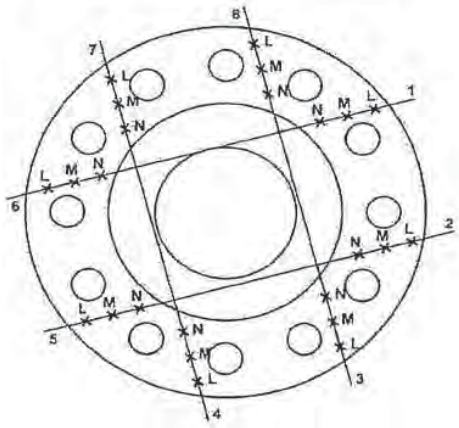
Comments:

Steam Lead Flange

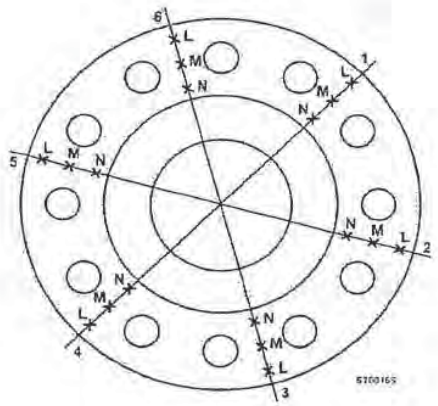
MECHANICAL DYNAMICS and ANALYSIS, LLC

STEAM LEAD FLANGE

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Gen Station	Type	G3
Unit No	Unit #3	Date	10/26/2005
Serial No	170X819	Recorded By	J. Toohey
OEM	GE		



MALE RABBET



FEMALE RABBET

Location HP LS

Readings in mils using feeler gauge

	L	M	N
1		0.002	0.002
2		0.002	0.003
3		0.002	0.003
4		0.002	0.003
5		0.002	0.003
6		0.002	0.002
7		0.002	0.003
8		0.002	0.003
Average		0.002	0.003
Dished	0.00275		

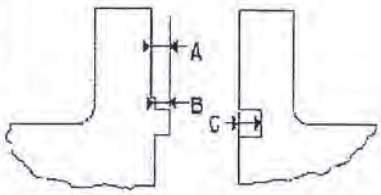
Location HP LS

Readings in mils using feeler gauge

	L	M	N
1		0.002	
2		0.002	
3		0.002	
4		0.002	0.002
5		0.002	
6		0.002	
Average		0.002	0.000
Dished	0.000		

Total Distortion	0.003

RABBET DEPTH	Top	Bottom	Right	Left	Average
A	0.311	0.308	0.311	0.311	0.310
B	0.253	0.248	0.252	0.252	0.251
C	0.368	0.371	0.371	0.369	0.370
			Face Step		0.059
			Gasket Pocket		0.119



Comments:

Steam Lead Flange

NOZZLE STEAM INLET PIPE/RING DIAMETERS

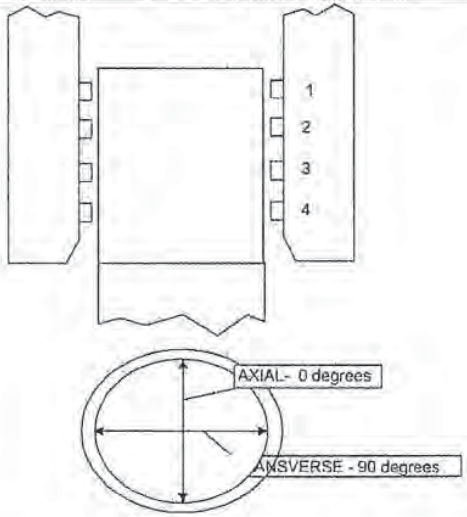
Customer	Basin Electric	Rating	570 MW
Plant	Laramie River	Type	G-2
Unit No	3	Date	05/04/05
Serial No	270T107	Recorded By	MD&A
OEM	GE		

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #1 (upper left)	12.261	12.262	12.261	12.263	12.261	12.261		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.250	12.249	12.249	12.251	12.248	12.250		
CLEARANCE	0.011	0.013	0.012	0.012	0.013	0.011		
Ave Clearance	0.012		0.012		0.012			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #4 (upper right)	12.261	12.261	12.261	12.261	12.261	12.261		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.246	12.250	12.251	12.250	12.249	12.250		
CLEARANCE	0.015	0.011	0.010	0.011	0.012	0.011		
Ave Clearance	0.013		0.010		0.011			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #2 (lower left)	12.259	12.261	12.259	12.262	12.260	12.262		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.251	12.251	12.251	12.251	12.251	12.251		
CLEARANCE	0.008	0.010	0.008	0.011	0.009	0.011		
Ave Clearance	0.009		0.010		0.010			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #3 (lower right)	12.263	12.262	12.264	12.263	12.264	12.263		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.250	12.250	12.250	12.250	12.250	12.250		
CLEARANCE	0.013	0.012	0.014	0.013	0.014	0.013		
Ave Clearance	0.013		0.013		0.013			



Comments:

Sherco Snout Ring Insp (Nozzle) As Found

NOZZLE STEAM INLET PIPE/RING DIAMETERS

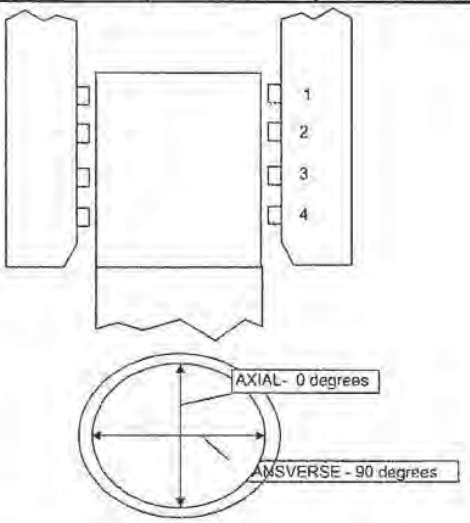
Customer	Xcel Energy	Rating	950MW
Plant	Sherco Gen Station	Type	G3
Unit No	#3	Date	10/20/05
Serial No	170X819	Recorded By	J. Toohey
OEM	GE		

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #1 (upper left)	12.264	12.260	12.261	12.261	12.264	12.261		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.248	12.249	12.248	12.249	12.248	12.249	12.249	12.250
CLEARANCE	0.016	0.011	0.013	0.012	0.016	0.012		
Ave Clearance	0.013		0.012		0.014			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #4 (upper right)	12.258	12.258	12.257	12.257	12.260	12.258		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.244	12.250	12.244	12.249	12.248	12.250		
CLEARANCE	0.014	0.008	0.013	0.008	0.012	0.008		
Ave Clearance	0.011		0.010		0.010			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #2 (lower left)	12.251	12.249	12.250	12.249	12.255	12.252		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.242	12.244	12.243	12.245	12.244	12.244		
CLEARANCE	0.009	0.005	0.007	0.004	0.011	0.008		
	0.007		0.006		0.010			

	0°	90°	0°	90°	0°	90°	0°	90°
	RING 1		RING 2		RING 3		RING 4	
INLET #3 (lower right)	12.252	12.253	12.252	12.254	12.257	12.257		
	PIPE @ 1		PIPE @ 2		PIPE @ 3		PIPE @ 4	
	12.244	12.244	12.246	12.244	12.246	12.247		
CLEARANCE	0.008	0.009	0.006	0.010	0.011	0.010		
Ave Clearance	0.009		0.008		0.010			



Comments:

TURBINE ROTORS

HP ROTOR

The HP rotor was removed from the unit, blast cleaned and NDE'd, no indications were noted. After blast cleaning, Steampath Consultants inspected the rotor. The rotor was then slow speed balanced. After balancing, the T1 and T2 journals were strap lapped and dimensionally checked. All oil deflector journals were cleaned and measured. The coupling face, rabbet fit and coupling bolt holes were cleaned and visually inspected. The control rotor run out was checked during slow speed balance work, the run out was within the OEM tolerance. The main shaft oil pump was NDE'd and visually inspected, thin volute partitions were dressed to increase the thickness. The steady rest bearing journal and seal ring journals were cleaned and dimensionally checked o.k. Opening and closing pump clearances were recorded and left within the OEM tolerance.

REHEAT ROTOR

The reheat rotor was removed from the unit, blast cleaned and NDE'd no indications were noted. After blast cleaning, Steampath Consultants inspected the rotor. The eighth stage buckets and covers on both the TE and GE of the rotor were removed and replaced with new buckets by Steam Path Consultants. The rotor was then slow speed balanced. After balancing, the T3 and T4 journals were strap lapped and dimensionally checked. All oil deflector journals were cleaned and measured. The A and B coupling faces, rabbet fits and coupling bolt holes were cleaned and visually inspected. The thrust collars were visually inspected and cleaned, no defects were noted.

LP A ROTOR

The LP A rotor was removed, from the unit, blast cleaned and NDE'd, no indications were noted. The rotor was turned over to Steam Path Consultants for further examination. The L-0 bucket covers were replaced on both the turbine end and generator end.

The LP A rotor journals T5 and T6, oil deflector journals and couplings were cleaned and dimensionally checked.

LP B ROTOR

The LP B rotor was removed, from the unit, blast cleaned and NDE'd, no indications were noted. The rotor was turned over to Steam Path Consultants for further examination. The L-0 bucket covers were replaced on both the turbine end and generator end.

The LP B rotor journals T7 and T8, oil deflector journals and couplings were cleaned and dimensionally checked. During unit disassembly, the D coupling spacer disk gear was found to have slipped since the last outage. Two coupling bolts had to be cut off and drilled out while the rotor was in the rotor stands. The slipped spacer gear was removed from the coupling and re-aligned, new dowels were fabricated and installed size to size. The two cut coupling bolts were replaced.

COMBINED REHEAT

AUXILIARY VALVES

NOZZLES

TURBINE SHELLS

TURBINE ROTORS

Title Page – Insert this sheet into title page holder back of binder

DIAPHRAGMS

HP DIAPHRAGMS
The HP diaphragms were removed from the unit without difficulty. The diaphragm packing was removed and all diaphragms were blast cleaned and NDE'd. Steam Path Consultants inspected, recommended, and repaired all HP diaphragms.

All HP diaphragm spill strips were replaced by MDA this outage. New retaining keys and screws were fit and installed.

During diaphragm installation, the diaphragm side slips and axial crush pin clearances were checked and corrected where required. All the HP diaphragm horizontal joints have previous Inconnel joint repairs. The Inconnel is now sitting proud compared to the base metal. The Inconnel weld beads/stringers were stoned in order to close the diaphragm joints. New HP diaphragm joint bolts were installed in all HP diaphragms and tourqed.

REHEAT DIAPHRAGMS
The RH diaphragms were removed from the unit. Stage 8 lower half diaphragm had to be wedged out of its fit. All diaphragms were blast cleaned and NDE'd. Steam Path Consultants inspected, recommended, and repaired all RH diaphragms. Stage 8 and stage 9 diaphragm spill strips were changed this outage. The plant was short single tooth spill strips for stage eight, so double tooth spill strips were installed in Z1 and Z2 8te and Z1 8ge. Z2 GE is single tooth.

During diaphragm installation, the diaphragm side slips and axial crush pin clearances were checked and corrected where required.

New reheat diaphragm joint bolts were installed in all reheat diaphragms and tourqed.

LP A DIAPHRAGMS
The LP A diaphragms were removed from the unit without difficulty. The diaphragm packing was removed and all diaphragms were blast cleaned and NDE'd. Steam Path Consultants inspected, recommended repairs, and repaired all LP A diaphragms.

During diaphragm installation, the diaphragm side slips and axial crush pin clearances were checked and corrected where required.

LP B DIAPHRAGMS
The LP B diaphragms were removed from the unit without difficulty. The diaphragm packing was removed and all diaphragms were blast cleaned and NDE'd. Steam Path Consultants inspected, recommended repairs, and repaired all LP B diaphragms.

During diaphragm installation, the diaphragm side slips and axial crush pin clearances were checked and corrected where required.

HOODS/CROSSOVERS/CASINGS

LP A & B HOOD
The LP A and B hoods were removed from the unit and visually inspected. All steam joints, bolts, bolt holes, dowels and dowel holes were cleaned, chased and tapped.

The LP A and LP B rupture diaphragms were changed out this outage. The knife edges were inspected and all bolting and tapped holes were cleaned.

LP A & B INNER CASING
The upper half LP A and B inner casings were removed from the unit and visually inspected. All steam joints, bolts, bolt holes, dowels and dowel holes were cleaned, chased and tapped. Damaged threaded holes in the lower half were sleeved.

All struts and strut welds were wire wheeled and visually inspected, no defects were noted.

The water spray piping was visually inspected, all supports and piping was in excellent condition.

The cross-over flanges were cleaned and all holes were tapped. Cut off bolts and damaged tapped holes were repaired by MD&A.

All key fits, diaphragm ledges, and seal surfaces were stoned and cleaned.

The hand hole doors were cleaned and wire wheeled, new gaskets installed. The bolt shield tapped holes were all tapped and cleaned, new lock tabs were used during the shield assembly.

NOTE: The horizontal joint is experiencing erosion/leakage across the joint. The joint has not been closed here previously. The bolt tightening sequence for this casing has to be modified from the OEM procedures being used. The eroded area was covered with Hi Temp sealant and the joint was closed by tightening the outer flange first and then closing the inner joint at the hand hole location second.

LP A & B INNER SHELL
The LP A and B inner shells were removed, cleaned and blast cleaned. Galled and scored surfaces were dressed and cleaned up. All centerline keys were found bent and loose; the keys were cleaned and straightened.

Bolting and dowels were cleaned and all dowels were match marked for location. The lower half shell was cleaned and visually inspected. Damaged threaded holes in the lower half were sleeved.

PACKING AND PACKING CASES

All shaft packing was visually inspected prior to removing by Steam Path Consultants. New packing was installed in N2 G3, 4, 5, 6, 7, and 8. All other packing was sharpened and re-used.

All upper half packing cases were blast cleaned and visually inspected. No defects were noted.

Upper half cone extensions were removed, all tapped holes were cleaned and two broken bolts were drilled out and the hole tapped. No other defects were noted.

BEARINGS

TURBINE BEARINGS

T-1 through T8 bearings were removed from the unit and visually inspected. T1, T3, and T4, remained on site and were cleaned, NDE'd, blued and scraped. The pads were adjusted to achieve the proper clearance. T2 and T5 through T8 were found with considerable damage and were sent to RPM for repair.

T5 through T8 were returned to site, blue checked, and checked for pinch, the pinch was corrected on T5 through T8. Clearance measurements were taken to confirm the shop work.

RPM had re-rounded the bearing balls, as they were found considerably out of round. The bearing ball roundness corrections required pinch check corrections.

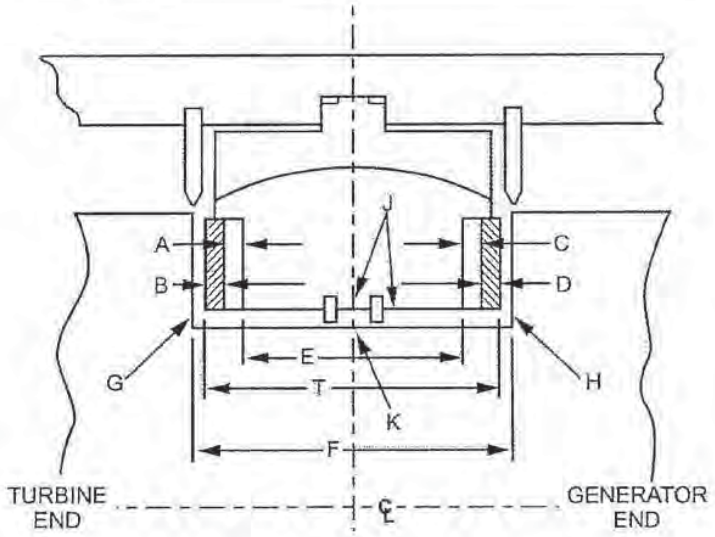
Thrust Bearing
Straddle

Date(m/d/y) 10/17/2005 Turbine Serial No. 170X819 Prepared by J. Toohey

INSPECTIONS & CHECKS				CODE	
Ball Contact Check		Runner Inspection	X, V	X	Work Carried Out
Ball Pinch Check	C	Wear Device Inspection		N	Not Done
Ball Torque Check		Screens and Orifices		NA	Not Applicable
Parallelism Check	X	Thermocouples Calib.		C	See Comments
Thrust Plate Inspection	X, UT	Seal Rings Inspection	X	V	Visual Inspection
Babbitt Inspection	X, PT			MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant

THRUST BEARING DATA

"A" Shim	.495"
"B" Plate	1.515"
"C" Shim	.482"
"D" Plate	1.489"
"E" Casing	10.997"
"T" Total	14.978"
"F" Rotor	15.000"



THRUST CLEARANCE

Clearance (F minus T)	.022"
Clearance (By float)	.013"
Difference	.009"
Stack Check	✖

RUNOUT (mils TIL)

G	
H	

BALL TORQUE

Ball Diam.		Inches
Reading		Ft-Lb
Check		

SEAL RING CLEARANCES

	Turbine End				Generator End		
	0°	90°	Out of Round		0°	90°	Out of Round
Seal Diameter (J)	14.009"	14.009"	.000"		14.009"	14.009"	.000"
Rotor Diameter (K)							
Clearance							

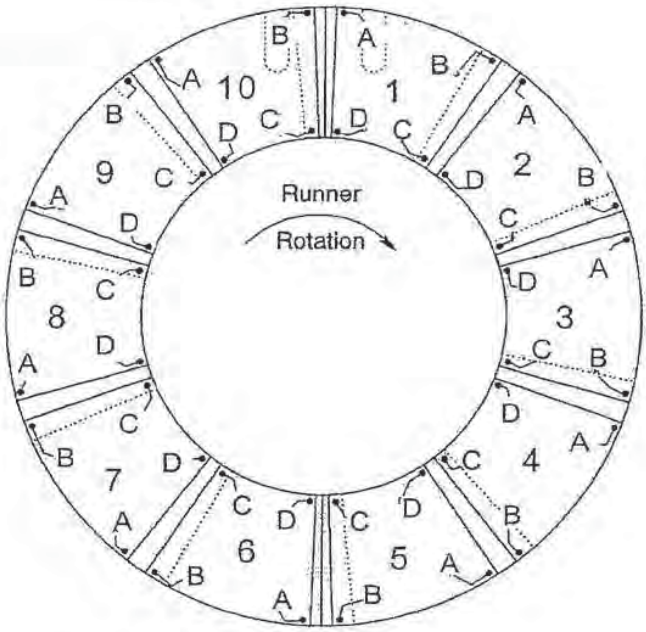
Comments
Note: As found thrust was .013 pushed several times, their was no ball movement. As left thrust bump check was .022, note that the pinch was corrected during the outage. A sfound pinch was .003, as left pinch is .001

MECHANICAL DYNAMICS and ANALYSIS, LLC

TAPERED LAND THRUST PLATE MEASUREMENT

(CW Rotation, 10 Pads)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	Oct. 21, 2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Pad #	A	B	C	D
1	1.48	1.489	1.489	1.477
2	1.48	1.49	1.489	1.476
3	1.479	1.489	1.489	1.476
4	1.478	1.489	1.488	1.477
5	1.4	1.489	1.489	1.477
6	1.478	1.489	1.489	1.477
7	1.48	1.49	1.489	1.477
8	1.479	1.489	1.489	1.477
9	1.479	1.488	1.489	1.477
10	1.479	1.487	1.488	1.477

Comments:

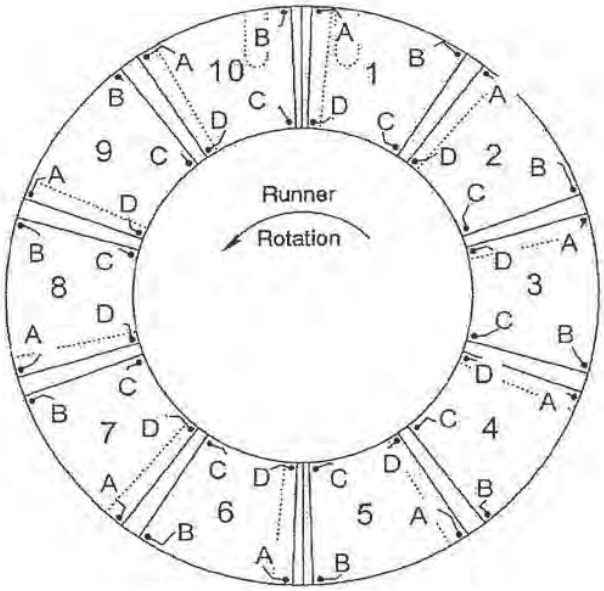
sherco thrust plate cw 8/17/2006 as found

MECHANICAL DYNAMICS and ANALYSIS, LLC

TAPERED LAND THRUST PLATE MEASUREMENT

(CCW Rotation, 10 Pads)

Customer	Xcel Energy	Rating	950MW
Plant	Sherco Generating Station	Type	G3
Unit No.	Unit #3	Date	Oct. 21, 2005
Serial No.	170X819	Recorded By	J. Toohey
OEM	GE		



Pad #	A	B	C	D
1	1.513	1.506	1.504	1.515
2	1.515	1.506	1.504	1.515
3	1.516	1.506	1.503	1.515
4	1.516	1.506	1.503	1.515
5	1.514	1.506	1.504	1.514
6	1.515	1.505	1.503	1.515
7	1.515	1.505	1.502	1.515
8	1.515	1.506	1.503	1.515
9	1.515	1.506	1.503	1.515
10	1.514	1.506	1.502	1.515

Comments:

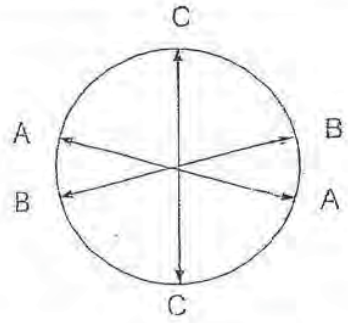
sherco thrust plate ccw 8/17/2006 As Found

Journal Bearings

Date(m,d,y) 11/11/05 Turbine Serial No. 170X819 Prepared by J. Toohey

INSPECTIONS & CHECKS				CODE	
Ball Contact Check		Megger Bearing Insulation	X	X	Work Carried Out
Ball Pinch Check	X	Inspect Bearing Insulation		N	Not Done
Ball Torque Check		Inspect Pipe Flange Insulation		NA	Not Applicable
Twist & Tilt Check	X			C	See Comments
Journal Inspection	X			V	Visual Inspection
Babbit Inspection	X			MP	Mag. Particle
Screens & Orifices	N			UT	Ultrasonic
T/C Calib				PT	Penetrant

Bearing No.	Bearing Type	Forward or Turbine End			Aft or Generator End			Journal Dia.	Vertical Clearance	
		A-Dia	B-Dia	C-Dia	A-Dia	B-Dia	C-Dia		Mils	Mils/In
T-5		17.038	17.037	17.015	17.038	17.038	17.015	17.000	15	0.9
T-6		20.046	20.046	20.019	20.046	20.046	20.019	20.000	19	0.9
T-7		20.045	20.044	20.017	20.044	20.044	20.017	20.000	17	0.8
T-8		22.053	22.054	22.023	22.053	22.055	22.024	22.000	23	1.1
T-9		22.049	22.049	22.019	22.049	22.049	22.019	22.000	19	0.9
T-10		20.047	20.047	20.019	20.046	20.046	20.018	19.999	20	1.0
T-11		6.512	6.513	6.513	6.512	6.513	6.512	6.500	12	1.9
T-12		6.512	6.511	6.512	6.512	6.512	6.512	6.500	12	1.8



Shim

Leadwire

Ball Seat Pinch Fits

Bearing Number	Pinch* Mils	Bearing Number	Pinch*
T-5	3	T-11	1
T-6	2	T-12	1
T-7	3		
T-8	2		
T-9	3		
T-10	1		

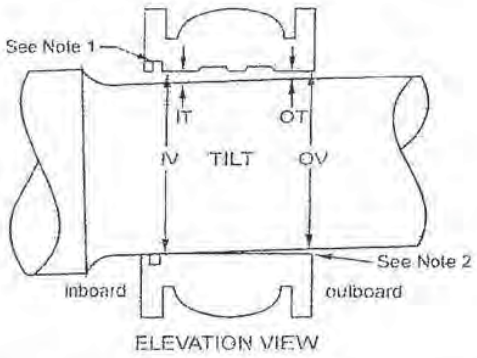
* Pinch equals wire thickness minus shim

Comments

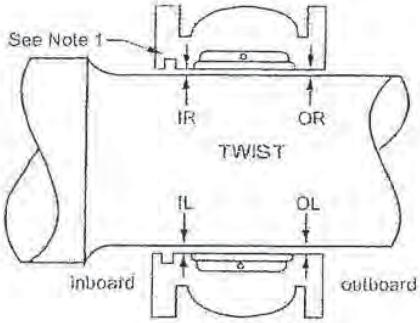
Bearing To Journal Alignment

For Bearings With Ball Seats

Date(m/d/y) 11/17/2005 Turbine Serial No. 170X819 Prepared by J. Toohey



ELEVATION VIEW



PLAN VIEW

NOTE:
1. On most generator bearings, the end leakage groove is on the outboard end.
2. On hood bearings, the outboard end is set low to compensate for vacuum deflection.

TILT

Brg #	Section	Reading in Inches		Reading in Mils		Limits 0.0 To	Actual (Mils)	Tolerance Check
		IV	OV	IT	OT			
T5	LP A	17.015"	17.015"	17.0 Mils	16.0 Mils	1.7 Mils	1.0 Mils	✓
T6	LP A	20.019"	20.019"	20 Mils	20 Mils	2.0 Mils	0.0 Mils	✓
T7	LP B	20.017"	20.017"	21 Mils	21 Mils	2.0 Mils	0.0 Mils	✓
T8	LP B	22.023"	22.024"	21 Mils	22 Mils	2.2 Mils	0.0 Mils	✓
T9	GEN	22.019"	22.019"	21 Mils	21 Mils	2.2 Mils	0.0 Mils	✓
T10	GEN	20.019"	20.019"	19 Mils	19 Mils	2.0 Mils	0.0 Mils	✓
T11	EXCITER	6.513"	6.512"	14 Mils	13 Mils	0.7 Mils	0.0 Mils	✓
T12	EXCITER	6.510"	6.510"	12 Mils	12 Mils	0.7 Mils	0.0 Mils	✓

TWIST

Brg #	Section	Readings in Mils				Limits	Actual	Tolerance Check
		IL	OL	IR	OR			
T5	LP A	19.0 Mils	18.0 Mils	19.0 Mils	19.0 Mils	±5.1 Mils	-0.5 Mils	✓
T6	LP A	24.0 Mils	23.0 Mils	22.0 Mils	21.0 Mils	±6.0 Mils	0.0 Mils	✓
T7	LP B	28.0 Mils	28.0 Mils	27.0 Mils	27.0 Mils	±6.0 Mils	0.0 Mils	✓
T8	LP B	28.0 Mils	25.0 Mils	28.0 Mils	26.0 Mils	±6.6 Mils	-0.5 Mils	✓
T9	GEN	24.0 Mils	26.0 Mils	26.0 Mils	25.0 Mils	±6.6 Mils	1.5 Mils	✓
T10	GEN	25.0 Mils	26.0 Mils	24.0 Mils	25.0 Mils	±6.0 Mils	0.0 Mils	✓
T11	EXCITER	7.0 Mils	8.0 Mils	8.0 Mils	8.0 Mils	±2.0 Mils	0.5 Mils	✓
T12	EXCITER	7.0 Mils	8.0 Mils	7.0 Mils	7.0 Mils	±2.0 Mils	0.5 Mils	✓

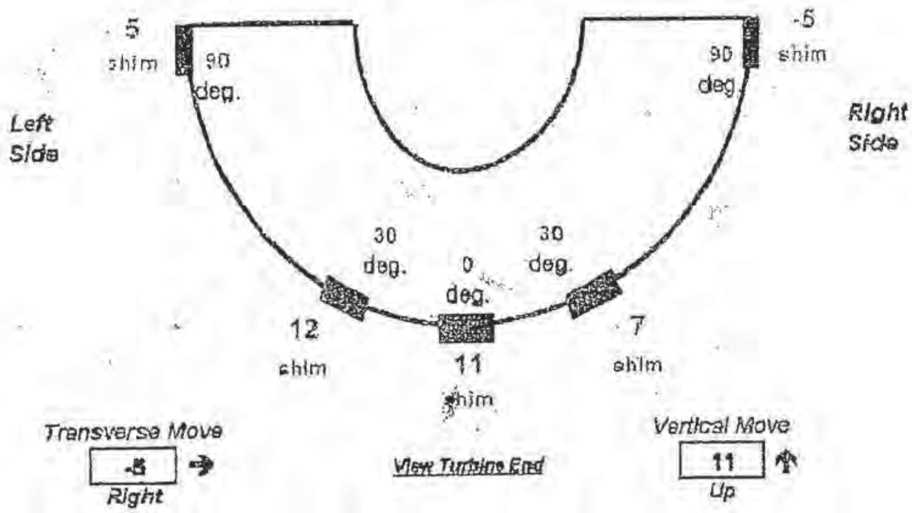
Comments

T-5

#5 Bearing

Nov 18, 2005

Shim Change



Input the bearing number and move into the yellow boxes.
(Plus is Left & Up; Minus is Right & Down)
(Values are in mils.)

Change the blue numbers to the correct pad angles.
(Values are in degrees.)

SHIM PACK

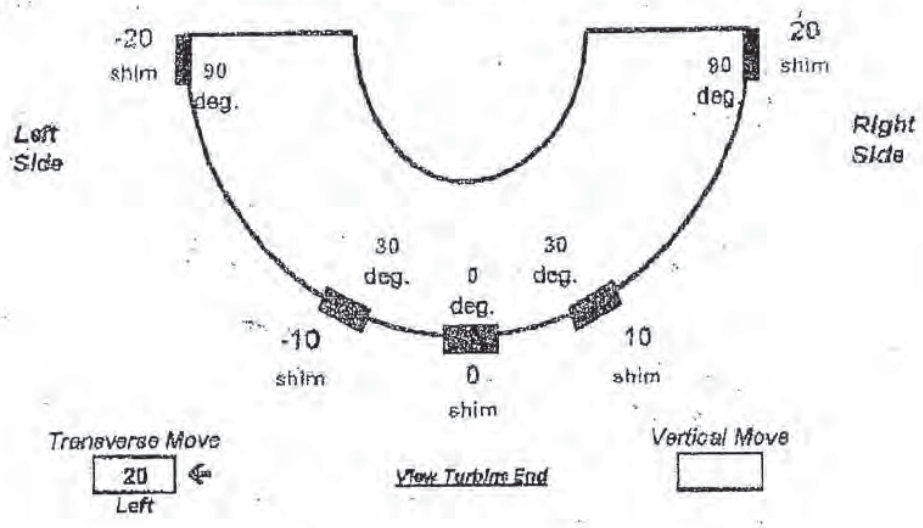
LEFT 90	LEFT 30	BOTTOM	RIGHT 30	RIGHT
.137	.122	.122	.122	.120
.014	.014	-.014	.015	-.010
.007	-.005	.015	.013	.014
.007	-.007	+.010	.007	-.013
-.005	+.014	+.015	.013	-.004
.004	+.010		+.007	-.003
+.010				.015
				-.010
				.015
				+.014
				+.014
				+.007

T-6

#5 Bearing

Nov 14, 2005

Shim Change



Input the bearing number and move into the yellow boxes.
(Plus is Left & Up; Minus is Right & Down)
(Values are in mils.)

Change the blue numbers to the correct pad angles.
(Values are in degrees.)

SHIM PACK

LEFT 90	LEFT 30	BOTTOM	RIGHT 30	RIGHT
	122	4	7	
	14	12	12	
	6	15	13	
	14	122	5	
	5	14	122	
	6		15	
	7			

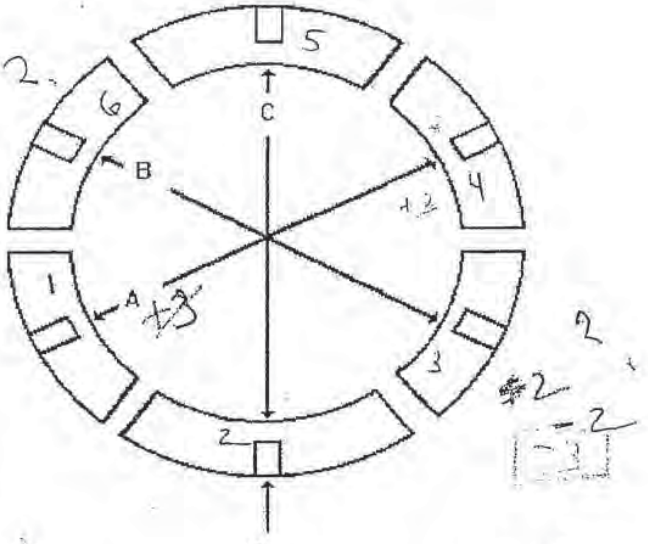
Page 1

T-1

MECHANICAL DYNAMICS and ANALYSIS, LLC

Tilt Pad Bearings

Customer
Plant
Unit No.
Serial No.
OEM
Rating
Type
Date 10-27-05
Recorded By. WATT
STERLING



Bearing Number	T-1
Single Tilt	
Double Tilt	

All pads have been scraped + lined by Maribel

Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
13.020	13.018	13.019	13.021	13.012	13.016

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		
13.020	13.015	13.017	13	

13.0177 13.015 13.017

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	240	254	247	
2	242	241	2415	
3	250	258	254	
4	248	245	246.5	
5	250	259	254.5	
6	253	254	253.5	

Note

The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing.Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

Comments

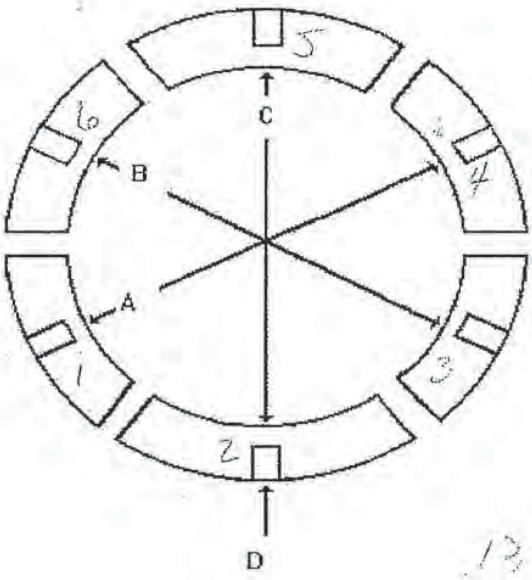
T-1

MECHANICAL DYNAMICS and ANALYSIS, LLC

Tilt Pad Bearings

10-26

Customer _____
Plant _____
Unit No. _____
Serial No. _____
OEM _____
Rating _____
Type _____
Date _____
Recorded By. _____



Bearing Number	T-1
Single Tilt	
Double Tilt	

W

12.5

Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
13.019	13.022	13.021	13.010	13.013	13.017

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		
13.013	13.017	13.019		

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	24.4	2.53	24.85	
2	[illegible]	[illegible]	24.2	
3	24.5	[illegible]	2.50	
4	25.2	25.5	2.53	
5	[illegible]	25.8	[illegible]	
6	24.8	24.7	24.7	

Note

The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing.Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

Comments

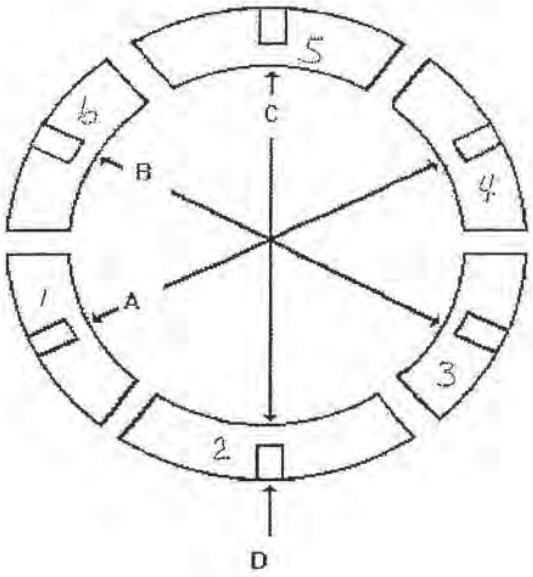
2.45
24.3
2.55
2.498
13.019

T-1

MECHANICAL DYNAMICS and ANALYSIS, LLC

Tilt Pad Bearings

Customer
Plant
Unit No.
Serial No.
OEM
Rating
Type
Date 10-27-05
Recorded By. WATTS



Bearing Number	T-1
Single Tilt	
Double Tilt	

Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
13.020	13.019	13.019	13.021	13.012	13.016

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	240	254		
2	242	241		
3	250	258		
4	248	245		
5	250	259		
6	253	254		

Note

The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing.Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

Comments

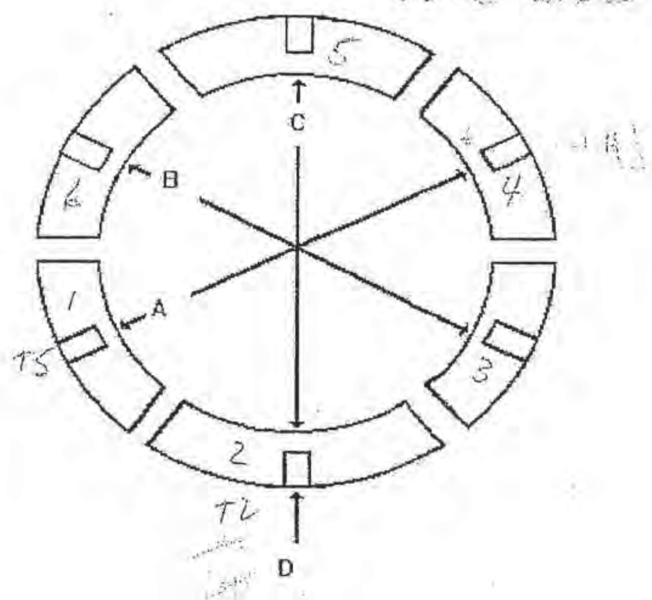
T-3

MECHANICAL DYNAMICS and ANALYSIS, LLC

Tilt Pad Bearings

AFTER SCRAPING PADS FOR BLUE CHECK

Customer SHERCO
Plant
Unit No.
Serial No.
OEM
Rating
Type
Date
Recorded By. WATTS



Bearing Number	T-3
Single Tilt	
Double Tilt	

As left

Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
14.022	14.018	14.021	14.024	14.018	14.019

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		
14.023	14.018	14.020	14	.020

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	241	241	241	
2	237	236	236	.004
3	241	240	240	
4	250	244	249	+2-3
5	239	253	253	
6	243	244	244	244

Note

The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing. Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

Comments

#1 PAD - No shim change   #4 Add .002-.003
#2 PAD - Add .004   #5 OK.
#3 PAD - No shim change   #6 No shim change

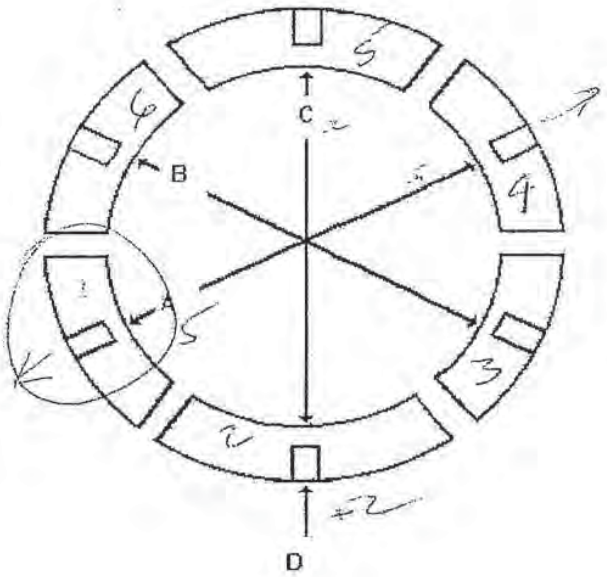
T-3

MECHANICAL DYNAMICS and NALYSIS, LLC

Tilt Pad Bearings

Customer _____
Plant _____
Unit No. _____
Serial No. _____
OEM _____
Rating _____
Type _____
Date _____
Recorded By. _____

Bearing Number	T-3
Single Tilt	
Double Tilt	



Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
14.022	14.018	14.021	14.024	14.018	14.019

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		
14.023	14.018	14.020	14.000	0.020

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	0.241	0.241	0.241	
2	0.237	0.236	0.237	
3	0.241	0.240	0.241	
4	0.250	0.244	0.247	
5	0.239	0.253	0.246	
6	0.243	0.244	0.244	

Note

The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing.Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

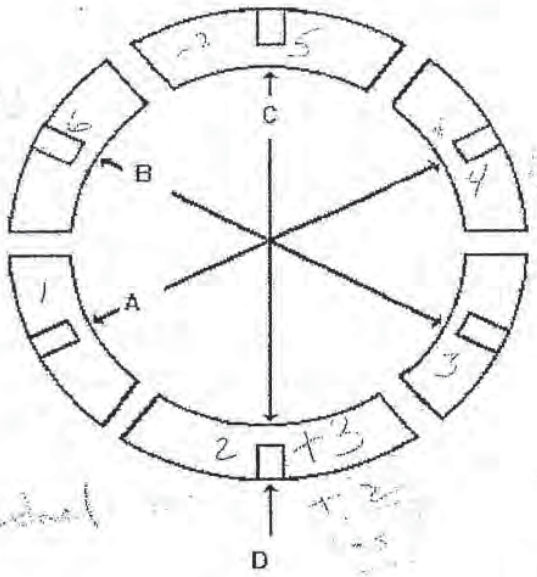
Comments

T-4

MECHANICAL DYNAMICS and ANALYSIS, LLC

Tilt Pad Bearings

Customer SHERCO
Plant
Unit No.
Serial No.
OEM
Rating
Type
Date 10-21
Recorded By. WATTS



Bearing Number	T-4
Single Tilt	
Double Tilt	

SCRAPE pads & Mandrel

Forward or Turbine End			Aft or Generator End		
A- Dia	B- Dia	C- Dia	A- Dia	B- Dia	C- Dia
17.030	17.033	17.024	17.032	17.031	17.032

AS A-SHIM

Average Bearing Diameter			Journal Diameter	Vertical Clearance
A- Dia	B- Dia	C- Dia		
17.031	17.032	17.028	17	

Pad Number	D- Dim Fwd	D- Dim Aft	D- Dim Average	Note
1	233	241	237	
2	229	231	230	
3	236	237	236	
4	242	231	236	
5	255	240	247	
6	242	239	240	

Note

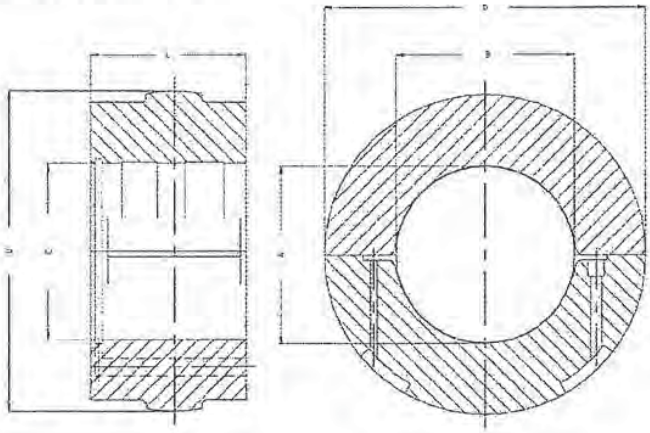
The D dimension is the pad bore to the ring bore. Assemble the pads in the housing with the anti-rotation bolts removed. Use allthread to tighten the pads into the housing.Do the same with the lower pads if the pin holes are located in the center of the pads. Measure and record the bearing bore dimensions. If the lower pads have pin holes off center, leave the anti-rotation bolts installed and measure the bore only in the true verticle position by rotation the bearing assembly.

Comments

#1 PAD

RPM Renewal Parts Maintenance, Inc.

Inspection Report
Journal Bearing
RPM Job# 50853

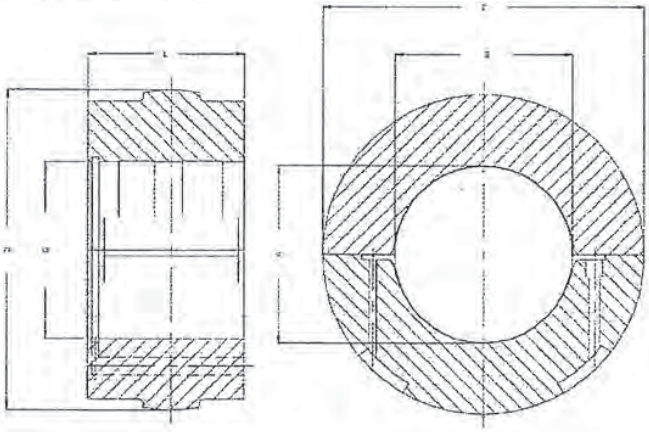


Customer: Xcel					Plant/Unit: Sherburne/Unit #3		
OEM/Design: Elliptical					Comments:		
Work Scope: Centrifugal Cast Repair							
P/N T9		As Received Date: 10/21/05			As Shipped Date: 10/29/05		
		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	22.019	22.050	22.050	22.0225	22.0555	22.056
	Midboard						
	Outboard	20.021	22.049	22.050	22.023	22.056	22.0555
Seal Diameter	Inboard	22.020	22.022	22.022	22.023	22.0235	22.0235
	Outboard						
Outside Diameter	Inboard						
	Midboard	36.496	36.493	36.490	36.498	36.496	36.496
	Outboard						
Length		OAL 17.279			OAL 17.257		
Dowels		(2) 1.325 Not Acceptable			(2) 1.332 Refit		
Joints		In .005 / .003 Contact 65%			In .000 / Out .001 Contact 75%		
Babbitt Bond		N/A			UT/PT>95% Adhesion		

RPM Renewal Parts Maintenance, Inc.

Inspection Report
Journal Bearing

RPM Job# 50854



Customer: Xcel					Plant/Unit: Sherburne/Unit #3		
OEM/Design: Elliptical					Comments:		
Work Scope: Centrifugal Cast Repair							
P/N T10		As Received Date: 10/21/05			As Shipped Date: 10/29/05		
		Vert	Horz	Horz	Vert	Horz	Horz
Inside Diameter	Inboard	20.020	20.048	20.046	20.0197	20.051	20.0507
	Midboard						
	Outboard	20.017	20.047	20.048	20.0195	20.0507	20.0505
Seal Diameter	Inboard						
	Outboard	20.020	20.019	20.022	20.021	20.021	20.021
Outside Diameter	Inboard						
	Midboard	34.490	34.495	34.496	34.497	34.495	34.495
	Outboard						
Length		OAL 17.162			N/A		
Dowels		(2) 1.330 Not Acceptable			(2) 1 5/16" Knurled		
Joints		In .005 / Out .003 Contact 75%			In .000 / Out .000 Contact 75%		
Babbitt Bond		N/A			UT/PT>95% Adhesion		