67

TECO's Responses OPC's Third Request to Produce Documents, No. 11.

TAMPA ELECTRIC COMPANY
DOCKET NO. 20220001-EI
OPC'S THIRD REQUEST FOR
PRODUCTION OF DOCUMENTS
DOCUMENT NO. 11
BATES PAGES: 1-1472
FILED: AUGUST 10, 2022

11. Please provide all inspection reports and generator tests of the Polk 1 turbine and generator since the unit was placed in service.

A. For the list of all inspection reports and generator tests within the last 10 years, please see Tampa Electric's response to OPC's Third set of Interrogatories, No. 39. The requested reports are attached.

CONFIDENTIAL MATERIAL REDACTED

BATES STAMPED PAGES 2 - 303

PK1 – Forced Major Outage High Potential
Date: 11/29/2021

Polk Power Station

Type:	CT 1 Forced Outage
Date:	November 29th, 2021
Time:	0748
Location:	PPS Unit 1 Combustion Turbine
Contractor:	N/A
Job Task:	N/A
Environmental Conditions	Mild morning

Events Prior to the Incident

- Planned Outage: 05/19/2021- 06/03/2021
  - Water Wash: 05/20/2021
  - Emergent Work (Generator stator): 06/03/2021
  - Return to service: 10/02/2021
- Start up: 10/02/2021
  - Shutdown: 10/20/2021
- Planned Outage (Relay Testing): 10/20/2021 – 10/23/2021
  - Emergent work (GCB linkage): 10/23/2021
  - Return to service: 10/27/2021
- Planned Outage (Relay Testing): 10/31/2021 – 11/04/2021
- Start up: 11/05/2021
  - Shutdown: 11/18/2021
- Planned Outage (Nat. Gas Yard): 11/18/2021 – 11/21/2021
  - Return to service: 11/21/2021
- Attempted start (Bucket liberation): 11/29/2021
  - Forced Outage 11/29/2021 – 03/04/2022
  - Return to Service 03/05/2021
- Start-up: 03/07/2022
  - Shutdown: 03/07/2022

Incident - Sequence of Events

During start up on Polk 1, the combustion turbine was firing and approaching FSNL when the Compressor Discharge Air (CPD) Block valves, VS13-1 and VS13-2, opened as designed to provide cooling air to the syngas nozzles. Shortly after the CPD block valves opened, the unit tripped on high vibration and coasted down at what appears to be a typical coast down curve. Turning gear engaged and unit cooled down and shut off for inspection.

Events after the Incident

After the unit tripped, investigations started immediately. A maintenance specialist recalled a similar 2012 incident when Polk CT1 tripped on high vibrations due to the presence of water in the syngas header. It was determined for this specific instance that the water injection utilized for liquid fuel operations leaked within the fuel nozzles and made its way into the header. With this recollection, the syngas header was the first location to be investigated for water - a significant amount of water was discovered. The discovered water was tested and contained a pH level like demineralized water (~5 pH). Continuing to back track the source, water was also found upstream in the P2 cavity of the syngas skid, which had to leak by two valves (VS4-2 and VGC-11) to enter the syngas header. The P1 and P2 cavities are vented to the flare header. During the initial investigation, it was believed water had leaked by through the HRSG HP drum into the Nitrogen Blanket System (NBS) system, and ultimately into the syngas skid by way of the flare header. With one successful start-up (03/07/2021) after the repair outage (11/29/2021 – 03/04/2021) water was found in the syngas header again, with further discovery, it was later determined that steam injection (used for NOx control) leaked into the syngas header.

Observations (Facts)

- Polk 1 was called to start on 11/29/2021 at 0700
- Polk 1 tripped on high vibrations
- Water was found in the low point on the syngas header inside the compartment
- Water was found in the flare header connection in the syngas skid
- Source of water was a demineralized source
- 3rd stage buckets liberated from the turbine rotor
- Water wash valve WW-23 was found closed after second investigation
    - The labeling of the valve was burned off from the heat in compartment
    - Valve color deviated from the labelling associated with normal Water wash practice (Blue; Normally Closed – Red; Normally Open)

Injury / Damage

- No injuries occurred due to this event.
- 3rd stage buckets, nozzles, and shrouds were damaged, exhaust frame was damaged.
- 2nd stage Nozzles and buckets were replaced
- 1st stage Buckets were replaced
- Compressor blades and stators needed blending for minor tip curl and rubbing.
- Stage 16 Stator Vanes were replaced due to heavy rubs
- Bearing seals were replaced and hydrogen seals required inspection.
- Turbine/Generator bearings are planned on being inspected and refurbished if needed

Operational Factors

- CPD cooling air was valved out and stop valves were leaking by allowing water to accumulate in flare header to a level significant enough that upon shut down water drained back and filled the syngas header

Immediate Factors

- The Syngas Block Valve (VS4-2) and Syngas Control Valve (VGC-11) allowed steam injection to leak by which created a large reservoir of water with enough head pressure to leak back into the syngas header while unit was shut down. (If these valves were functioning as designed it would have eliminated the ability of a large reservoir of water to accumulate during operation.)
- Syngas Purge Air isolation valve (WW-23) did not seal properly allowing steam to back flow into the syngas line and leak past the block valves, ultimately building a water reservoir in the flare header

Equipment Factors

- Gasification has been in short term reserve since September 2018
- Valve VS4-2 and VGC-11 were leaking by

Conclusion

- Several barriers were broken down to allow water to be ingested into the turbine
- Steam was able to back flow through the syngas nozzle because the CPD isolation valve (WW-23) that provides cooling air to the syngas nozzles was mostly closed.
- Steam was able to leak by the syngas valves and create a reservoir of water in the P2 cavity and flare header
- During shut down water was able to then leak into the syngas header to allow water ingestion into CT1 while at FSNL operation.

- The flow around WW-23 was enough to push water from the syngas header into the turbine
- When water was introduced to the CT nozzles, the sudden expansion to steam significantly increased the system's mass flow, causing severe stress and catastrophic failure to the 3rd stage buckets

Recommendations

- See additional information

Additional Information

Polk 1 Investigation.pdf

Root Cause Tree CT1 Water Inductior

PIDs.pdf

Pictures

Figure 1 As-found condition 3rd Stage Buckets and Nozzles

Figure 2 Metal fragments from 3rd stage buckets and nozzles

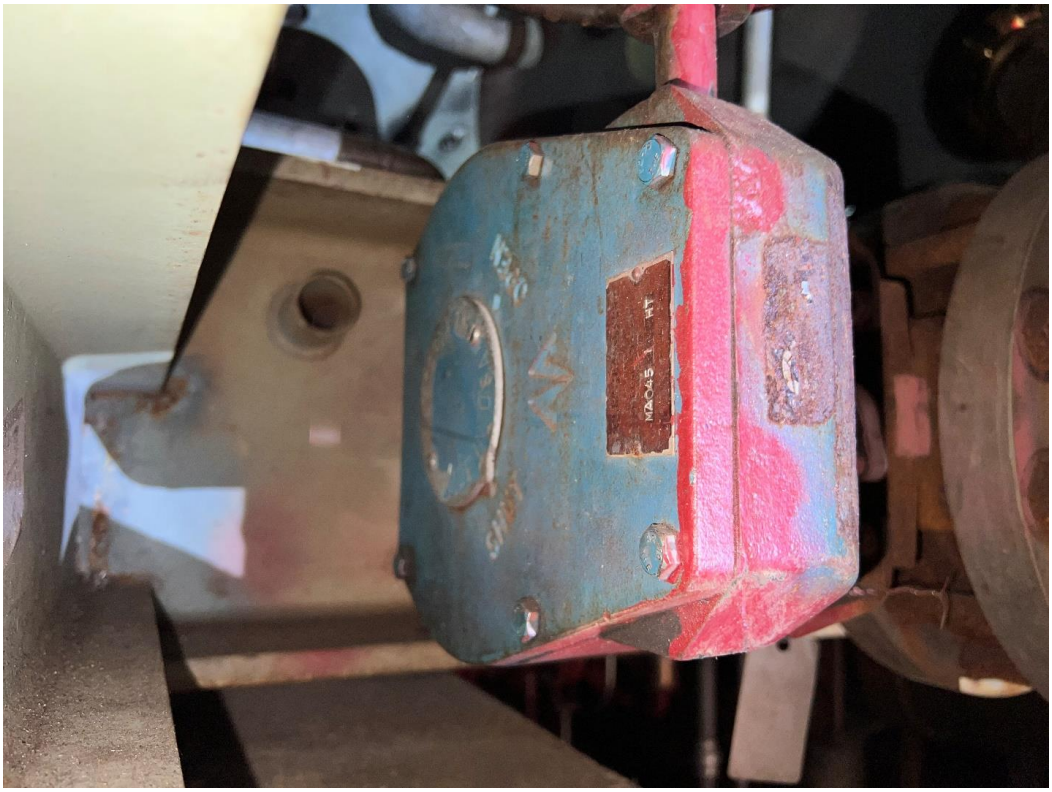


Figure 3 WW-23 Valve Compressor Discharge Syngas Purge Valve

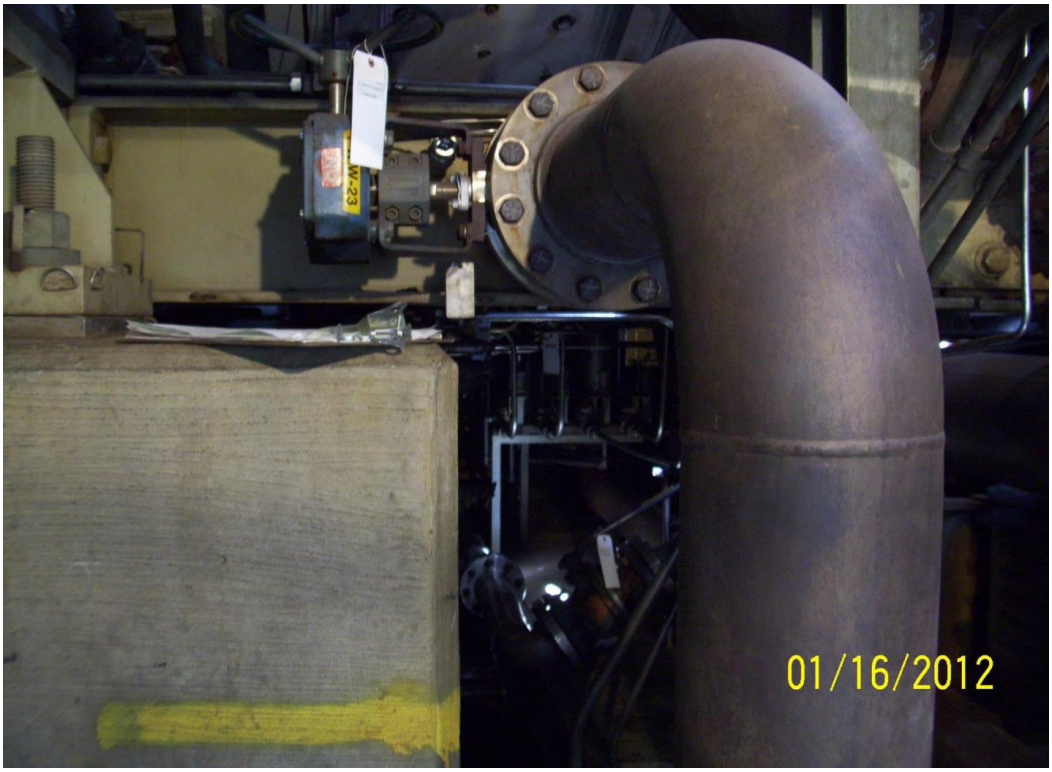


Figure 4 Same Valve as Figure 3 but in 2012

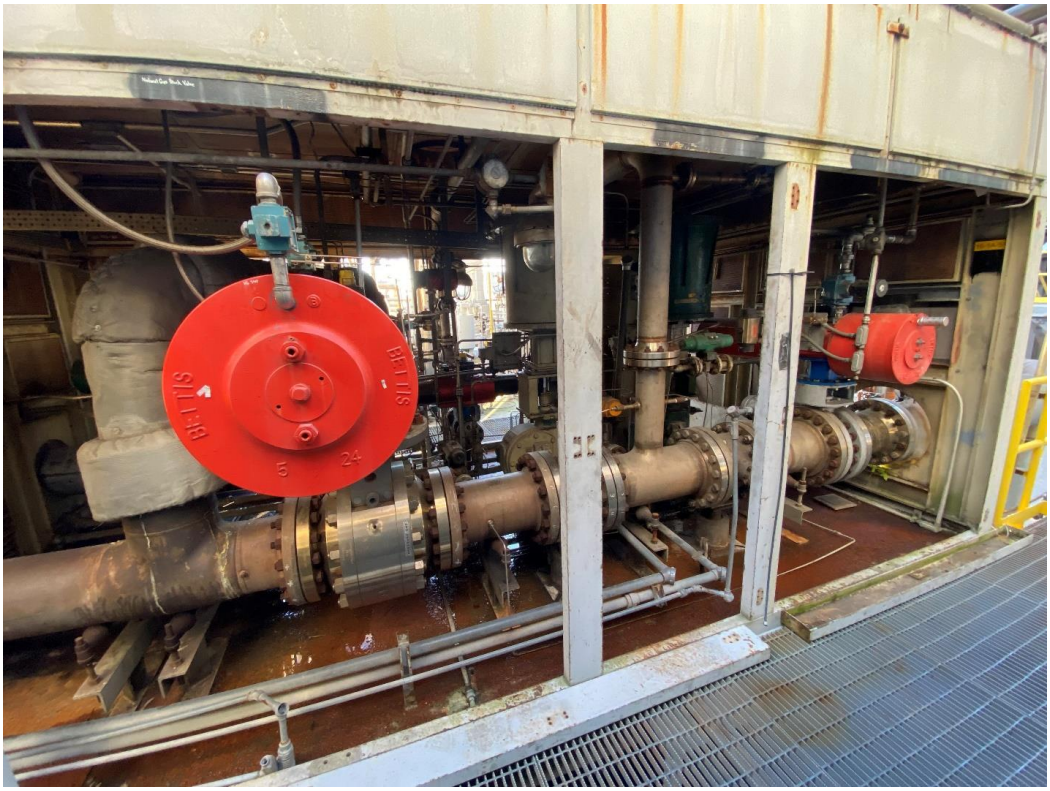


Figure 5 Syngas header with valves installed and crossover on left (90° Elbow insulated)

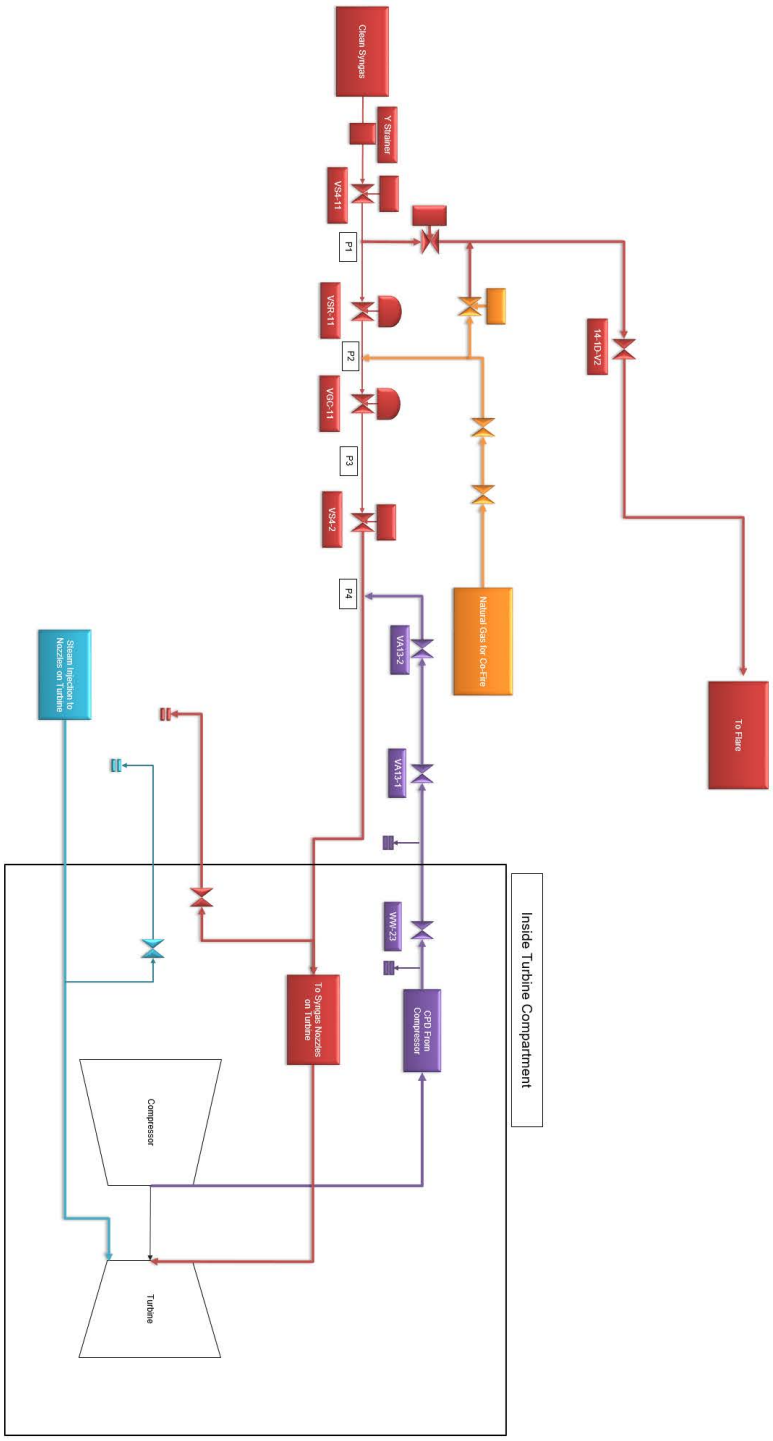


Figure 6 Sketch of system (also found Root Cause Tree under additional information)

[redacted]

Polk 1 Investigation

Initial findings after turbine trip.

3rd Stage Bucket and nozzle damage

Initial findings after turbine trip.

3rd Stage Bucket and nozzle damage

Initial findings after turbine trip.

HRSG inlet with debris on floor

Initial findings after turbine trip.

HRSG inlet with debris on floor

Syngas Line inlet showing original double block drain line

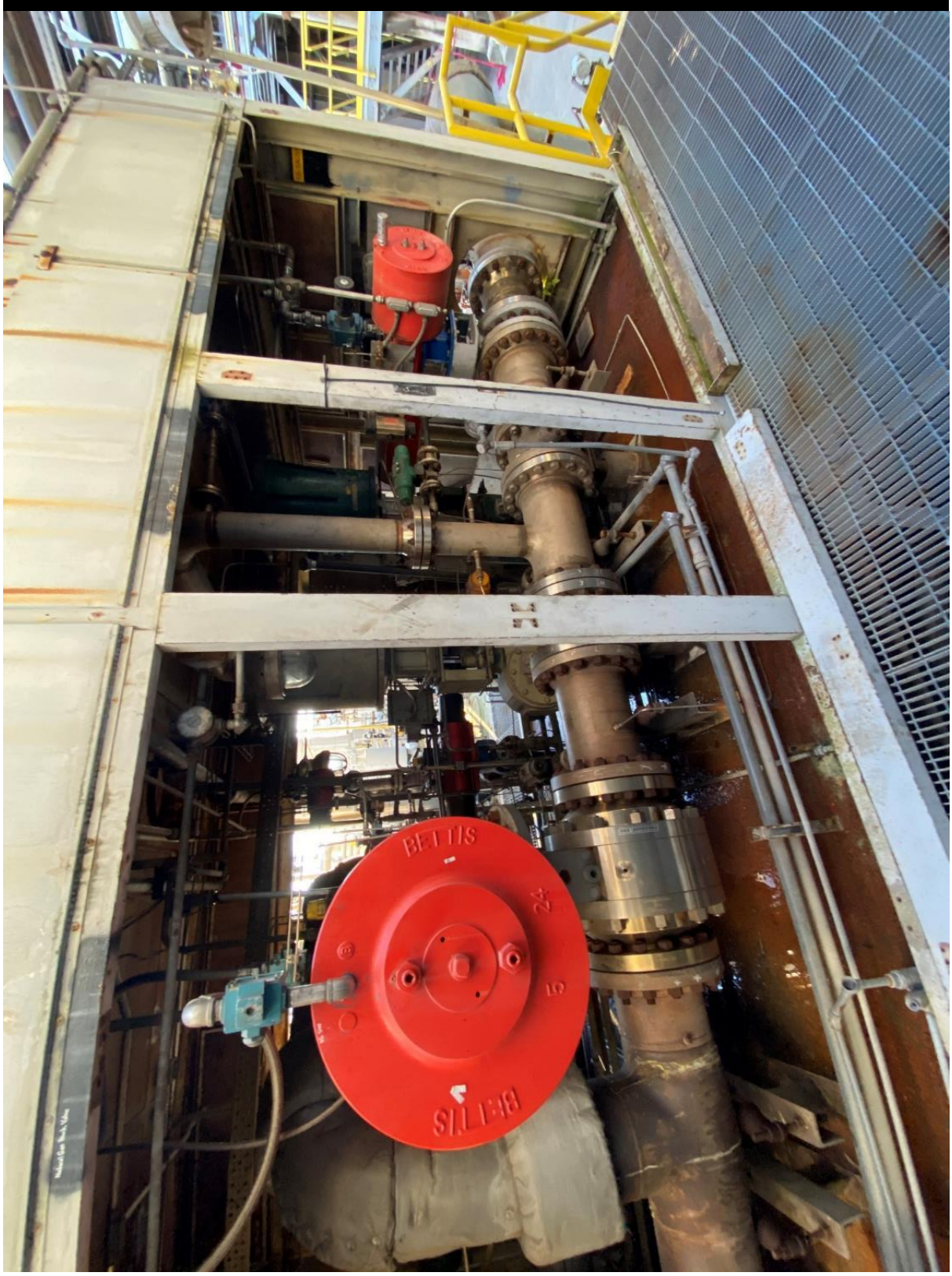
Syngas Line Ring
Header

Drain for water wash

Drains from syngas lowpoint

VS13-1 and VS13-2 Valves
CPD inlet to Syngas Header

Syngas Line showing both Syngas block valves and control valves



Syngas Line showing both Syngas block valves and control valves

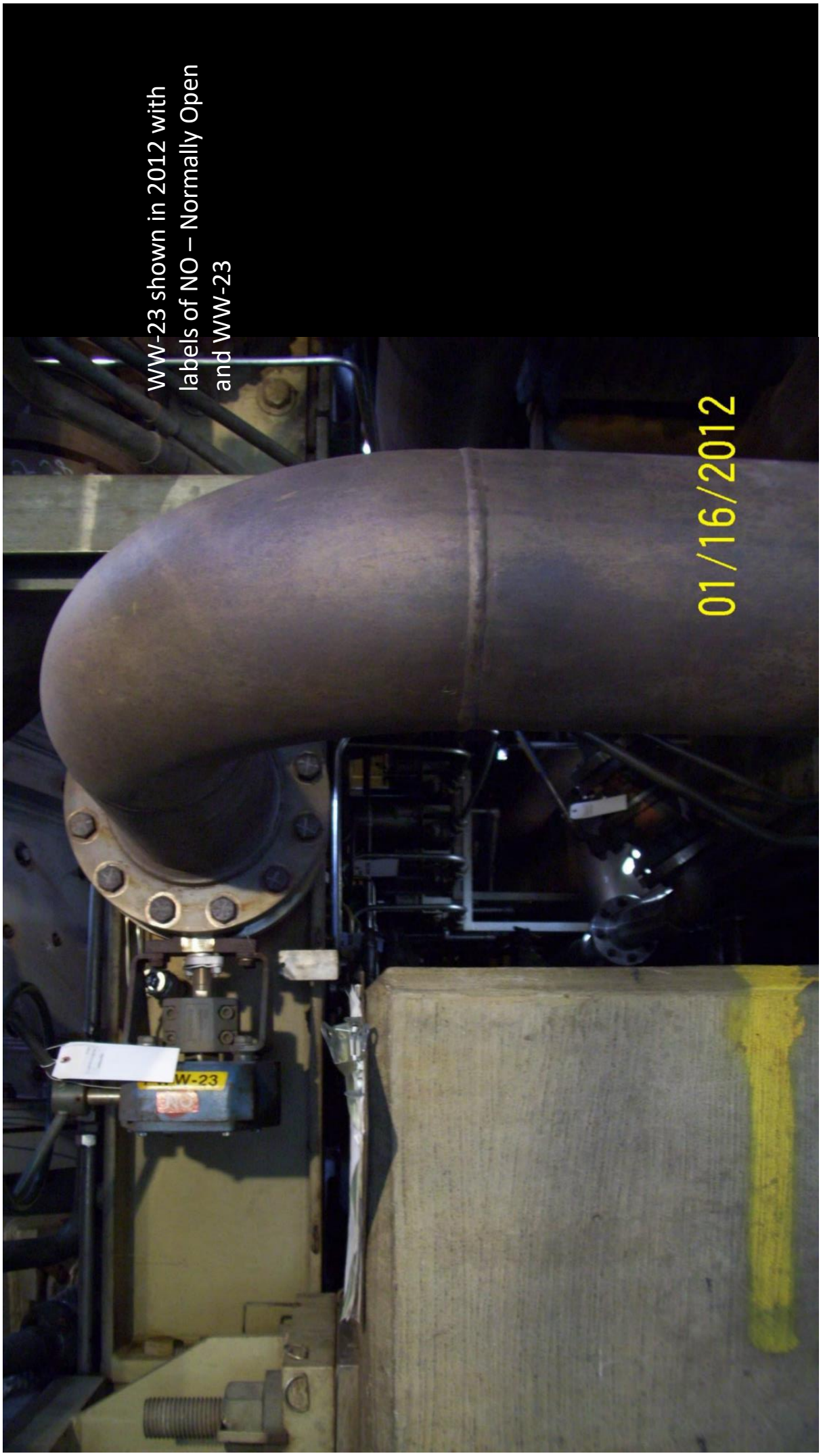
Water draining from P2 cavity

Head pressure in P2 Cavity
12psi equates to 27 FT

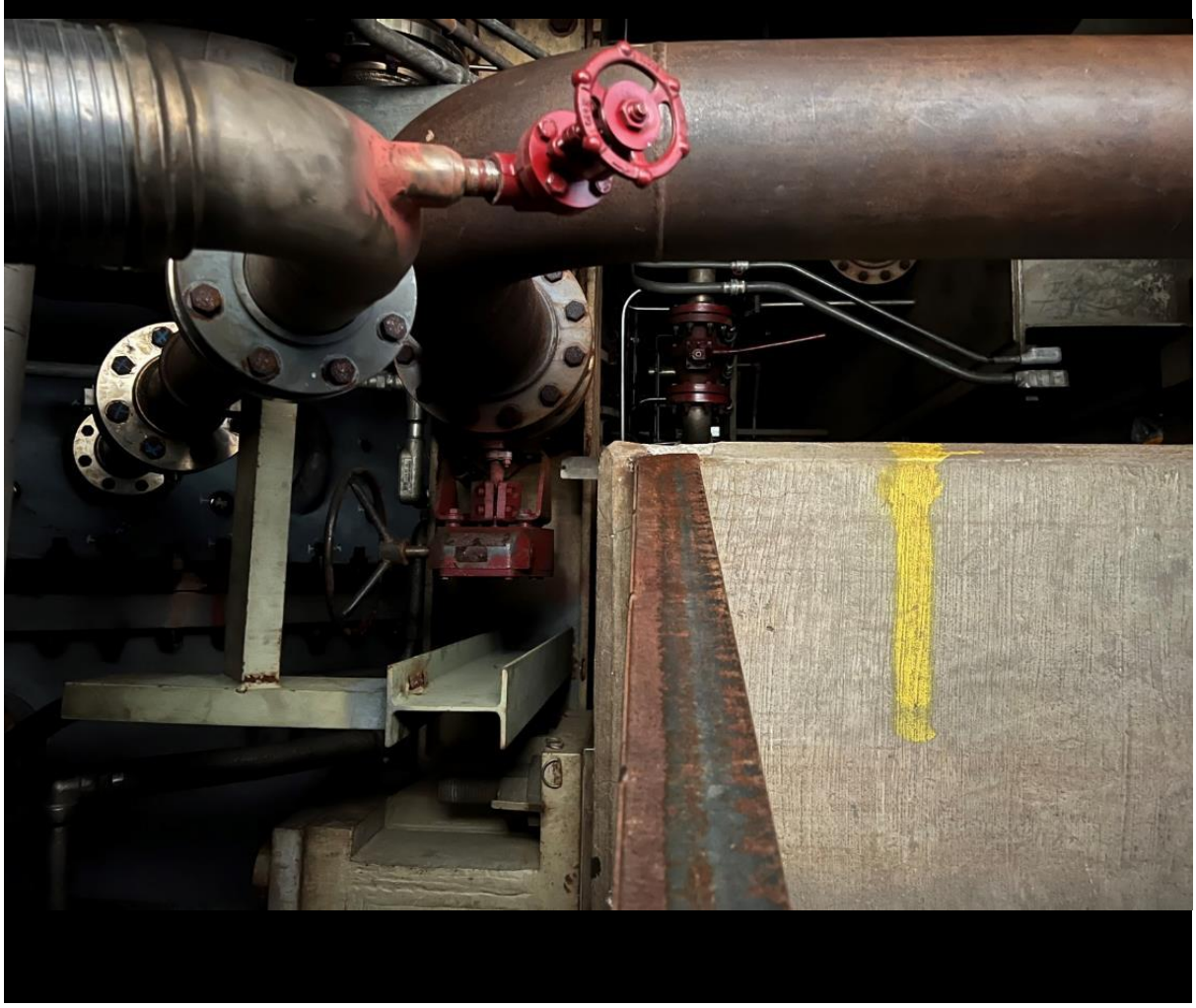
Water draining from the tie point from Syngas to flare

Dye going into P3 cavity
to test leak by of VS4-2


Dye leaking by VS4-2
shown in P4 cavity


WW-23 shown in 2012 with labels of NO – Normally Open and WW-23
01/16/2012
W-23

WW-23 as found with labels gone and repainted




WW-23 as found with labels
gone and repainted. Valve was
mostly closed

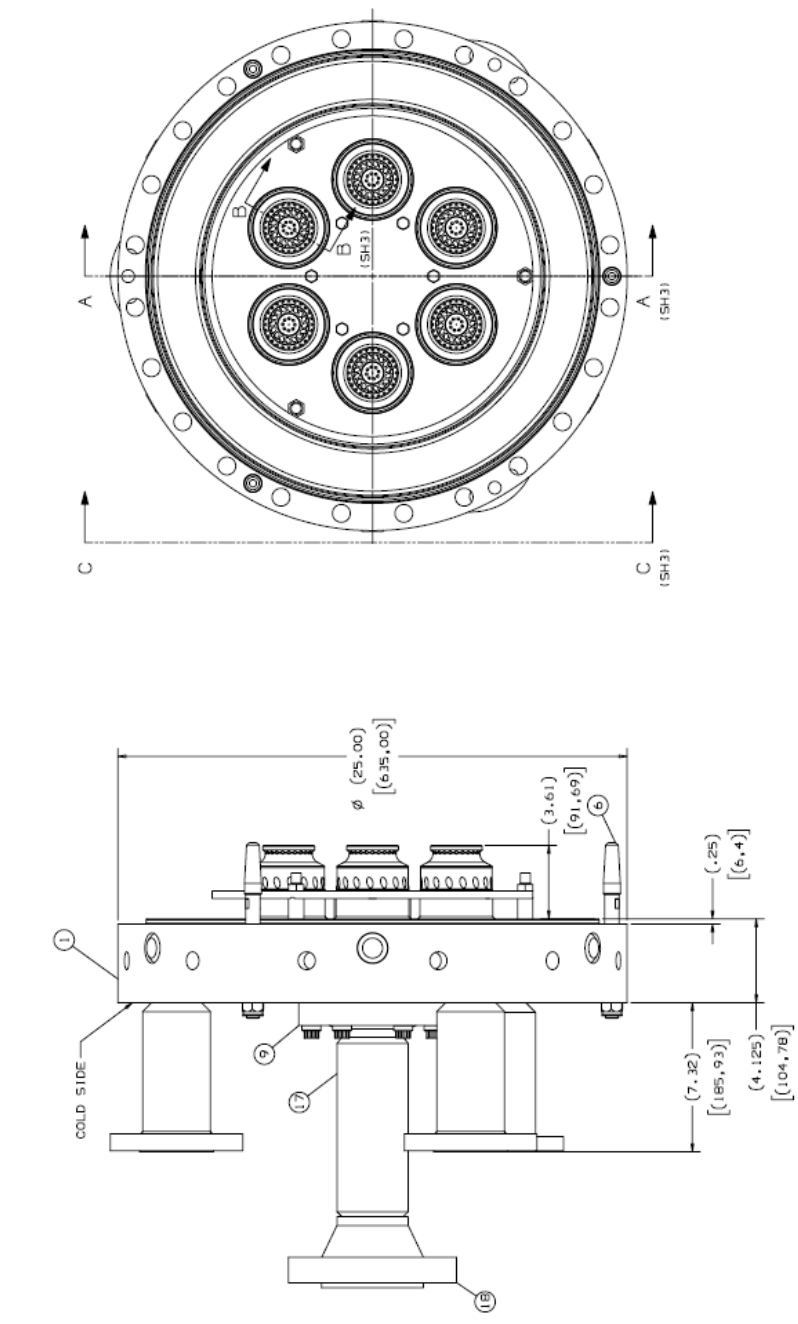
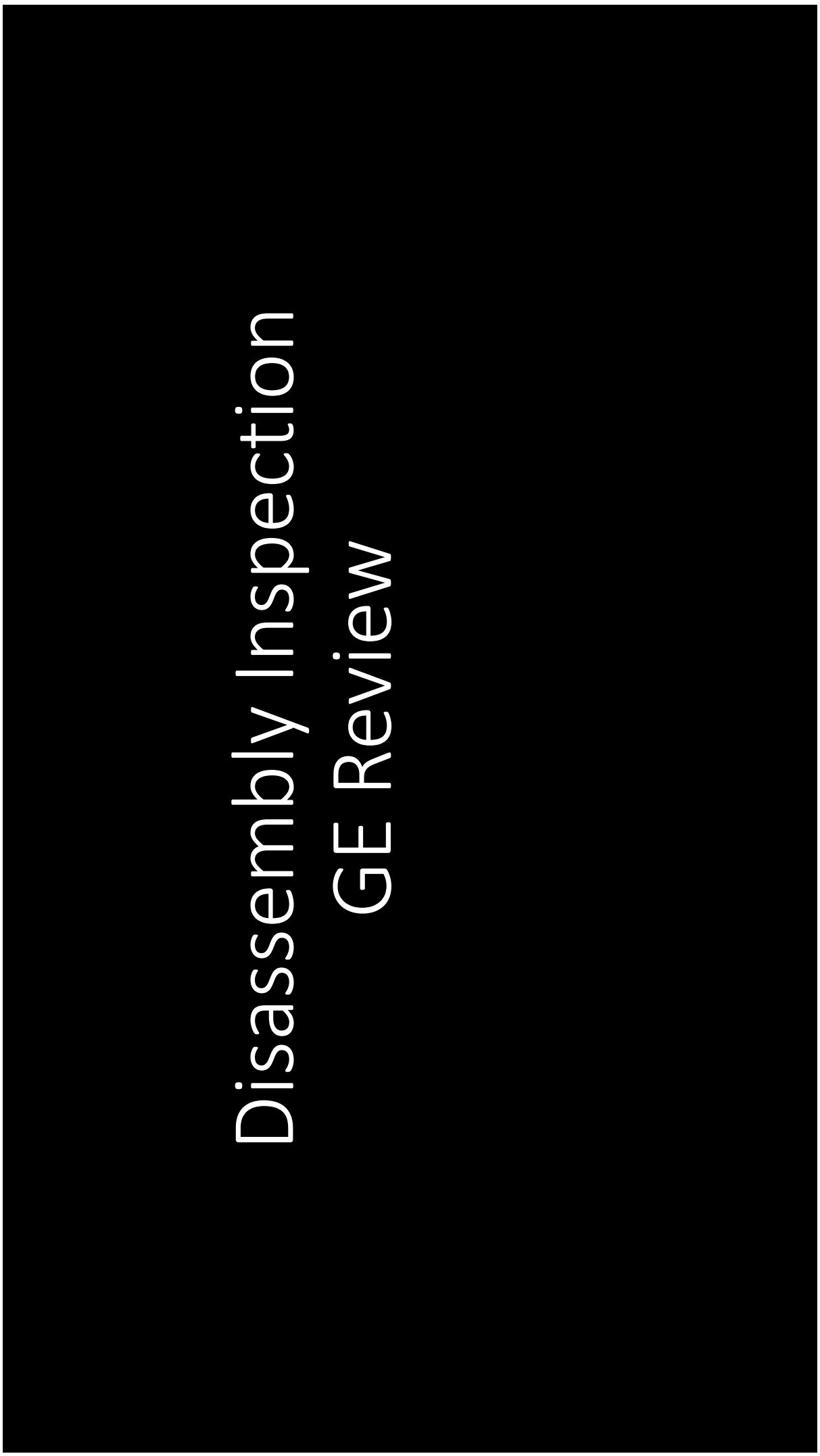
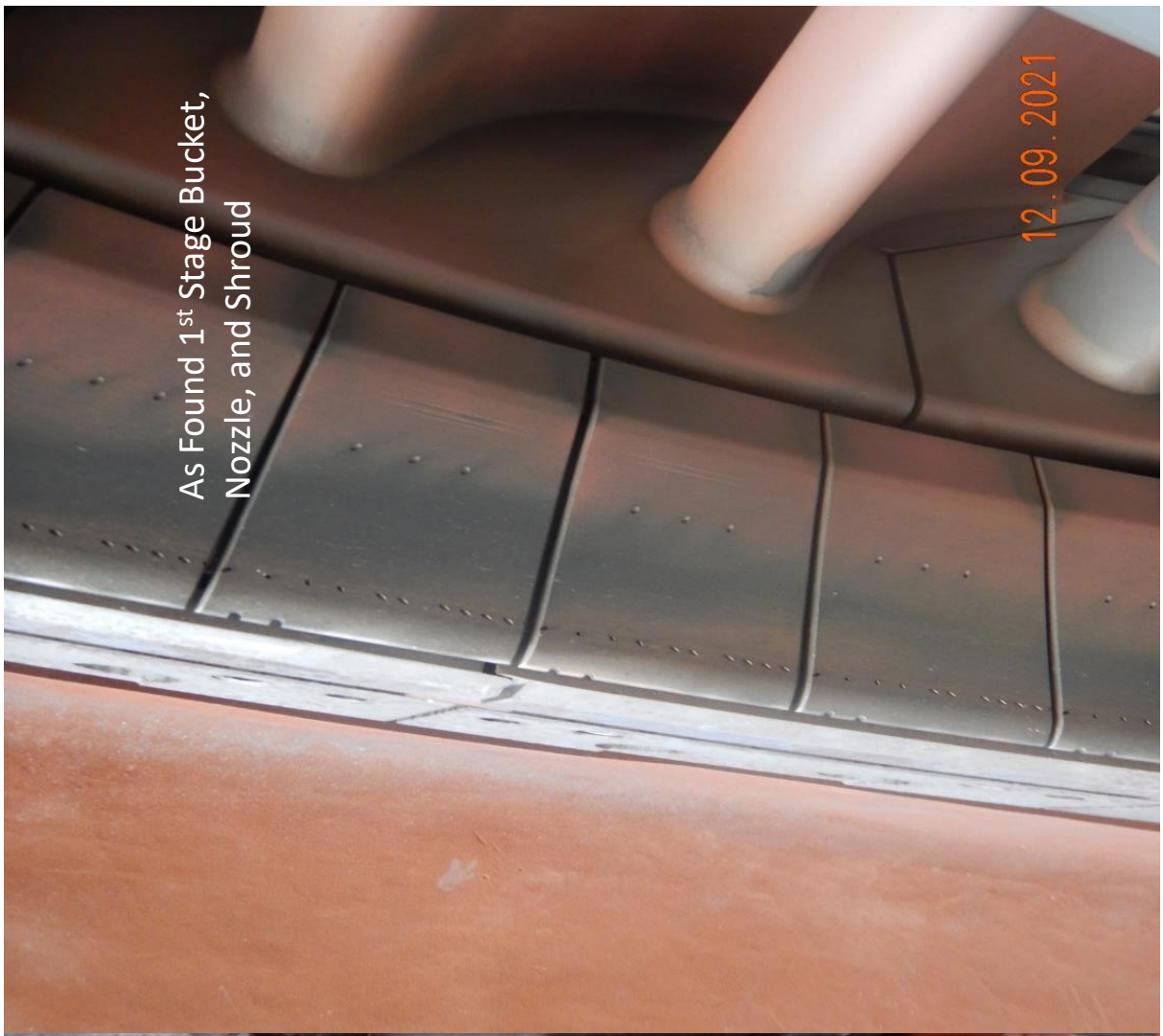


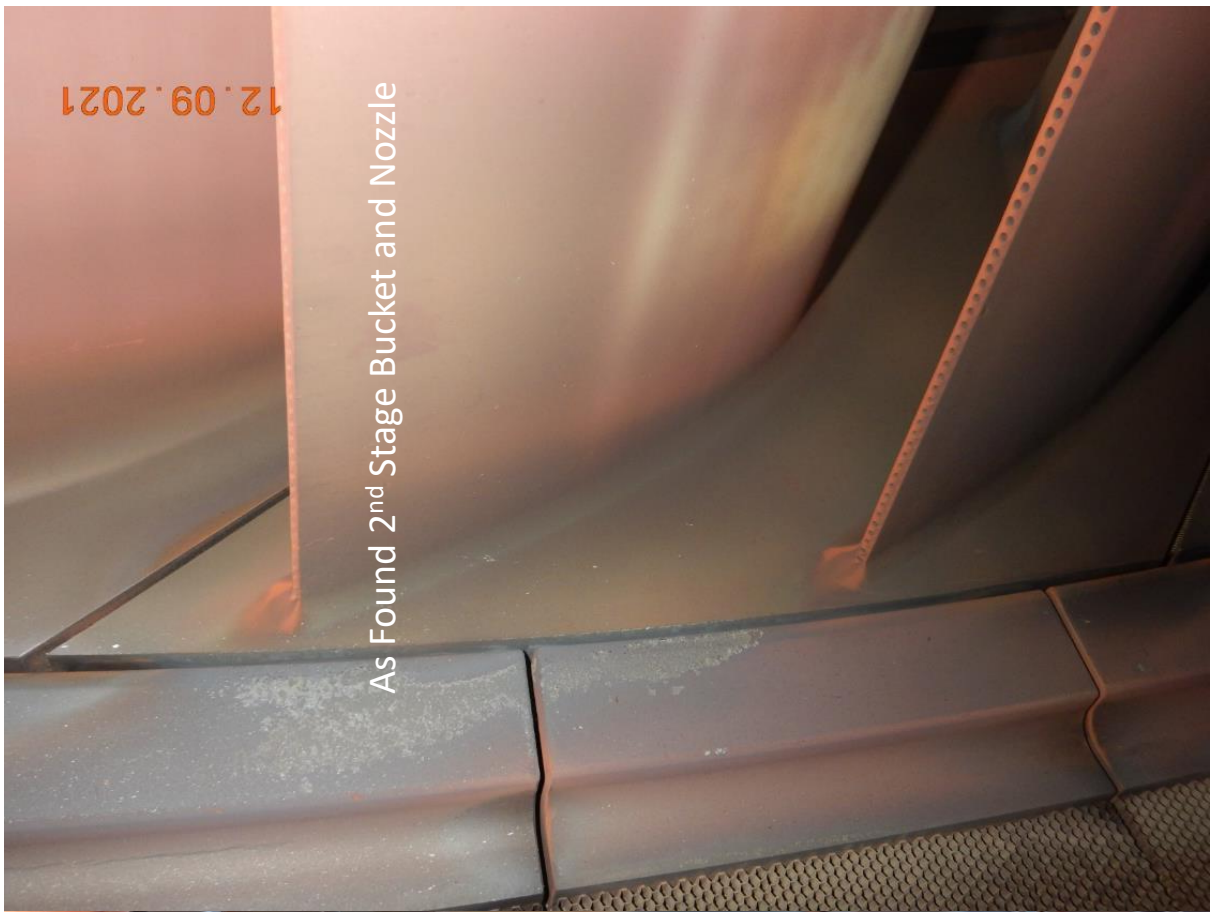
Diagram of End Cover– shows the diluent and syngas line tie to end cover to go to nozzles. There are 14 end covers per Unit


Disassembly Inspection
GE Review

As Found 1st Stage Bucket and Nozzle


As Found 1st Stage Bucket,
Nozzle, and Shroud
12.09.2021


12.09.2021


12.09.2021
As Found 2nd Stage Bucket and Nozzle


12.11.2021


12.09.2021


12.02.2021
As Found 3rd Stage Bucket and Nozzle

As Found Turbine Blades


As Found Exhaust Frame
12.11.2021
12.11.2021


As Found Compressor Blades
12.11.2021

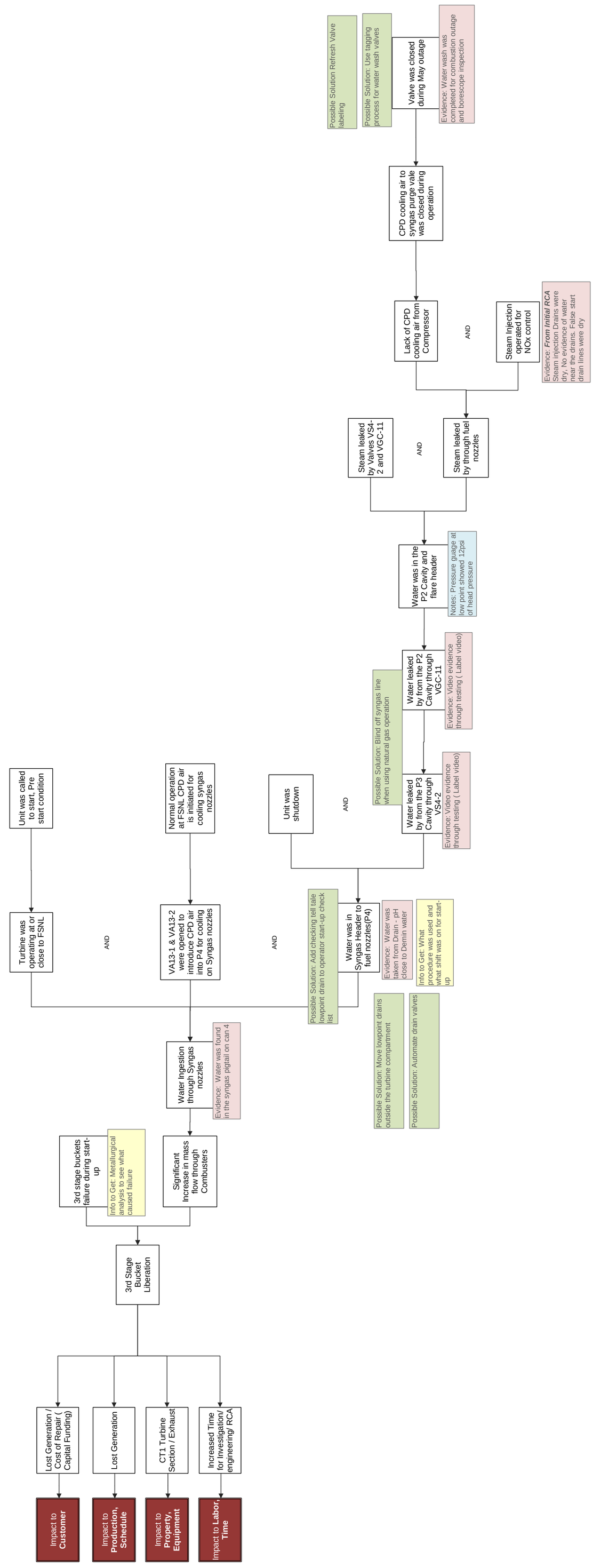

12.11.2021


As Found Compressor Blades

What	Problem(s)	CT1 Turbine 3rd stage nozzles and buckets liberated
When	Date	November 29, 2021
	Time	8:00 AM
	Different, unusual, unique	Plant was Starting Up
Where	Facility, site	Polk Power Station
	Unit, area, equipment	Powerblock, Unit 1, CT
	Task being performed	CT was approaching FSNL

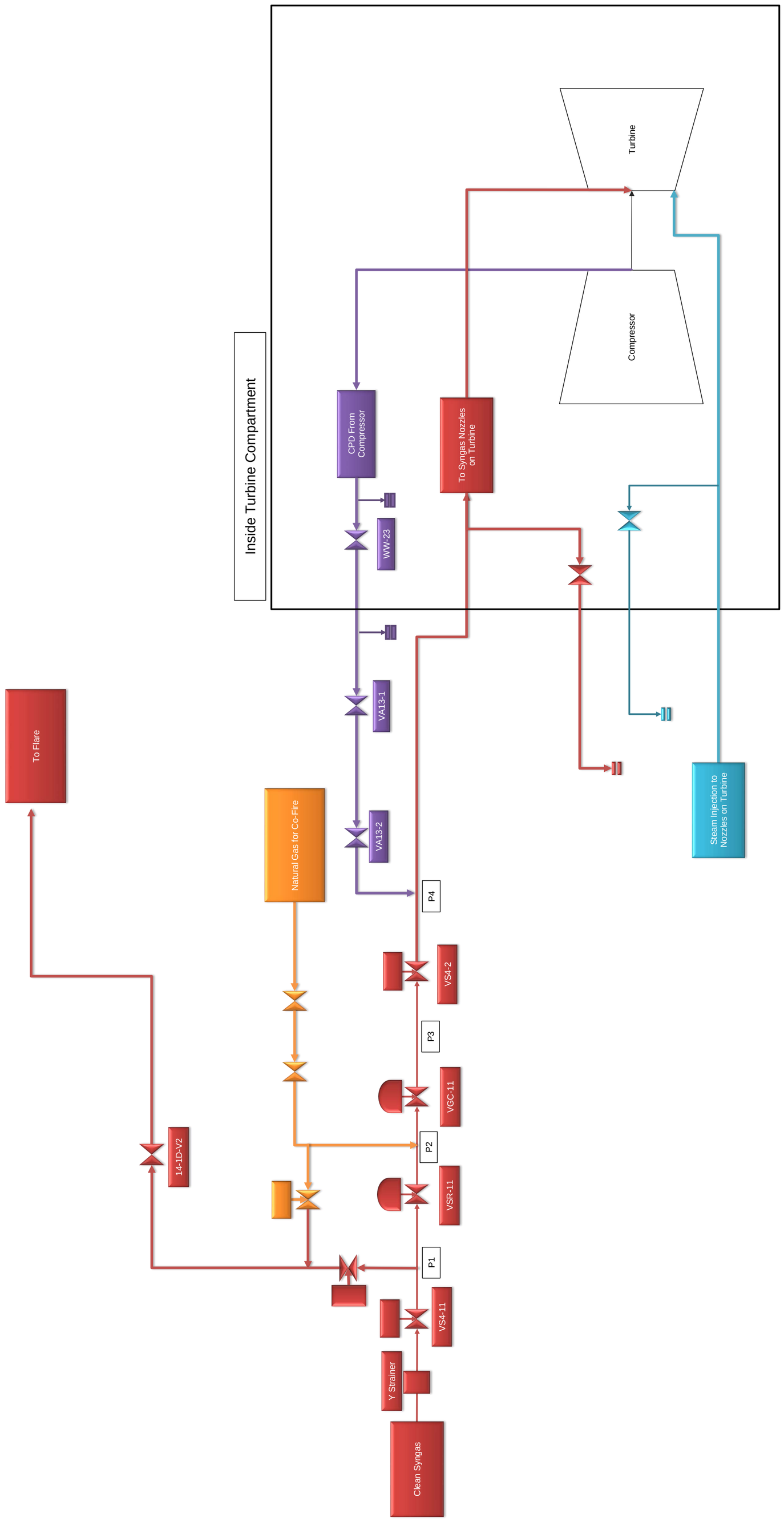
Impact to each GOAL

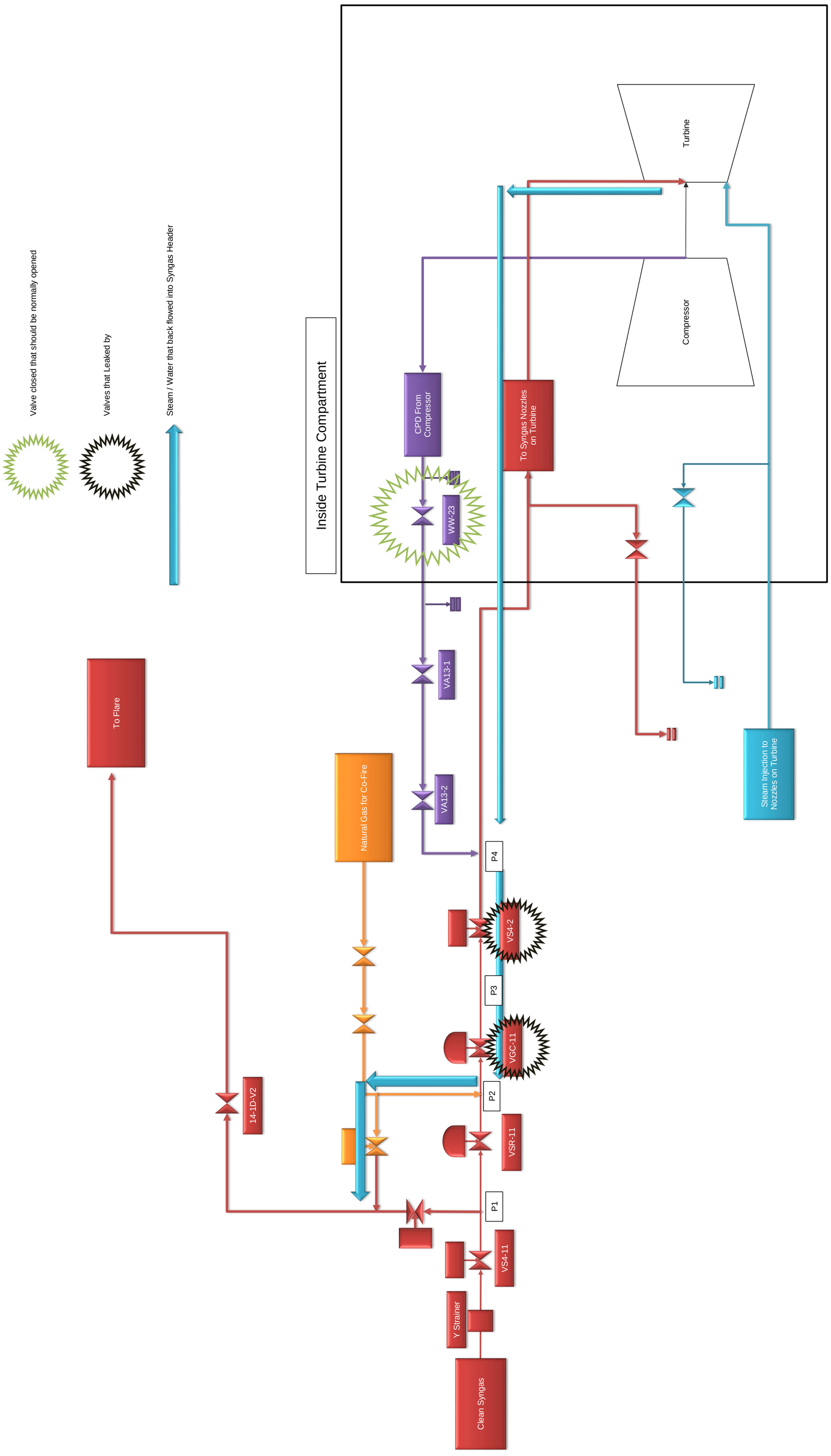
Safety		
Environment		
Customer		
Production, Schedule	92 days of Forced Outage at 200MW	
Property, Equipment	CT1 Turbine HGP Hardware, Exhaust Frame, Bearings, Compressor Blending	TBD
Labor, Time		
	This incident	$0
Frequency		
	Annualized Cost	$0

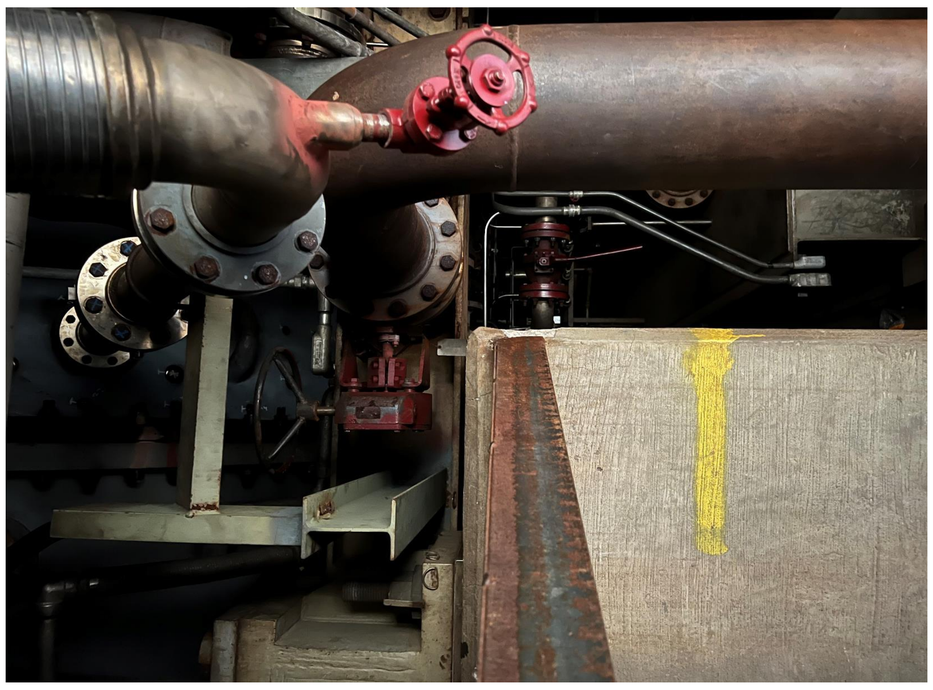

Possible Solution Refresh Valve labeling
Possible Solution: Use tagging process for water wash valves
Valve was closed during May outage
Evidence: Water wash was completed for combustion outage and borescope inspection
CPD cooling air to syngas purge vale was closed during operation
Lack of CPD cooling air from Compressor
AND
Steam Injection operated for NOx control
Evidence: From Initial RCA Steam injection Drains were dry, No evidence of water near the drains. False start drain lines were dry
Steam leaked by Valves VS4-2 and VGC-11
AND
Steam leaked by through fuel nozzles
Water was in the P2 Cavity and flare header
Notes: Pressure guage at low point showed 12psi of head pressure
Possible Solution: Blind off syngas line when using natural gas operation
Water leaked by from the P2 Cavity through VGC-11
Evidence: Video evidence through testing (Label video)
Water leaked by from the P3 Cavity through VS4-2
Evidence: Video evidence through testing (Label video)
Unit was called to start, Pre start condition
Turbine was operating at or close to FSNL
AND
Normal operation at FSNL CPD air is initiated for cooling syngas nozzles
VA13-1 & VA13-2 were opened to introduce CPD air into P4 for cooling on Syngas nozzles
AND
Unit was shutdown
Possible Solution: Add checking tell tale lowpoint drain to operator start-up check list
Water was in Syngas Header to fuel nozzles(P4)
Evidence: Water was taken from Drain - pH close to Demin water
Info to Get: What procedure was used and what shift was on for start-up
Possible Solution: Move lowpoint drains outside the turbine compartment
Possible Solution: Automate drain valves
Water Ingestion through Syngas nozzles
Evidence: Water was found in the syngas pigtail on can 4
3rd stage buckets failure during start-up
Info to Get: Metallurgical analysis to see what caused failure
Significant Increase in mass flow through Combusters
3rd Stage Bucket Liberation
Lost Generation / Cost of Repair (Capital Funding)
Lost Generation
CT1 Turbine Section / Exhaust
Increased Time for Investigation/ engineering/ RCA
Impact to Customer
Impact to Production, Schedule
Impact to Property, Equipment
Impact to Labor, Time

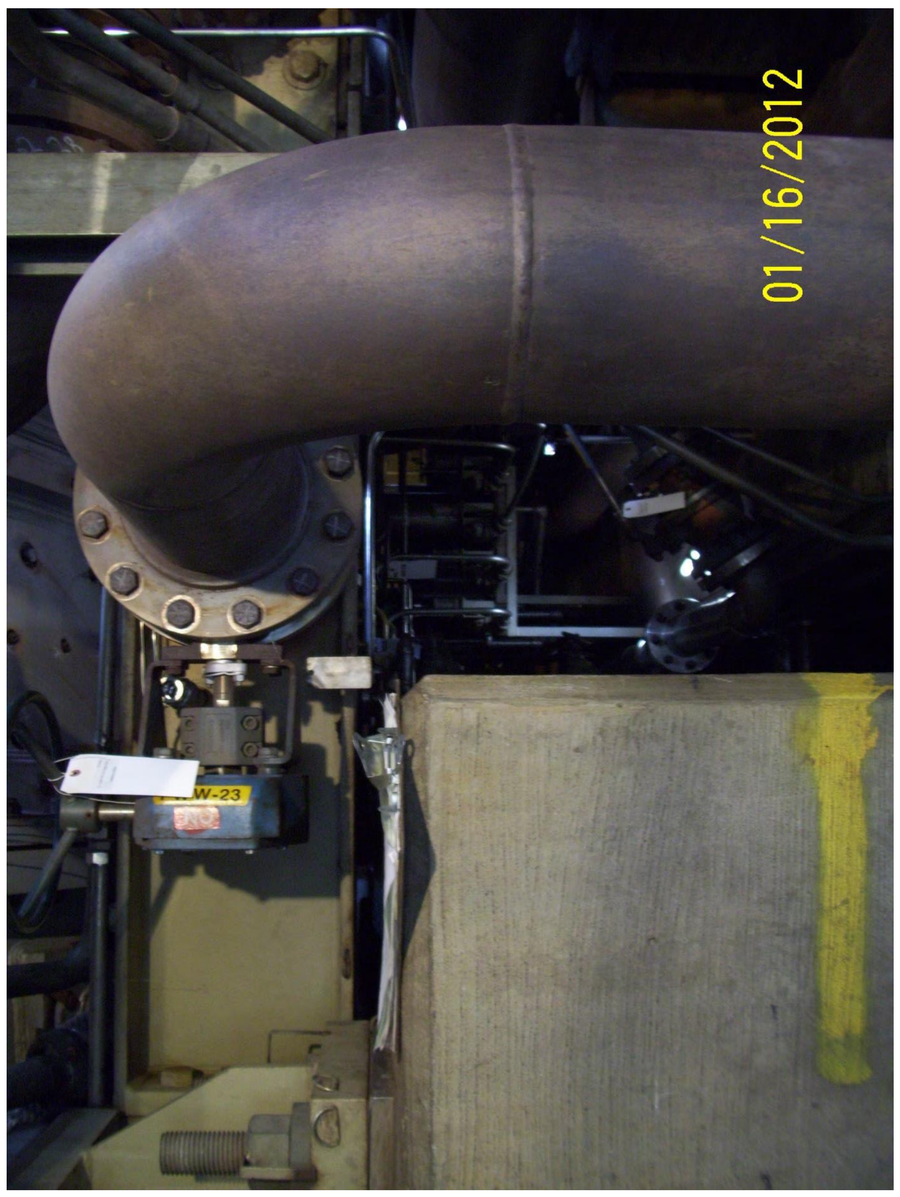
Possible Solutions for Consideration

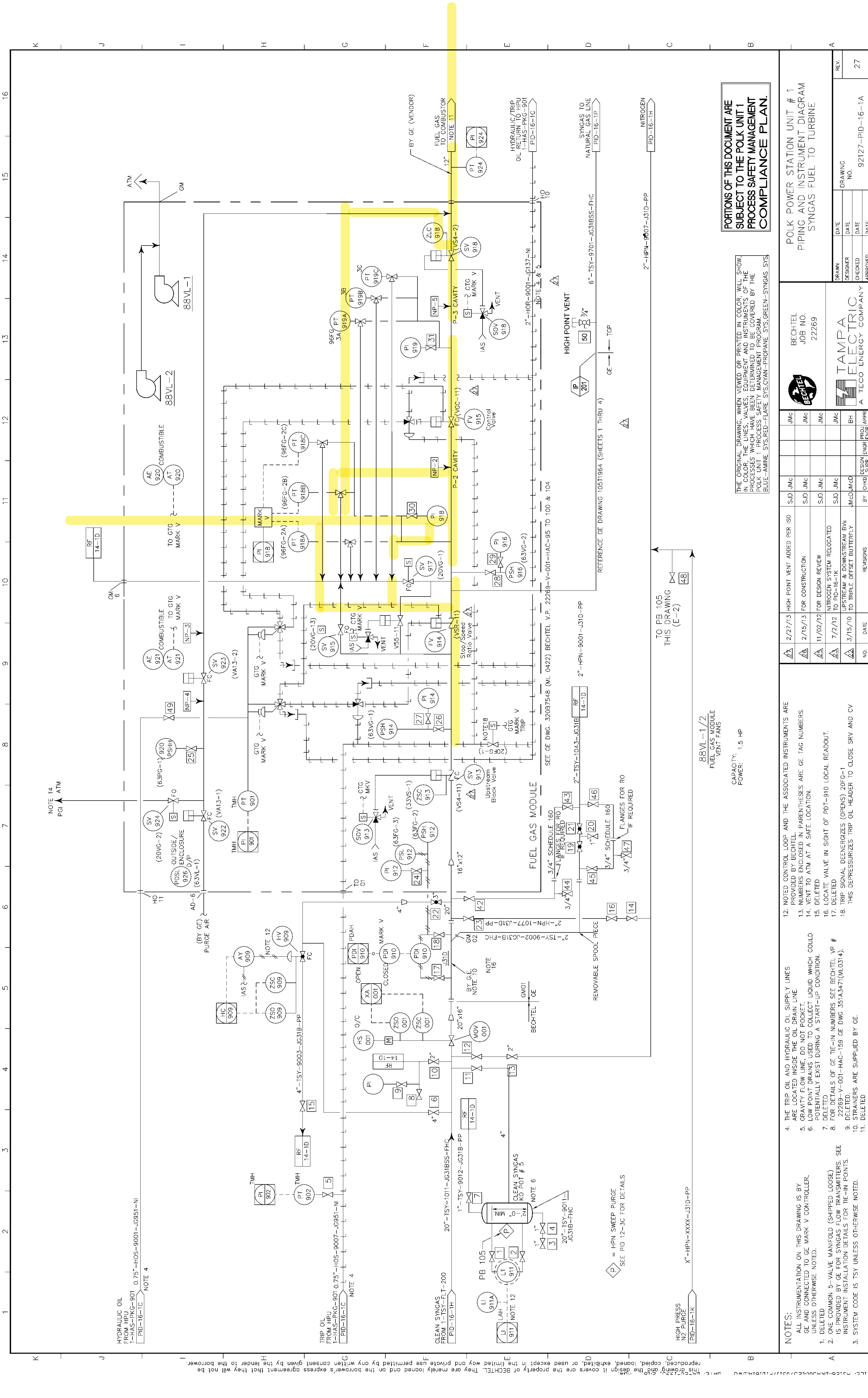
Ref.	Possible Solution	Cause Controlled
1	Add a Prestart walkdown or procedure for operators to visually look for water	Water leaked by from the P3 Cavity through VS4-2
2	Put a WO request for all work	Water leaked by from the P3 Cavity through VS4-2
3	Blind off syngas line when using natural gas operation	Water leaked by from the P3 Cavity through VS4-2
4	Add checking tell tale lowpoint drain to operator start-up check list	Water was in Syngas Header to nozzles(P4)
5	Move lowpoint drains outside the turbine compartment	Water was in Syngas Header to nozzles(P4)
6	Automate drain valves in P4 cavity	Water was in Syngas Header to nozzles(P4)
7	Signoff on all operator rounds / electronic logs of operator rounds	Valve was left closed
8	Use tagging process for water wash valves	Valve was left closed
9	Refresh Valve labeling	Valve was left closed


Inside Turbine Compartment
Turbine
Compressor
CPD From Compressor
To Syngas Nozzles on Turbine
WW-23
VA13-1
VA13-2
To Flare
Natural Gas for Co-Fire
Steam Injection to Nozzles on Turbine
P4
VS4-2
P3
VGC-11
P2
VSR-11
14-1D-V2
P1
VS4-11
Y Strainer
Clean Syngas


Valve closed that should be normally opened
Valves that Leaked by
Steam / Water that back flowed into Syngas Header
Inside Turbine Compartment
Turbine
Compressor
CPD From Compressor
To Syngas Nozzles on Turbine
WW-23
VA13-1
VA13-2
To Flare
Natural Gas for Co-Fire
Steam Injection to Nozzles on Turbine
P4
VS4-2
P3
VGC-11
P2
VSR-11
14-1D-V2
P1
VS4-11
Y Strainer
Clean Syngas




01/16/2012
W-23


PORTIONS OF THIS DOCUMENT ARE SUBJECT TO THE POLK UNIT 1 PROCESS SAFETY MANAGEMENT COMPLIANCE PLAN.
THE ORIGINAL DRAWING, WHEN VIEWED OR PRINTED IN COLOR, WILL SHOW, IN COLOR, THE LINES, VALVES, EQUIPMENT AND INSTRUMENTS OF THE PROCESSES WHICH HAVE BEEN DETERMINED TO BE COVERED BY THE POLK UNIT 1 PROCESS SAFETY MANAGEMENT PROGRAM. BLUE-AMINE SYS,RED-FLARE SYS,CYAN-PROPANE SYS,GREEN-SYNGAS SYS
POLK POWER STATION UNIT # 1
PIPING AND INSTRUMENT DIAGRAM
SYNGAS FUEL TO TURBINE
BECHTEL JOB NO. 22269
TAMPA ELECTRIC
A TECO ENERGY COMPANY
DRAWING NO. 92127-PID-16-1A
REV. 27
TAMPAPID.DWG 16 06/15/93
FUEL GAS MODULE
FUEL GAS TO COMBUSTOR
HYDRAULIC/TRIP OIL RETURN TO HPU 1-HAS-PKG-901
SYNGAS TO NATURAL GAS LINE
NITROGEN
HYDRAULIC OIL FROM HPU 1-HAS-PKG-901
TRIP OIL FROM HPU 1-HAS-PKG-901
CLEAN SYNGAS FROM 1-TSY-FLT-200
HIGH PRESS N2 PURGE
CLEAN SYNGAS KO POT # 5
HIGH POINT VENT
Stop/Speed Ratio Valve
Control Valve
Upstream Block Valve
88VL-1
88VL-2
88VL-1/2 FUEL GAS MODULE VENT FANS
CAPACITY: POWER: 1.5 HP
SEE GE DWG. 320B7548 (ML 0422) BECHTEL V.P. 22269-V-001-HAC-95 TO 100 & 104
REFERENCE GE DRAWING 105T1964 (SHEETS 1 THRU 4)
TO PB 105 THIS DRAWING (E-2)
REMOVABLE SPOOL PIECE
= HPN SWEEP PURGE SEE PID 12-3C FOR DETAILS
2/27/13 HIGH POINT VENT ADDED PER ISO SJD JMc JMc
2/15/13 FOR CONSTRUCTION SJD JMc JMc
11/02/12 FOR DESIGN REVIEW SJD JMc JMc
7/2/12 NITROGEN SYSTEM RELOCATED TO PID-16-1K SJD JMc JMc
3/15/10 UPSTREAM & DOWNSTREAM BVs TO TRIPLE OFFSET BUTTERFLY JMcD JMcD BH
NOTES:
ALL INSTRUMENTATION ON THIS DRAWING IS BY GE AND CONNECTED TO GE MARK V CONTROLLER, UNLESS OTHERWISE NOTED.
1. DELETED
2. ONE COMMON 5-VALVE MANIFOLD (SHIPPED LOOSE) IS PROVIDED BY GE FOR SYNGAS FLOW TRANSMITTERS. SEE INSTRUMENT INSTALLATION DETAILS FOR TIE-IN POINTS.
3. SYSTEM CODE IS TSY UNLESS OTHERWISE NOTED.
4. THE TRIP OIL AND HYDRAULIC OIL SUPPLY LINES ARE LOCATED INSIDE THE OIL DRAIN LINE.
5. GRAVITY FLOW LINE, DO NOT POCKET.
6. LOW POINT DRAINS USED TO COLLECT LIQUID WHICH COULD POTENTIALLY EXIST DURING A START-UP CONDITION.
7. DELETED
8. FOR DETAILS OF GE TIE-IN NUMBERS SEE BECHTEL VP # 22269-V-001-HAC-159 GE DWG 351A3471(ML0314).
9. DELETED.
10. STRAINERS ARE SUPPLIED BY GE.
11. DELETED
12. NOTED CONTROL LOOP AND THE ASSOCIATED INSTRUMENTS ARE PROVIDED BY BECHTEL.
13. NUMBERS ENCLOSED IN PARENTHESES ARE GE TAG NUMBERS.
14. VENT TO ATM AT A SAFE LOCATION.
15. DELETED
16. LOCATE VALVE IN SIGHT OF PDT-910 LOCAL READOUT.
17. DELETED
18. TRIP SIGNAL DEENERGIZES (OPENS) 20FG-1 THIS DEPRESSURIZES TRIP OIL HEADER TO CLOSE SRV AND CV

SIZE B | DWG NO 320B6274 | SH 1 | REV D

NOTES:

1. SEE DEVICE SUMMARY (ML1 0414) FOR CONTROL DEVICE SETTINGS.
2. AD-2 (IF USED) SEE LIQUID FUEL (ML1 0424).
3. CONDENSATE BLOWDOWN FROM INLET AIR HEATING (ML1 0432).
4. AD-7 (IF USED) SEE LIQUID FUEL FWD (ML1 0427).
5. AD-8 (IF USED) SEE ATOMIZING AIR (ML1 0425).
6. AD-3 (IF USED) SEE CONTROL AIR (ML1 0419).
7. FOR CONTINUATION SEE INLET AIR HEATING (ML1 0432) AND INLET AND EXHAUST (ML1 0471).
8. PROCESS AIR EXTRACTION FOR CUSTOMER USE.
9. FA6-1 COMPRESSOR BLEED FILTER SHELL DRAIN VALVE NORMALLY CLOSED.
10. AD-6 (IF USED) SEE FUEL PURGE (ML1 0477).
11. ALL LINES WITH AN AD DESIGNATION ARE FOR REFERENCE ONLY, NOT INTENDED TO DEPICT TRUE LOCATION ON CASING.

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
D	MP18614 MDR-940115 ADDED NOTE 11; REV SH 2; ADDED SH 4; LAST REV C	94-9-8 C.Queenby 94.05.11	

REVISE ON CAD ONLY
UG PART: 320B6274_0417.PRT

TAMPA ELECTRIC COMPANY
POLK POWER STATION-UNIT #1
EQUIP#: 1-PWR-GTG-901
PLANT ID #: 92127
CONTRACT #: 357-1193

V. P.—22269-V-001-HAC-43/5

EQUIP. NO.

1	SYMBOLS, PIPING	277A2415
IT.	NOMENCLATURE	IDENT

LIST OF COMPLEMENTARY DOCUMENTS

D	C	D	D	REV	REV STATUS OF SHEETS
4	3	2	1	SH	

- ☐ (1) Work May Proceed.
- ☐ (2) Revise and Resubmit. Work May Proceed. Subject to Incorporation of Changes Indicated.
- ☐ (3) Revise and Resubmit. Work May Not Proceed.
- ☐ (4) Review Not Required. Work May Proceed.

DATE RECEIVED 9-12-94

IMPORTANT: Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

DWG. STATUS
SIGNED
DATE
BECHTEL

GR0268

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES. TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± ANGLES ± FRACTIONS ±	DRAWN C JONES	93-05-17
	CHECKED C JONES	93-05-17
	ENGRG J PADGETT	93-05-18
	ISSUED C POWELL	93-05-25
	QA HN MILDE	93-05-25
	SIM TO: 25986987	

GE Power Generation

GENERAL ELECTRIC COMPANY
GAS TURBINE
Greenville, SC

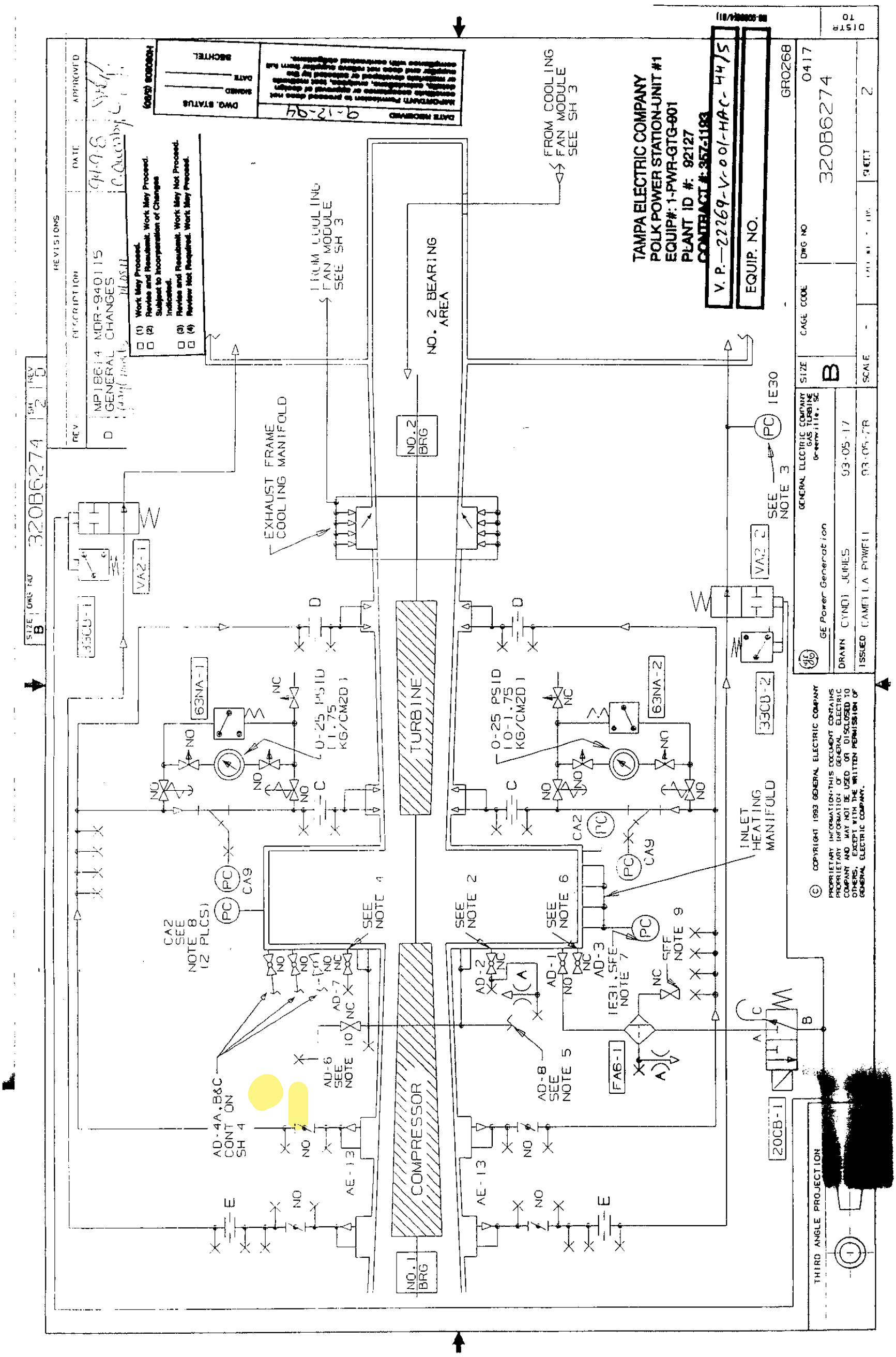
DIAGRAM,SCH PP-CLG & SLG AIR

FIRST MADE FOR 7L7AIPFA13-1 0417

SIZE	CAGE CODE	DWG NO	DISTR TO
B		320B6274	
SCALE -	CALC NO - LIN -	SHEET 1	

THIRD ANGLE PROJECTION

[redacted]-1N


TAMPA ELECTRIC COMPANY
POLK POWER STATION-UNIT #1
EQUIP#: 1-PWR-GTG-001
PLANT ID #: 92127
CONTRACT #: 357-1193
V. P.—22269-V-001-HAC-44/S
EQUIP. NO.
GR0268
320B6274
FROM COOLING FAN MODULE SEE SH 3
NO. 2 BEARING AREA
EXHAUST FRAME COOLING MANIFOLD
NO.2 BRG
TURBINE
NO.1 BRG
COMPRESSOR
INLET HEATING MANIFOLD
0-25 PSID 0-1.75 KG/CM2D
63NA-1
63NA-2
VA2-1
VA2-2
33CB-1
33CB-2
20CB-1
FA6-1
CA2 SEE NOTE 8 (2 PLCS)
AD-4A,B&C CONT ON SH 4
AD-6 SEE NOTE 10
AD-8 SEE NOTE 5
AD-7
AD-2
AD-1
AD-3
AE-13
IE31, SEE NOTE 7
SEE NOTE 9
SEE NOTE 3
SEE NOTE 2
SEE NOTE 6
SEE NOTE 4
GE Power Generation
GENERAL ELECTRIC COMPANY GAS TURBINE Greenville, SC
DRAWN CYNDI JONES 93-05-17
ISSUED CAMILLA POWELL 93-05-28
SIZE B
SCALE
THIRD ANGLE PROJECTION
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BATES STAMPED PAGES 353 - 481

TAMPA ELECTRIC COMPANY
DOCKET NO. 20220001-EI
OPC'S THIRD REQUEST FOR
PRODUCTION OF DOCUMENTS
FILED: AUGUST 10, 2022

GE Energy Services

G A S T U R B I N E I N S P E C T I O N R E P O R T

Major Inspection

for

TECO ENERGY INC
TECO POLK POWER STATION, Unit 1

Equipment Serial #: 0296436

Job Start Date: 2/2/2009

Report Issued: 6/24/2009

FSR#: 357T1061

Report Printed: June 24, 2009

Prepared By:
Jason Barody
Field Engineer

Approved By:
Steve Braamse
Service Manager

GE Energy Services

JOB SUMMARY

Customer:	TECO ENERGY INC		
Station:	TECO POLK POWER STATION		
Unit No.:	1		
Equipment Serial #:	0296436	Rating:	159 MW
Service Year:	1996		
Eng. Responsibility:	GTD		
Equipment Model:	NA	Control System:	Mk V
Frame Size:	Ms7000	Fuel Type:	Dual Fuel
Driven Equipment:	Generator	Driven Equip S/N:	337X011
Accessory Gear S/N:	NA	Load Gear S/N:	NA
Service Type:	Contract Maintenance		
Office Location:	SE CS-TAMPA (SB)		
FSR#:	357T1061		
Service Manager:	Steve Braamse		
Service Director:	Randy Willis		
Field Engineer:	Jason Barody		
Job Start Date:	2/2/2009	Completion Date:	3/22/2009
Job Type:	Major		
Work Scope:	[N] Hot Gas Path	[Y] Major [N] Fuel Nozzle [N] Combustion [N] Other	

	Total Fired Hours	Fired Starts	Emergency Stops	Peak Fired Hours	Cogen Starts	Total Starts
Current:	83906	340	435	0	0	1451
Last:	23194	0	0	0	0	0
Interval:	60712	340	435	0	0	1451

GE Site Personnel:

Name	Responsibility
Winard Parsons	Project Manager

GE Energy Services

JOB SUMMARY

Name	Responsibility
Jason Barody	Mechanical TA Days
Art Payne	Mechanical TA Nights

Customer Site Personnel:

Name	Responsibility
Jake English	TECO Contract Supervisor

Contractors:

Company	Responsibility
APM	MW Craftlabor
Dale C. Rossman	Electrical and I&C
ESI	Scaffolding / Insulation

JOB SUMMARY

GE Energy Services provided Contract Maintenance services, including necessary supervision, craft labor, tooling, equipment, and replacement parts to perform a Major Inspection with ECI at the TECO Polk Power Plant on the Unit 1 Combustion Turbine (SN 296436). A Magic inspection was also performed on Generator (SN 337X011).

The main scope of this outage is to perform a major inspection on the gas turbine and Magic inspection on the generator. Disassembly of the unit began on 02/02/2009 and the unit was turned over as mechanically complete on 03/20/2009. Work on the unit was completed on a 2 shift per day, 7 day a week basis with labor provided by APM.

Unit disassembly consisted of removal of the inlet, compressor, compressor discharge, turbine and exhaust casings, turbine piping, all combustion hardware, and all hot gas path components. Inspections on all the hardware to be replaced (transition pieces, combustion caps, liners, flow sleeves, shrouds, nozzles, and buckets) were conducted by a General Electric Field Representative. After disassembly, opening clearances were taken in order to reference rotor position.

GE Life Extension Services performed erosion tests, ECI and PT inspections on the compressor and turbine rotors. During their inspection of the stage 1 turbine wheel, an indication was found in a cooling slot. The rotor was then loaded and shipped to the Houston Service Shop for replacement. The rotor replacement scope was per FMI F5940G2.

All lower half casings, piping and extraction lines were borescoped and upper half piping and pigtails blown out to ensure no foreign material was left in the machine. A GE representative verified all the closings.

Dale C. Rossman performed all instrumentation and electrical work.

All Insulation work and scaffolding work was performed by ESI. ESI built the parts shelves used to store parts.

GE supplied all replacement parts.

The unit was reassembled using the major inspection procedures and was mechanically complete on 03/20/2009 for turnover and start of clearance removals for BOP startup checks. The green rotor run in started on 03/21/2009 and the unit was released for operation on 03/22/2009.

RECOMMENDATIONS

SHOULD BE DONE IMMEDIATELY...

1. Bearing, Journal; Deflector - Oil; T2 Bearing

The removed T2 bearing oil seals should be sent to a GE Service Shop for refurbishment.

2. Combustion Liner; Assembly; 1-14

The removed combustion liners should be sent to a GE Service Shop for refurbishment.

3. Transition Piece, Combustion; Assembly; 1-14

The removed transition pieces should be sent to a GE Service Shop for refurbishment.

4. Flow Sleeve, Combustion; Assembly; 1-14

The removed flow sleeves should be sent to a GE service center for repair or refurbishment.

5. Fuel Nozzle; Assembly; 1-14

The removed fuel nozzles should be sent to a GE Service Shop for refurbishment.

6. Valves, Check; Vck4 Pfd Liq Fuel Check Vlv; 1-14

A complete set of liquid fuel check valves and o-rings should be kept in storage for emergency situations.

7. Valve (VA19), Liquid Purge; Assembly; 1-14

A complete set of liquid fuel purge valves should be kept in storage for emergency situations.

RECOMMENDATIONS

8. Bucket, 1st Stage; Assembly; 1-92

The removed 1st stage buckets should be sent to a GE Service Shop for refurbishment.

9. Bucket, 2nd Stage; Assembly; 1-92

The removed 2nd stage buckets should be sent to a GE Service Shop for refurbishment.

10. Bucket, 3rd Stage; Assembly; 1-92

The removed 3rd stage buckets should be sent to a GE Service Shop for refurbishment.

11. Nozzle Arrangement, Stage 1; Assembly;

The removed 1st stage nozzle should be sent to a GE Service Shop for refurbishment.

12. Nozzle Arrangement, Stage 2; Assembly;

The removed 2nd stage nozzles should be sent to a GE Service Shop for refurbishment.

13. Nozzle Arrangement, Stage 3; Assembly;

The removed 3rd stage nozzles should be sent to a GE Service Shop for refurbishment.

14. Shroud, Stage 1 Turbine; Assembly; 1-32

The removed 1st stage shroud blocks should be sent to a GE Service Shop for refurbishment.

15. Shroud, Stage 2 Turbine; Assembly; 1-48

The removed 2nd stage shrouds should be sent to a GE Service Shop for refurbishment.

RECOMMENDATIONS

16. Shroud, Stage 3 Turbine; Assembly; 1-36

The removed 3rd stage shrouds should be sent to a GE Service Shop for refurbishment.

RECOMMENDATIONS

SHOULD BE DONE ON A REGULAR MAINTENANCE SCHEDULE...

1. Rotor, Compressor; Assembly; Aft Compressor

Inspect the aft end compressor for rubs per TIL 1502-2R1 at the yearly borescope.

RECOMMENDATIONS

SHOULD BE DONE AT THE NEXT OUTAGE...

1. Inlet Guide Vane; Assembly; 1-64

GE recommends that the bushings, spring washers, and vanes be thoroughly cleaned and inspected at the next outage.

2. Thermocouples/RTD's; Tt-ws1 Turb Temp-Whlspc 1st Stg; Left and Right

These areas should be inspected at the next opportunity for any damage or missing parts.

3. Piping/Components (GF); Hose - Flexible; All

All flexible metal hoses should be inspected at each outage.

4. Piping/Components (GF); Hose - Flexible; All

All flexible metal hoses should be inspected at each outage.

5. Piping/Components (GF); Hose - Flexible; Multiple

The fuel gas pigtails should be inspected for fretting and wear at the next outage.

TIL/ECN ACTIVITY

TIL # 1214-3R3 7FA BUCKET LOCKWIRE DOWEL PIN ASSEMBLY PROCEDURE AND LOCKWIRE INSPECTION

All three stages of buckets were removed and replaced during the major inspection. Each stage was installed per GE procedure and the lockwire was installed and pinned per TIL 1214-3R3. Each individual pin was inspected by GE and verified to have 2 stake marks.

TIL # 1502-2R1 7F AND 9F AFT END COMPRESSOR RUBS

The aft end compressor was inspected during the outage for rubs per TIL 1502-2R1. There were no issues to note. All opening and closing clearances were sent to GE Engineering for approval. The unit was reassembled without any need for tip grinding.

Inspect the aft end compressor for rubs per TIL 1502-2R1 at the yearly borescope.

TIL # 1547-2 GAS TURBINE FLEX HOSE RECOMMENDATIONS

All gas turbine flexible hoses were removed during the major inspection and pressure tested per TIL 1547-2. There were no major issues to note and a few gaskets that were found to be leaking. All in question were replaced. See attached data sheet for further details.

All flexible metal hoses should be inspected at each outage.

TIL # 1562 E- AND F-CLASS SHIM MIGRATION AND LOSS

During the major inspection, all existing compressor shims were inspected for shim migration. All new shims that were added during the major inspection were pinned per the latest GE procedure.

TIL/ECN ACTIVITY

TIL # 1565 SAFETY PRECAUTIONS TO FOLLOW WHILE WORKING ON VARIABLE GUIDE VANES

During the major inspection, all necessary safety precautions were taken while working on the inlet guide vane assembly per TIL 1565.

TIL # 1585 PROPER USE AND CARE OF FLEXIBLE METAL HOSES

All gas turbine flexible hoses were removed during the major inspection and pressure tested per TIL 1547-2. There were no major issues to note and a few gaskets that were found to be leaking. All in question were replaced. See attached data sheet for further details.

All flexible metal hoses should be inspected at each outage.

TIL/ECN ACTIVITY

FMI # F5940G2 a

While in Houston Service Shop for repair, the compressor rotor was modified. Note that stages R0 and R3 were tipped to bring this compressor blade/wheel tip diameters to current AO standards. This CR forward stub shaft also received the R0 Biscuit Mod.

	Current Dia	To be tipped
R0	80.704"	80.680"
R3	69.706"	69.686"

A new GEN-4 Turbine Rotor (Serial # RM68078001) was used for this unit rotor rebuild. Customer supplied Stage 1, 2 and 3 buckets were sent to Houston for installation and balance.

During the outage, TECO decided to use the new Turbine Rotor of the latest design. To further improve unit rotor life/reliability, the exhaust frame was modified in conjunction with the rotor modification. This modification involves relocation of the exhaust frame cooling holes and replaces the current single wall cone assembly with a double wall cone assembly. These modifications were applied per drawing 143E5344G001.

The existing discourager seal was removed using pneumatic hand grinder and vacuum cleaner. The double wall cone modification also relocates the exhaust frame cooling holes to redirect airflow and pre-warming the air prior to impingement on rotor aft 3rd stage wheel. This results in increasing the operating temperature of the turbine rotor aft shaft, significantly reducing stresses in the third stage wheel to aft shaft rabbet due to more uniform turbine rotor temperature.

Along with the exhaust frame modification mentioned above, exhaust flow shields have been provided and were installed per drawing 114E1819G001. These flow shields will reduce the potential for liquid leakage through the bolted joints at the bottom vertical centerline of the exhaust diffuser.

COMBUSTION SECTION

Combustion Liner

Assembly; 1-14

The existing test combustion hardware was replaced with new hardware. The new liner PN was 979E0242G007. The removed liners that came out of the unit were found in good general condition and were inspected by GE. The liners were inspected for signs of wear along the liner stops and for distortion along the body. The liner caps appeared in excellent condition with no TBC coating defects. All floating collars moved freely with none to minimal collar wear detected. The liner bodies had numerous cracks around the second band of combustion mixing holes located 6 inches from inlet end. The liners all displayed significant heat patterns, including all cracked areas. All liners remained symmetrical with no bulging or dips. All liners showed minor wear observed on the liner stops and on the inner crossfire tube collar. This wear is the result of these pieces being in constant contact with liners and inner crossfire tubes. The results from the inspection are on the attached data sheet. The serial numbers and the part numbers were also recorded. The components will also be inspected further at the GE Service Shop.

The removed combustion liners should be sent to a GE Service Shop for refurbishment.

Combustion Liner

Crossfire Tube; 1-14

The crossfire tubes were removed and visually inspected for damage by GE. There was normal wear on the male and the female inner crossfire tubes where the tubes rest in the liner, as well as wear located in the slots where the retainers clip onto the crossfire tube. All of the inner crossfire tubes were replaced with new components. Refer to the data sheets in this report for further details.

Combustion Liner

Crossfire Tube; Outer - All

The outer crossfire tubes were removed and inspected. There were a few found to be incorrect parts and were replaced during the outage with the proper parts.

COMBUSTION SECTION

Combustion Liner

Retainer - Crossfire Tube; 1-14

The retainers were removed and visually inspected for damage by GE. The wear on the retainer clips was found in the area where the crossfire tube is in constant contact with the clip. There were also cases where the retainer clips were bent. All retainers were replaced new components. Refer to the data sheets in this report for further details.

Combustion Transition Piece

Assembly; 1-14

The transition pieces were removed as part of the major inspection. The serial numbers and the part numbers were recorded, and the transition pieces were inspected. They were inspected for cracks along the aft brackets, implosion on the impingement sleeve, and thermal barrier coating loss. With the exception fretting on the picture frames no other issues found on any of the transition pieces. The respective data sheet is attached to this report. The removed hardware should be sent to a GE Service Shop for further inspection and refurbishment.

The new transition pieces part number is 979E0269G029. The serial numbers were recorded for each component. Care was taken upon installing the transition piece so that the floating seals were not damaged. The transition piece to first stage nozzle setback dimensions were recorded, and they were then compared to the design clearances listed on GE drawing 986E0312. The dimensions were within the specifications noted, and the transition piece lock tabs were bent.

The removed transition pieces should be sent to a GE Service Shop for refurbishment.

Combustion Transition Piece

Bracket - Bullhorn; 1-14

All bullhorn brackets were removed and inspected by GE. There were signs of wear on all, refer to the attached data sheet and picture. They were replaced with new components.

COMBUSTION SECTION

Transition Piece Hardware

Assembly; 1-14

New transition piece hardware was used during the installation of the transition pieces. The instructions for the installation of the transition pieces and the associated hardware were closely followed. GE performed a thorough QC inspection during and after the installation of the transition pieces and hardware to ensure proper installation.

All transition piece aft bracket and side seal retainer bolts and bullhorn mounting bolts were lubricated with heavy-duty anti-seize during assembly. The aft mounting bolts, bullhorn bolts and side seal retainer bolts were properly torqued as specified in reassembly instructions. The lock tabs were installed and checked for proper installation. A complete set of new hardware should be on hand for the next outage.

Transition Piece Hardware

Retainer - Side Seal; 1-14

The side seals were removed and visually inspected for damage by GE. They were replaced with new components during reassembly. GE also inspected the side seal blocks for damage.

Combustion Flow Sleeve

Assembly; 1-14

The flow sleeves were removed, serial numbers recorded and inspected. They were inspected for damage to the hula seals and for wear along the combustion piston ring. A visual inspection of the hula seals revealed no signs of bent seals or excessive wear. The flow sleeves were then turned on the forward face, and the combustion piston ring was inspected for wear. There were no defects to note. There were 8 components replaced with the correct group number, which were installed at the previous CI and per PAC were ok to run until the major inspection.

The removed flow sleeves should be sent to a GE service center for repair or refurbishment.

COMBUSTION SECTION

Combustion Spark Plug

Assembly; #2 & #3

The ignitors were removed and inspected for damage by GE personnel. One of the ignitors warranted replacement. Each was tested prior to final installation.

Fuel Nozzle

Assembly; 1-14

The fuel nozzles were removed from the combustion system and visually inspected. No damage was found on the swirl tips, no coking was present, and no holes were plugged. The part numbers and the serial numbers were recorded after the visual inspection was complete.

A new set of fuel nozzles was on hand for installation. The fuel nozzles were installed with a new gasket and with bolts that were cleaned and lubricated per GEK 107157. The serial numbers and part numbers were recorded from the new fuel nozzles.

The removed fuel nozzles should be sent to a GE Service Shop for refurbishment.

Flame Detector (28FD)

Assembly; 12a, 12b, 13 & 14

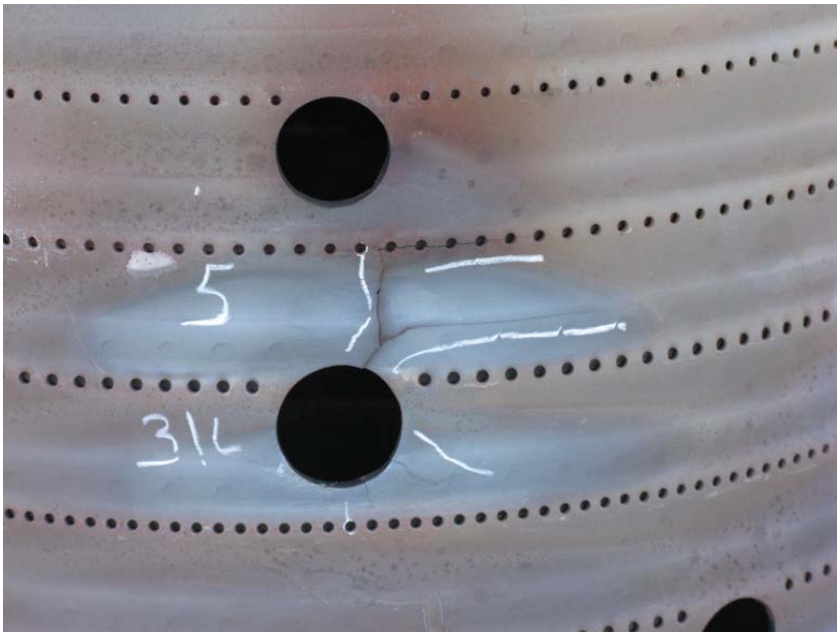
The flame detectors were removed and inspected by GE personnel. One out of the four detectors warranted replacement, no other serious defects were noted.

The cooling coils were visually inspected and found in great condition.

COMBUSTION SECTION

Liners As Found

COMBUSTION SECTION



Typical Liner Cracks Found

COMBUSTION SECTION

Liners - New

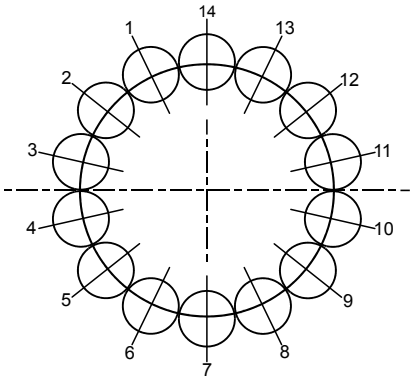
INSPECTION REPORT
Gas Turbine Maintenance

MS7001F

Combustion
Chambers – General Condition

Date	2/12/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes
		Data Type	As Found		

COMBUSTION LINER ORIENTATION
LOOKING DOWNSTREAM



MS7001F GT71F113

PROCEDURE

1. Make inspection of Combustion Casing (Cans), Inner Shields, and Covers.
2. Report Evidence of:
   a. **CORROSION** Make quantitative judgment of the degree (light, medium, heavy)
   b. **CRACKING** Report directional (axial or circumferential) length in inches, location location (weld or parent metal) and disposition (repair or replace)
   c. **OVERHEATING** Look for and report discoloration, bulging (inward) or holes holes burned through.

Chamber No.	Describe Condition and Disposition
1	No noted corrosion, cracking or overheating
2	No noted corrosion, cracking or overheating
3	No noted corrosion, cracking or overheating
4	No noted corrosion, cracking or overheating
5	No noted corrosion, cracking or overheating
6	No noted corrosion, cracking or overheating
7	No noted corrosion, cracking or overheating
8	No noted corrosion, cracking or overheating
9	No noted corrosion, cracking or overheating
10	No noted corrosion, cracking or overheating
11	No noted corrosion, cracking or overheating
12	No noted corrosion, cracking or overheating
13	No noted corrosion, cracking or overheating
14	No noted corrosion, cracking or overheating

Comments	
Overall the general condition is good for these components.	

GT3005 Combustion Can Arrangement General Cond(a)

INSPECTION REPORT
Gas Turbine Maintenance

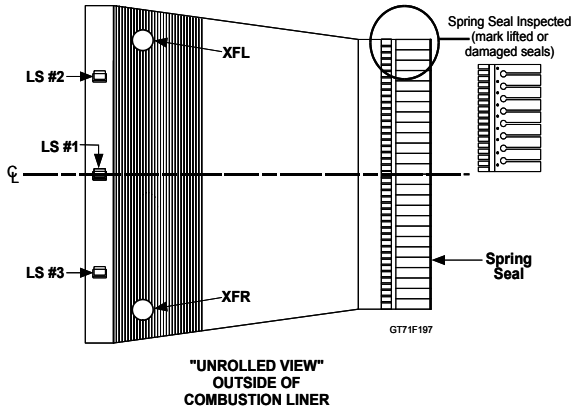
MS 7001FA, 7001FA+, 7001FA+e

Combustion

Liner – General Condition (DLN-2.6)

Date 2/20/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enc. No | Photos Enclosed? Yes
Data Type As-Found

Part No. Out: **919E024** *Part No. In:*



"UNROLLED VIEW"
OUTSIDE OF
COMBUSTION LINER

DISPOSITION CODES
N - No repairs or replacement necessary
R - Repaired (On-site, vendor, ASBD Service Shop)
RN - Replaced with new component (include Serial Number)
RRNI - Replacement recommended

DEFECT CODES
B - Burned
CO - Corroded
C - Crack
BK - Buckled
H - Hot Spots
W - Worn
PH - Plugged Cooling Holes
RD - Liner Ring Distortion
RC - Liner Ring Cracking
BR - Broken
BT - Bent
M - Missing
TB TBC Missing

Liner Inspections

Chamber Number	Serial Number Of Liner		Hula Seal Condition	Liner Stop Condition	Liner Body Condition	X-Fire Collar Condition	Liner Disposition Code
1	166169		W	W		C	RN
2	200436		W	W		C	RN
3	166159		W	W		C	RN
4	166171		W	W		C	RN
5	166170		W	W		C	RN
6	166167		W	W		C	RN
7	166161		W	W		C	RN
8	166162		W	W		C	RN
9	166158		W	W	C	C	RN
10	166166		W	W	C	C	RN
11	166160		W	W	C	C	RN
12	166163		W	W		C	RN
13	166164		W	W		C	RN
14	166165		W	W		C	RN

Comments:
All liners were replaced as part of the major inspection. These liners will be fully inspected when the go to a GE Service Shop for refurbishment.

Combustion Liners1

Inner cross fire tube wear

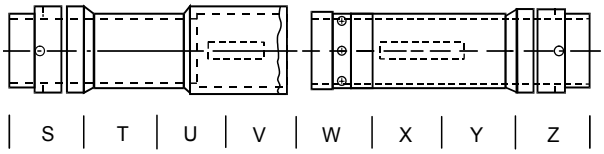
Retaining clips as found

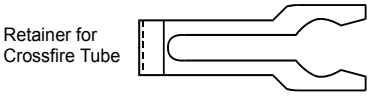
INSPECTION REPORT
Gas Turbine Maintenance
MS7001F

Combustion
Crossfire Tube & Retainer

Date 3/10/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? No

AS FOUND





DEFECT CODES
W - Wear **CR -** Cracked
BT - Bent **BU -** Burned
H - Hot Spots
WA - Wear Coating Lost

DISPOSITION CODES
N - No repair or replacement necessary.
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component.
RR - Replacement Recommended

Chambers	Defect & Location	Disposition	Chamber End	Defect & Location	Disposition
1-2	W-S; W-Z	RN	**1-2.**	BT, WA	RN
			2-1.	BT, WA	RN
2-3	W-Z; W-S	RN	**2-3.**	BT, WA	RN
			3-2.	BT, WA	RN
3-4	W-S	RN	**3-4.**	BT, WA	RN
			4-3.	BT, WA	RN
4-5	W-S; W-Z	RN	**4-5.**	BT, WA	RN
			5-4.	BT, WA	RN
5-6	W-S	RN	**5-6.**	BT, WA	RN
			6-5.	BT, WA	RN
6-7	W-S	RN	**6-7.**	BT, WA	RN
			7-6.	BT, WA	RN
7-8	W-S	RN	**7-8.**	BT, WA	RN
			8-7.	BT, WA	RN
8-9	W-S	RN	**8-9.**	BT, WA	RN
			9-8.	BT, WA	RN
9-10	W-S; W-Z	RN	**9-10.**	BT, WA	RN
			10-9.	BT, WA	RN
10-11	W-S; W-Z	RN	**10-11.**	BT, WA	RN
			11-10.	BT, WA	RN
11-12	W-S	RN	**11-12.**	BT, WA	RN
			12-11.	BT, WA	RN
12-13	W-S	RN	**12-13.**	BT, WA	RN
			13-12..	BT, WA	RN
13-14	W-S; W-Z	RN	**13-14.**	BT, WA	RN
			14-13.	BT, WA	RN
14-1	W-S; W-Z	RN	**14-1.**	BT, WA	RN
			1-14.	BT, WA	RN

Comments:
All components showed typical wear patterns for the amount of hours on them. All were replaced with customer spares during the outage.

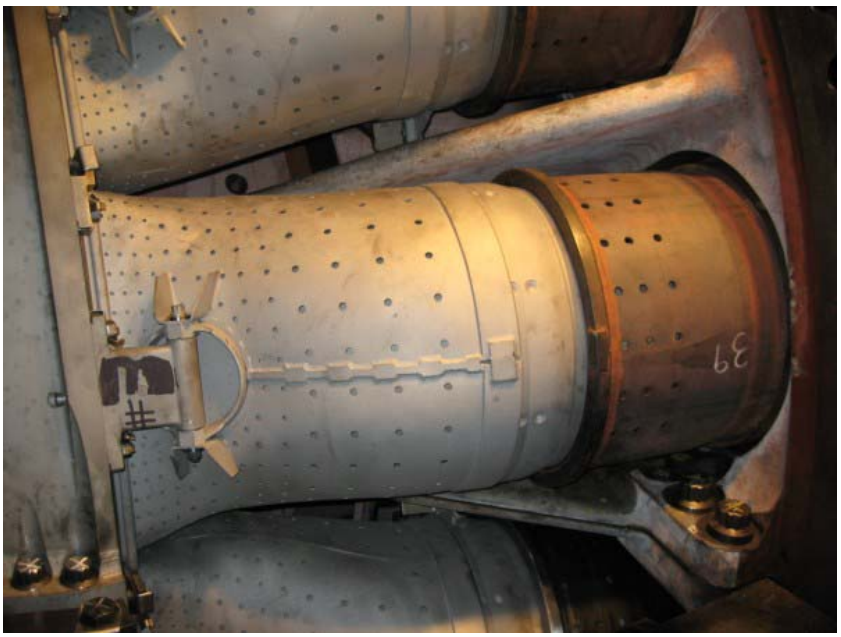
GT3051_Crossfire tube and RetainerInspection

Outer crossfire tubes -- Note the different lengths

TP As Found Condition

TP Picture Frame - As Found Condition

TP - New



TP's Installed

INSPECTION REPORT
Gas Turbine Maintenance
MS7001F

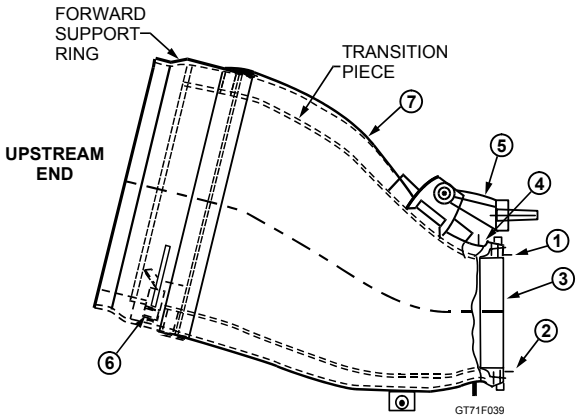
Combustion

Transition Piece – General Condition

Date	2/25	Turbine S/N	296436	Prepared by	Barody, Jason
FSR#	357T1061	Sketches Enclosed?	NO	Photos Enclosed?	N
		Data Type	AS FOUND		

*Part Number Out** **919E0269G013** *Part Number In** **919E0269G013**

*** NOTE: If part number IN is different than part number OUT, check with customer service.**



DEFECT CODES
W - Wear
C - Cracked
H - Hot Spots

CRACK LOCATION CODE
1 - Outer Seal
2 - Inner Seal
3 - Side Frame
4 - Seal Retainer Strip
5 - Aft Bracket
6 - Forward Support
7 - Impingement Sleeve

DISPOSITION CODES
N - No repair or replacement necessary
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component
RR - Replacement Recommended

PART # 129E9499G005

	Serial No.		CRACKS			DEFECTS		
Chamber	Out	In	Cracks	Location	Length	Code	Location	Disposition
1	71F0652					C	1,2,8	RN
2	71F0642					W	1,2,8	RN
3	71F0655					W	1,2,8	RN
4	71F0646					W	1,2,8	RN
5	71F0645					W	1,2,8	RN
6	71F0649					W	1,2,8	RN
7	71F0650					W	1,2,8	RN
8	71F0647					W	1,2,8	RN
9	71F0643					W	1,2,8	RN
10	71F0653					W	1,2,8	RN
11	71F0648					W	1,2,8	RN
12	71F0651					W	1,2,8	RN
13	71F0654					W	1,2,8	RN
14	71F0644					C	1,2,8	RN

GT3200_Transition Piece (a)

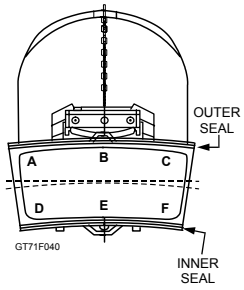
INSPECTION REPORT
Gas Turbine Maintenance

MS 7001F, 9001F

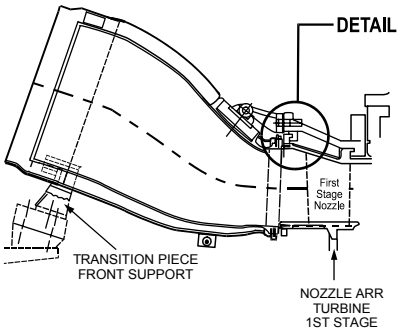
Combustion

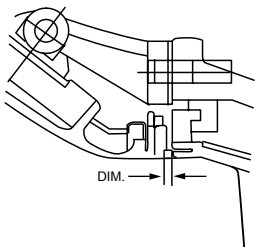
Transition Piece to Nozzle Setback

Date 03/11/09 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type CLOSING



SIX POSITIONS





SIX DIMENSIONS

NOTE: Dimension is taken between the 1st stage nozzle sidewall and the transition piece aft end frame. Measurement is to be taken with feeler gauges or vernier

SETBACK TABLE						
CHAMBER NO.	**Dim. A**	**Dim. B**	**Dim. C**	**Dim. D**	**Dim. E**	**Dim. F**
1	0.275	0.228	0.245	0.393	0.353	0.352
2	0.298	0.258	0.241	0.419	0.384	0.381
3	0.364	0.309	0.281	0.441	0.426	0.369
4	0.303	0.256	0.204	0.286	0.301	0.324
5	0.347	0.278	0.241	0.384	0.353	0.317
6	0.284	0.284	0.248	0.300	0.308	0.283
7	0.270	0.275	0.287	0.431	0.415	0.407
8	0.307	0.279	0.299	0.403	0.402	0.411
9	0.294	0.296	0.296	0.431	0.430	0.436
10	0.314	0.320	0.313	0.407	0.415	0.407
11	0.376	0.333	0.336	0.392	0.418	0.422
12	0.299	0.259	0.259	0.390	0.398	0.412
13	0.271	0.260	0.253	0.379	0.413	0.379
14	0.230	0.244	0.229	0.315	0.310	0.294

Comments:

GE Spec for Dim A, B, and C = 0.200 - 0.400
GE Spec for Dim D, E, and F = 0.250- 0.500

GT3225 TP SETBACK(a)

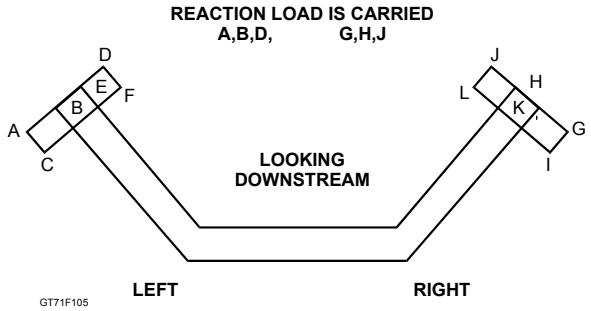
Bullhorns - General Condition

INSPECTION REPORT
Gas Turbine Maintenance

Combustion

MS 7001F, 9001F — ***Transition Piece Front Support Clamp - General Condition***

Date	3/10/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	N	Photos Enclosed?	N
		Data Type	As Found		



CONDITION CODES
N - Normal
W - Worn
CR - Cracked
BT - Bent
M - Missing Metal
BR - Broken
AJ - Adjustment Required

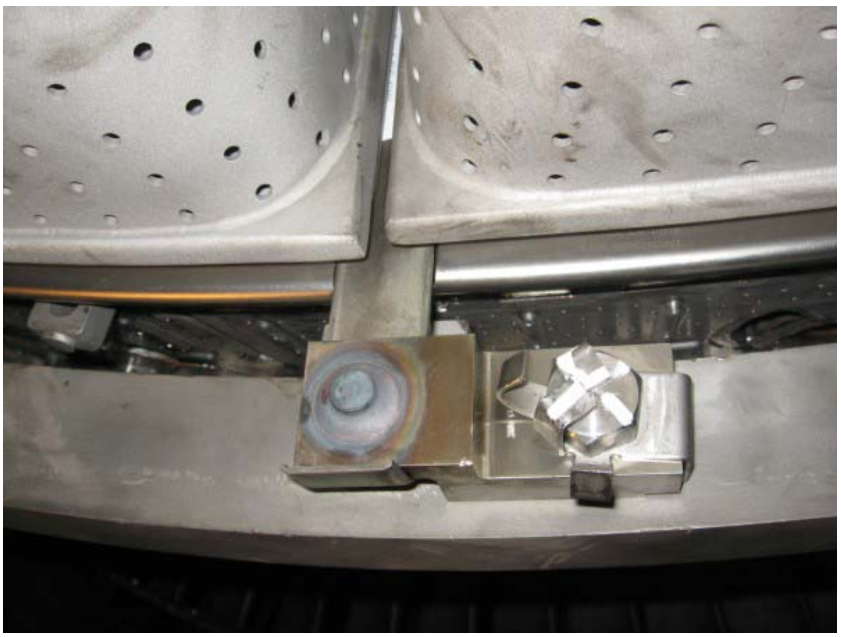
DISPOSITION CODES
NR - No repair or replacement necessary.
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other
RN - Replaced with new component.
RR - Replacement Recommended

		MEASUREMENT LOCATION AND CONDITION											
CHAMBER	**DISP.**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
1	RN	W		W	W					W			W
2	RN	W											
3	RN			W			W	W			W		W
4	RN			W						W	W		
5	RN	W			W			W			W		W
6	RN	W		W	W		W			W	W		W
7	RN			W				W		W			W
8	RN	W		W				W					W
9	RN	W			W			W			W		W
10	RN	W		W	W		W			W	W		W
11	RN			W				W		W			W
12	RN	W		W				W					W
13	RN	W		W				W					W
14	RN	W			W			W			W		W

NOTE: Wear measurement is approximate (visual, feel). Wear depth in MILS.

Comments:
Typical wear on all bullhorn blocks. All were replaced during the outage with a spare set.

GT3215_BullHorns(a)



TP Hardware Installed

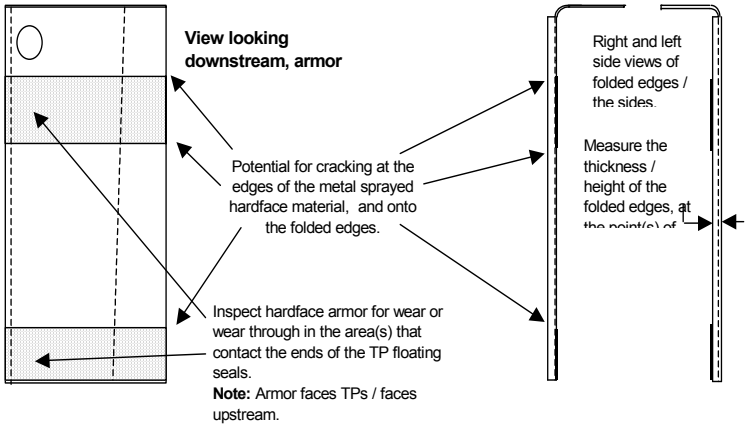
Side seal block condition

Side seal wear - As Found

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001F, 9001F

Combustion
Transition Piece Side Seal Condition

Date 3/10/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed ? Yes
Data Type As Found



CONDITION CODES:

N - Normal
CR - Cracked Armor
BT - Bent
M - Missing Metal
BA - Breeched (Hardfaced)
W1 - Wear Less Than 50%

DISPOSITION CODES

NR - No repair or replacement necessary.
RN - Replaced with new component.

Location Between	Condition	Disposition
1-2	W1	RN
2-3	W1	RN
3-4	W1	RN
4-5	W1	RN
5-6	W1	RN
6-7	W1	RN
7-8	W1	RN
8-9	W1	RN
9-10	W1	RN
10-11	W1	RN
11-12	W1	RN
12-13	W1	RN
13-14	W1	RN
14-1	W1	RN

Comments:
Typical condition for side seals. No major defects to note. All were replaced with new parts during the outage.

GT3235_Side Seals(a)

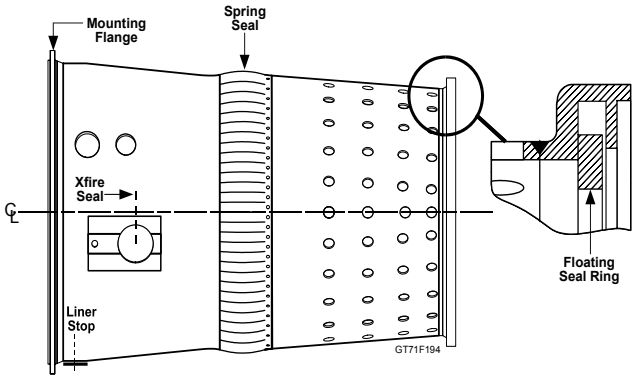
Flow Sleeves - New

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001FA, 7001FA+, 7001FA+e

Combustion Section

Flow Sleeve - General Inspection (DLN-2.6)

Date	2/20	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes



DEFECT CODES:
CR - Cracked
D - Distortion
W - Wear
B - Blockage
PW - Liner Stop Pin Wear
SW - Liner Stop Side Wear
CT - Crossfire Tube Flange Wear

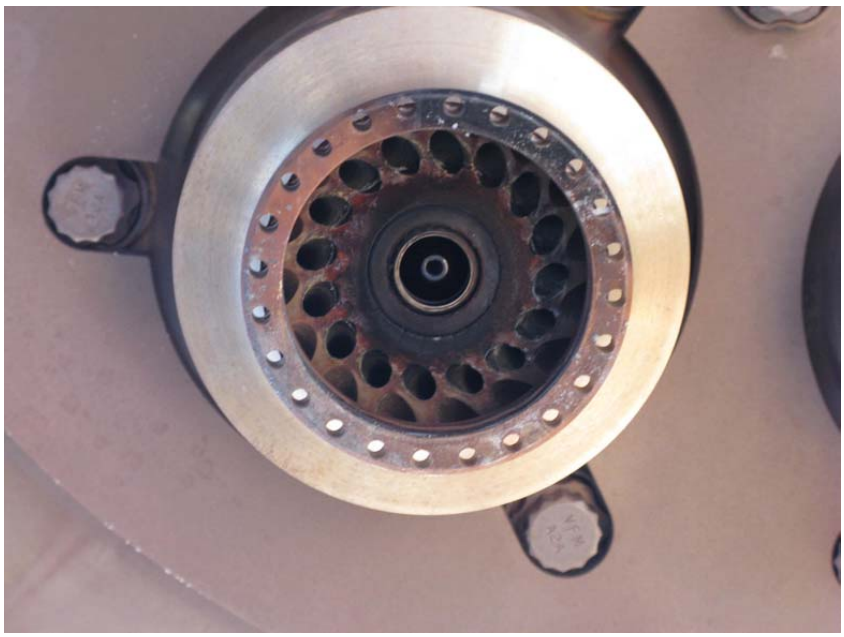
DISPOSITION CODES:
N - No Repair or Replacement
R - Repaired (by whom)
RN - Replace with new

Chamber #	S/N # Inspected	Defect Code and Location	Seal Condition	Seal Diameter	Disposition
1	G6612	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
2	G6614	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
3	G6613	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
4	G6623	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
5	G6624	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
6	G6619	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
7	G6620	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
8	G6616	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
9	G6617	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
10	G6618	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
11	G6615	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
12	G6621	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
13	G6622	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N
14	G6611	MINOR SIGNS OF PISTON SEAL WEAR	W	NA	N

Comments:

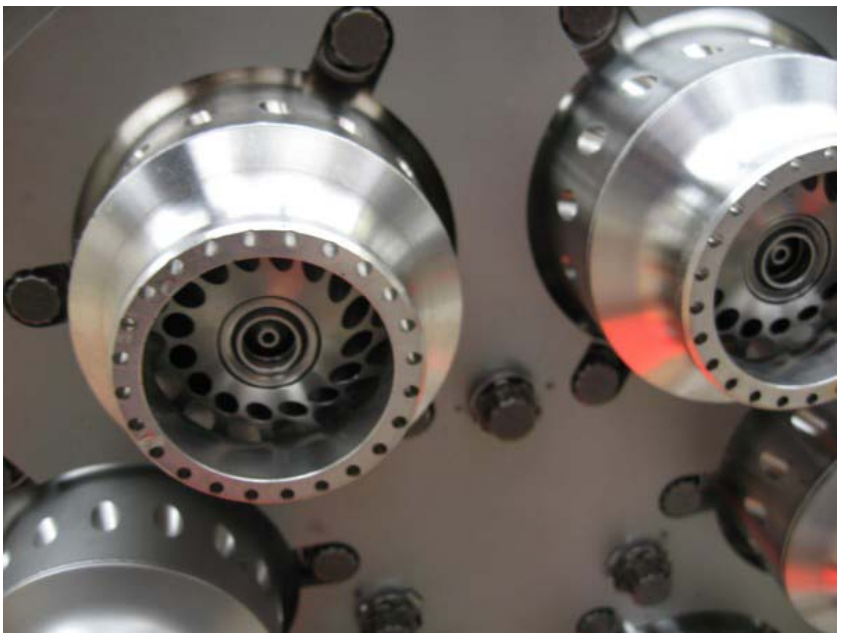
Flow sleeves were in good condition with no issues to note. The incorrect group numbers were replaced at this outage with the proper group number.

GT3076_Flow Sleeve General Inspection(a)



Fuel Nozzles As Found

Fuel Nozzle - New



Fuel Nozzle Tips - New

COMPRESSOR SECTION

Bellmouth Inlet Casing

Assembly;

The upper inlet bellmouth casing was removed during this outage to allow for removal of the turbine rotor. All casing bolting and hardware was cleaned and inspected for damage. All bolts were lubricated with Loctite Heavy Duty Anti-Seize prior to installation.

The upper and lower bellmouth casings were prepped for reassembly. All bolt holes and spot faces were cleaned. The upper casing was rigged and leveled. The upper casing was positioned over the lower casing and lowered using guide pins. The body dowels were installed and then all of the other casing bolts installed. The horizontal joint bolts were torqued.

Compressor Forward Casing

Assembly;

The upper compressor casing was removed during this outage to allow for removal of the turbine rotor. All compressor casing bolting and hardware was cleaned and inspected for damage. All bolts were lubricated with Loctite Heavy Duty Anti-Seize prior to installation. The upper and lower compressor casings were prepped for reassembly. All bolt holes and spot faces were cleaned.

The casings were blown out with air and a final QC check performed to ensure all foreign material was removed. The upper casing was rigged and leveled. The upper casing was positioned over the lower casing and lowered using guide pins. The body dowels were installed and then all of the other casing bolts installed. The horizontal joint bolts were torqued using the ITH and Hytorq equipment. After all of the compressor casing bolts were installed and torqued, the casing jacks were removed.

COMPRESSOR SECTION

Compressor Discharge Casing

Assembly;

The upper compressor discharge casing was removed during this outage to allow for the rotor removal. All compressor discharge casing bolting and hardware was cleaned and inspected for damage. All bolts were lubricated with Loctite Heavy Duty Anti-Seize prior to installation.

The upper and lower compressor discharge casings were prepped for reassembly. All bolt holes and spot faces were cleaned. The casings were blown out with air and a final QC check performed to ensure all foreign material was removed. The upper casing was rigged and leveled. The upper casing was positioned over the lower casing and lowered using guide pins. The body dowels were installed and then all of the other casing bolts installed. The horizontal joint bolts were torqued using the Hytorq equipment. After all of the compressor discharge casing bolts were installed and torqued, the casing jacks were removed.

Compressor Rotor Blade(s)

Blade; Multiple

The compressor was visually inspected during this outage. The compressor was found to be in generally good condition. There were a few blades that were found to have slight FOD on the leading or trailing edge. The General Electric Service Shop Technician blended the damaged area out per GE Engineering disposition while the rotor was at the Service Shop for repairs.

Compressor Rotor

Assembly;

While in Houston Service Shop for repair, the compressor rotor was modified. Note that stages R0 and R3 were tipped to bring this compressor blade/wheel tip diameters to current AO standards. This CR forward stub shaft also received the R0 Biscuit Mod.

	Current Dia	To be tipped
R0	80.704"	80.680"
R3	69.706"	69.686"

COMPRESSOR SECTION

Compressor Rotor

Assembly; Aft Compressor

The aft end compressor was inspected during the outage for rubs per TIL 1502-2R1. There were no issues to note. All opening and closing clearances were sent to GE Engineering for approval. The unit was reassembled without any need for tip grinding.

Inspect the aft end compressor for rubs per TIL 1502-2R1 at the yearly borescope.

Compressor Stator Vanes

Shim; All

During the major inspection, all existing compressor shims were inspected for shim migration. All new shims that were added during the major inspection were pinned per the latest GE procedure.

Compressor Stator Vanes

Vane; All Locations

All aft stator stages (S13-S16) were inspected for excessive rock. This check is performed per the GE Engineering recommendations and the data can be seen in the attached data sheets. There were no serious defects to note.

Compressor Stator Vanes

Vane; All Locations

All stator stages were inspected and checked for proper gap checks. If the stage needed adjustment, the vanes were either machined or a shim was added and pinned per the latest GE Engineering procedure. Refer to the attached data sheet for further details.

Inlet Guide Vane

Assembly;

During the major inspection, all necessary safety precautions were taken while working on the inlet guide vane assembly per TIL 1565.

COMPRESSOR SECTION

Inlet Guide Vane

Assembly; 1-64

The variable inlet guide vanes (VIGV) were cleaned and visually inspected and noted to be in good condition. There was no corrosion at the tips, no cracks on the vanes, and light erosion on the leading edges. After cleaning, the backlash, X-gap and bushing clearances measurements were recorded. The data can be found on GE inspection form GT4050.

GE recommends that the bushings, spring washers, and vanes be thoroughly cleaned and inspected at the next outage.

Inlet Guide Vane

Assembly; 1-64

After the inlet guide vanes were rebuilt, each vane was checked for proper angular position at the full open, full close and mid-span. A GE Controls Specialist then performed the calibration.

INSPECTION REPORT
Gas Turbine Maintenance

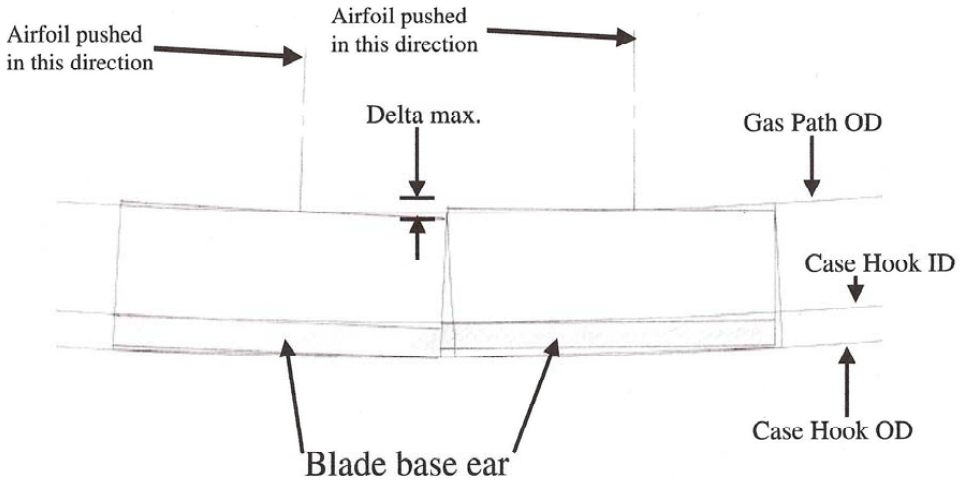
MS7001F

Compressor
Stator Rock Checks

Date 02/09/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N
As found

Stator rock is to be measured and recorded below. All views with turbine flow.

Stage: 13
Vane PN #:
Dwg #:



Vane #		Vane #		Vane #		Vane #		Vane #		Vane #			
1	0.021	**20**	0.009	**39**	0.007	**58**	0.009	**77**	0.006	**96**	0.007		
2	0.011	**21**	0.005	**40**	0.007	**59**	0.008	**78**	0.007	**97**	0.009		
3	0.010	**22**	0.006	**41**	0.007	**60**	0.007	**79**	0.008	**98**	0.011		
4	0.009	**23**	0.007	**42**	0.008	**61**	0.008	**80**	0.007	**99**	0.010		
5	0.008	**24**	0.005	**43**	0.006	**62**	0.008	**81**	0.009	**100**	0.008		
6	0.008	**25**	0.006	**44**	0.008	**63**	0.008	**82**	0.008	**101**	0.009		
7	0.010	**26**	0.007	**45**	0.007	**64**	0.007	**83**	0.009	**102**	0.009		
8	0.007	**27**	0.008	**46**	0.006	**65**	0.009	**84**	0.010	**103**	0.007		
9	0.005	**28**	0.008	**47**	0.006	**66**	0.006	**85**	0.008	**104**	0.008		
10	0.005	**29**	0.008	**48**	0.008	**67**	0.009	**86**	0.008	**105**	0.008		
11	0.009	**30**	0.009	**49**	0.007	**68**	0.008	**87**	0.007	**106**	0.008		
12	0.006	**31**	0.008	**50**	0.005	**69**	0.008	**88**	0.009	**107**	0.007		
13	0.007	**32**	0.011	**51**	0.010	**70**	0.007	**89**	0.007	**108**	0.006		
14	0.008	**33**	0.008	**52**	0.008	**71**	0.009	**90**	0.006	**109**	0.010		
15	0.007	**34**	0.006	**53**	0.009	**72**	0.008	**91**	0.009	**110**	0.009		
16	0.006	**35**	0.008	**54**	0.008	**73**	0.005	**92**	0.008				
17	0.006	**36**	0.006	**55**	0.019	**74**	0.008	**93**	0.008				
18	0.007	**37**	0.005	**56**	0.008	**75**	0.007	**94**	0.009				
19	0.005	**38**	0.008	**57**	0.009	**76**	0.006	**95**	0.008				

Comments:
All readings in .000"

Stator rock check13

INSPECTION REPORT
Gas Turbine Maintenance

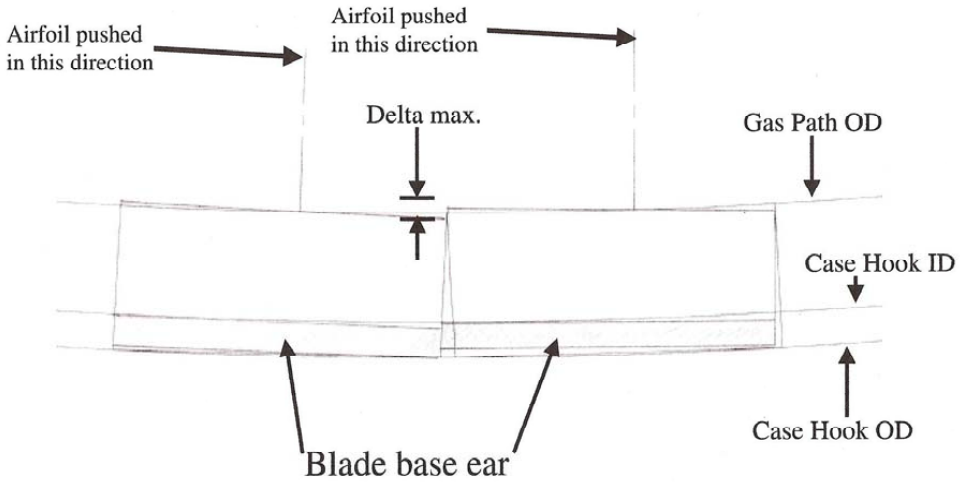
MS7001F

Compressor
Stator Rock Checks

Date 02/09/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N
AS FOUND

Stator rock is to be measured and recorded below. All views with turbine flow.

Stage: 14
Vane PN #:
Dwg #:



Vane #		Vane #		Vane #		Vane #		Vane #		Vane #		Vane #	
1	0.016	**20**	0.007	**39**	0.007	**58**	0.006	**77**	0.005	**96**	0.007		
2	0.007	**21**	0.011	**40**	0.009	**59**	0.005	**78**	0.004	**97**	0.008		
3	0.009	**22**	0.006	**41**	0.007	**60**	0.006	**79**	0.008	**98**	0.006		
4	0.006	**23**	0.008	**42**	0.008	**61**	0.006	**80**	0.006	**99**	0.006		
5	0.009	**24**	0.007	**43**	0.006	**62**	0.006	**81**	0.007	**100**	0.007		
6	0.007	**25**	0.008	**44**	0.008	**63**	0.007	**82**	0.005	**101**	0.008		
7	0.008	**26**	0.007	**45**	0.006	**64**	0.006	**83**	0.007	**102**	0.010		
8	0.005	**27**	0.007	**46**	0.007	**65**	0.004	**84**	0.008	**103**	0.010		
9	0.008	**28**	0.006	**47**	0.008	**66**	0.006	**85**	0.008	**104**	0.011		
10	0.007	**29**	0.007	**48**	0.008	**67**	0.006	**86**	0.004	**105**	0.008		
11	0.008	**30**	0.006	**49**	0.008	**68**	0.008	**87**	0.006	**106**	0.007		
12	0.008	**31**	0.008	**50**	0.008	**69**	0.004	**88**	0.008	**107**	0.010		
13	0.009	**32**	0.007	**51**	0.007	**70**	0.006	**89**	0.006	**108**	0.006		
14	0.007	**33**	0.009	**52**	0.007	**71**	0.008	**90**	0.006	**109**	0.008		
15	0.007	**34**	0.007	**53**	0.008	**72**	0.005	**91**	0.006	**110**	0.010		
16	0.008	**35**	0.008	**54**	0.007	**73**	0.005	**92**	0.007				
17	0.008	**36**	0.008	**55**	0.022	**74**	0.008	**93**	0.006				
18	0.008	**37**	0.006	**56**	0.004	**75**	0.007	**94**	0.006				
19	0.009	**38**	0.007	**57**	0.005	**76**	0.007	**95**	0.008				

Comments:
All readings in .000"

Stator rock check14

INSPECTION REPORT
Gas Turbine Maintenance

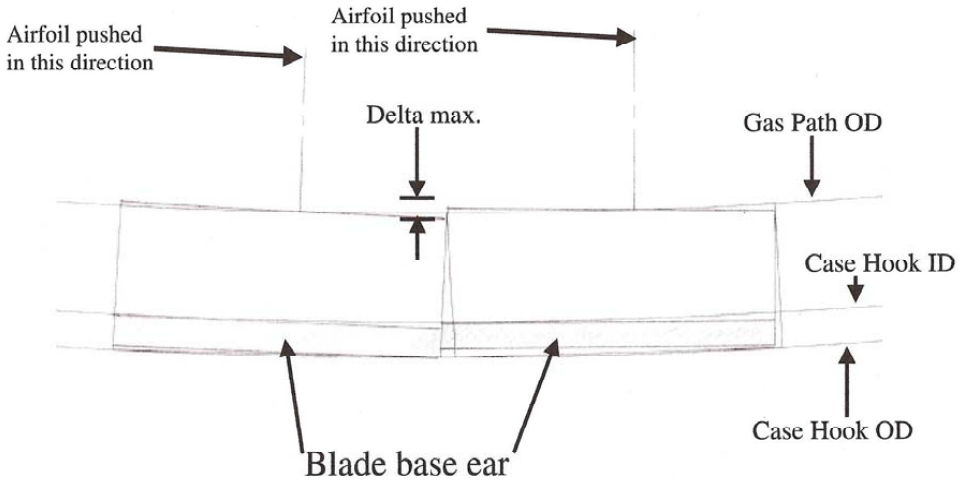
MS7001F

Compressor
Stator Rock Checks

Date 02/09/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N
AS FOUND

Stator rock is to be measured and recorded below. All views with turbine flow.

Stage: 15
Vane PN #:
Dwg #:



Vane #		Vane #		Vane #		Vane #		Vane #		Vane #		Vane #	
1	0.021	**20**	0.008	**39**	0.007	**58**	0.008	**77**	0.007	**96**	0.006		
2	0.008	**21**	0.009	**40**	0.007	**59**	0.007	**78**	0.006	**97**	0.010		
3	0.007	**22**	0.008	**41**	0.008	**60**	0.007	**79**	0.008	**98**	0.008		
4	0.009	**23**	0.010	**42**	0.005	**61**	0.006	**80**	0.007	**99**	0.007		
5	0.005	**24**	0.006	**43**	0.010	**62**	0.008	**81**	0.006	**100**	0.009		
6	0.006	**25**	0.010	**44**	0.009	**63**	0.008	**82**	0.006	**101**	0.006		
7	0.006	**26**	0.009	**45**	0.010	**64**	0.006	**83**	0.004	**102**	0.010		
8	0.004	**27**	0.008	**46**	0.008	**65**	0.006	**84**	0.004	**103**	0.007		
9	0.009	**28**	0.008	**47**	0.007	**66**	0.007	**85**	0.006	**104**	0.011		
10	0.009	**29**	0.009	**48**	0.007	**67**	0.006	**86**	0.006	**105**	0.009		
11	0.006	**30**	0.006	**49**	0.009	**68**	0.006	**87**	0.007	**106**	0.008		
12	0.008	**31**	0.008	**50**	0.009	**69**	0.009	**88**	0.007	**107**	0.010		
13	0.010	**32**	0.008	**51**	0.012	**70**	0.007	**89**	0.007	**108**	0.005		
14	0.009	**33**	0.008	**52**	0.010	**71**	0.009	**90**	0.008	**109**	0.009		
15	0.008	**34**	0.008	**53**	0.006	**72**	0.007	**91**	0.007	**110**	0.009		
16	0.009	**35**	0.007	**54**	0.009	**73**	0.007	**92**	0.006				
17	0.011	**36**	0.008	**55**	0.022	**74**	0.009	**93**	0.008				
18	0.008	**37**	0.006	**56**	0.008	**75**	0.006	**94**	0.007				
19	0.008	**38**	0.008	**57**	0.011	**76**	0.006	**95**	0.006				

Comments:
All readings in .000"

Stator rock check15

INSPECTION REPORT
Gas Turbine Maintenance

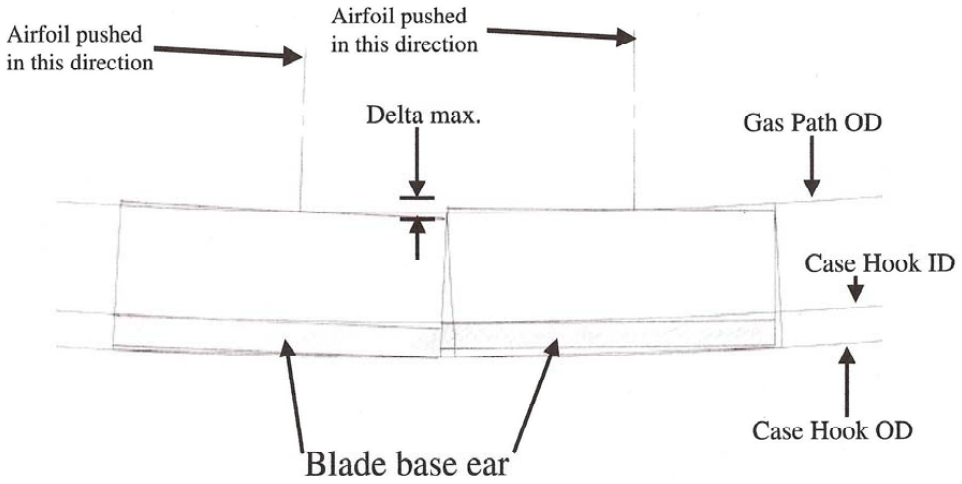
MS7001F

Compressor
Stator Rock Checks

Date 02/08/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N
AS FOUND

Stator rock is to be measured and recorded below. All views with turbine flow.

Stage: 16
Vane PN #:
Dwg #:



Vane #		Vane #		Vane #		Vane #		Vane #		Vane #		Vane #	
1	0.013	**20**	0.009	**39**	0.007	**58**	0.006	**77**	0.009	**96**	0.007		
2	0.008	**21**	0.009	**40**	0.008	**59**	0.007	**78**	0.006	**97**	0.005		
3	0.006	**22**	0.006	**41**	0.009	**60**	0.007	**79**	0.006	**98**	0.005		
4	0.006	**23**	0.008	**42**	0.009	**61**	0.008	**80**	0.005	**99**	0.007		
5	0.007	**24**	0.008	**43**	0.009	**62**	0.006	**81**	0.007	**100**	0.005		
6	0.004	**25**	0.006	**44**	0.008	**63**	0.007	**82**	0.006	**101**	0.006		
7	0.005	**26**	0.007	**45**	0.009	**64**	0.009	**83**	0.008	**102**	0.010		
8	0.005	**27**	0.007	**46**	0.009	**65**	0.008	**84**	0.007	**103**	0.006		
9	0.007	**28**	0.004	**47**	0.008	**66**	0.008	**85**	0.005	**104**	0.005		
10	0.007	**29**	0.008	**48**	0.005	**67**	0.008	**86**	0.006	**105**	0.007		
11	0.008	**30**	0.009	**49**	0.007	**68**	0.007	**87**	0.006	**106**	0.009		
12	0.009	**31**	0.008	**50**	0.007	**69**	0.008	**88**	0.008	**107**	0.008		
13	0.009	**32**	0.008	**51**	0.007	**70**	0.008	**89**	0.008	**108**	0.007		
14	0.007	**33**	0.007	**52**	0.008	**71**	0.006	**90**	0.005	**109**	0.008		
15	0.006	**34**	0.006	**53**	0.007	**72**	0.008	**91**	0.006	**110**	0.008		
16	0.006	**35**	0.008	**54**	0.007	**73**	0.006	**92**	0.008				
17	0.009	**36**	0.006	**55**	0.018	**74**	0.007	**93**	0.006				
18	0.010	**37**	0.008	**56**	0.011	**75**	0.009	**94**	0.008				
19	0.010	**38**	0.007	**57**	0.007	**76**	0.007	**95**	0.006				

Comments:
All readings in .000"

Stator rock check16

INSPECTION REPORT
Gas Turbine Maintenance

MS7001F, MS9001F

Stator Drops

Date 2/7/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N
Data Type Final

Stage #	Specification	UPPER HALF Left	UPPER HALF Right	80 Mil Shim Installed	Number of Vanes Ground
S-0	0.013 - .110"	-0.026	-0.022		
S-1	0.013 - .110"	-0.034	0.015	1	
S-2	0.013 - .110"	-0.023	-0.016		
S-3	0.013 - .110"	-0.029	-0.007		
S-4	0.013 - .110"	-0.025	-0.009		
S-5	0.030 +/- .010"	-0.018	-0.022	1	
S-6	0.030 +/- .010"	-0.015	-0.025		
S-7	0.030 +/- .010"	-0.017	-0.012	1	1
S-8	0.030 +/- .010"	-0.015	-0.019		
S-9	0.030 +/- .010"	-0.016	-0.017		
S-10	0.030 +/- .010"	-0.012	-0.017		
S-11	0.030 +/- .010"	-0.013	-0.015		2
S-12	0.030 +/- .010"	-0.017	-0.015		
S-13	0.030 +/- .010"	-0.018	-0.018	1	1
S-14	0.030 +/- .010"	-0.012	-0.013	1	2
S-15	0.030 +/- .010"	-0.015	-0.016	1	3
S-16	0.030 +/- .010"	-0.015	-0.017	1	4
S-17	0.013 - .110"	-0.017	-0.012		
EGV	0.013 - .110"	-0.016	-0.013	1	2
EGV	0.013 - .110"	-0.016	-0.015	1	2

Stage #	Specification	LOWER HALF Left	LOWER HALF Right	80 Mil Shim Installed	Number of Vanes Ground
S-0	0.013 - .110"	-0.108	0.024		
S-1	0.013 - .110"	-0.085	0.025		
S-2	0.013 - .110"	-0.030	-0.038		
S-3	0.013 - .110"	-0.030	-0.035		
S-4	0.013 - .110"	-0.033	-0.040		
S-5	0.030 +/- .010"	-0.019	-0.014	2	6
S-6	0.030 +/- .010"	-0.018	-0.019	1	5
S-7	0.030 +/- .010"	-0.010	-0.016	1	4
S-8	0.030 +/- .010"	-0.010	-0.020	1	1
S-9	0.030 +/- .010"	-0.019	-0.013		
S-10	0.030 +/- .010"	-0.017	-0.014	1	4
S-11	0.030 +/- .010"	-0.008	-0.019	1	3
S-12	0.030 +/- .010"	-0.017	-0.005		5
S-13	0.030 +/- .010"	-0.017	-0.010	1	
S-14	0.030 +/- .010"	-0.008	-0.018	1	1
S-15	0.030 +/- .010"	-0.008	-0.021	2	
S-16	0.030 +/- .010"	-0.016	-0.021	2	
S-17	0.013 - .110"	-0.017	-0.017		
EGV	0.013 - .110"	-0.020	-0.037		
EGV	0.013 - .110"	-0.015	-0.027		

Comments:
All 0.040" shims were removed and replaced with 0.080" shims.

Stator Drops and shimsStator Drops

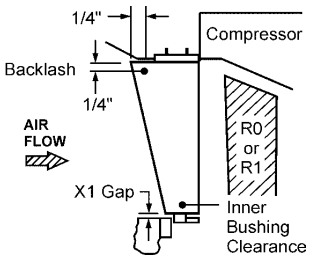
INSPECTION REPORT
Gas Turbine Maintenance

MS 7001, 9001

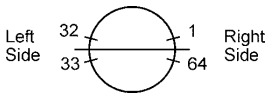
Compressor

Inlet Guide Vane Clearances – Variable

Date 2/9/2009 | Turbine No. 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? NO | Photos Enclosed?



Review TILs for Proper Procedure for Obtaining the Data.



All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.

Spec Limits:

Backlash	0.040
Inner Bearing Clearance	0.100
X1 Gap	.013 - .055

Position	Backlash	Inner B'ing Clr	X1-gap Cir	Position	Backlash	Inner B'ing Clr	X1-gap Cir
1	0.005	0.002	0.050	33	0.012	0.004	0.026
2	0.009	0.002	0.044	34	0.016	0.003	0.024
3	0.013	0.002	0.039	35	0.015	0.002	0.028
4	0.007	0.003	0.039	36	0.010	0.003	0.029
5	0.011	0.002	0.031	37	0.015	0.003	0.024
6	0.013	0.002	0.033	38	0.011	0.003	0.025
7	0.018	0.003	0.027	39	0.022	0.002	0.029
8	0.013	0.003	0.025	40	0.023	0.004	0.033
9	0.015	0.003	0.039	41	0.025	0.004	0.036
10	0.015	0.005	0.031	42	0.018	0.003	0.039
11	0.024	0.003	0.022	43	0.018	0.003	0.039
12	0.014	0.003	0.023	44	0.021	0.003	0.041
13	0.015	0.003	0.030	45	0.028	0.004	0.037
14	0.014	0.002	0.035	46	0.026	0.004	0.039
15	0.012	0.002	0.024	47	0.030	0.010	0.037
16	0.008	0.002	0.018	48	0.025	0.004	0.040
17	0.006	0.002	0.022	49	0.027	0.003	0.037
18	0.010	0.001	0.019	50	0.028	0.002	0.037
19	0.015	0.001	0.018	51	0.022	0.003	0.031
20	0.015	0.002	0.015	52	0.028	0.004	0.032
21	0.005	0.001	0.023	53	0.014	0.004	0.050
22	0.016	0.001	0.026	54	0.018	0.002	0.042
23	0.013	0.001	0.021	55	0.020	0.002	0.034
24	0.016	0.001	0.021	56	0.020	0.002	0.030
25	0.020	0.001	0.036	57	0.017	0.002	0.034
26	0.013	0.001	0.043	58	0.020	0.002	0.027
27	0.015	0.003	0.037	59	0.017	0.002	0.024
28	0.014	0.002	0.039	60	0.010	0.003	0.023
29	0.012	0.003	0.029	61	0.007	0.003	0.027
30	0.012	0.002	0.028	62	0.015	0.002	0.021
31	0.010	0.003	0.031	63	0.012	0.002	0.017
32	0.009	0.002	0.034	64	0.010	0.003	0.020

TIL 517CR - Backlash **TIL 1068-2 - Inner Bushing Clearance** **TIL 1132-2 - Thrust Washer Clearance**

Comments:	

INLET GUIDE VANE CLEARANCES - VARIABLE - FINAL gt4050(a)

TURBINE SECTION

Turbine Casing

Assembly;

The upper turbine casing was removed during this outage to allow for inspection, repair, replacement and refurbishing of the internal turbine section components. After the internal components were removed, all turbine casing penetrations; shroud pin, nozzle segment pin plugs / retainer bolt holes, borescope plugs, extraction piping bolt holes, wheelspace T/C adapter, center line and 45 key slots were cleaned and tapped. The borescope pin seals, springs and plugs were visually inspected to ensure that the correct pin, spring and plug were used in the correct location.

All turbine casing bolting and hardware was cleaned and inspected for damage. All bolts were lubricated with Loctite Heavy Duty Anti-Seize prior to installation. The upper and lower turbine casings were prepped for reassembly. All bolt holes and spot faces were cleaned.

The casings were blown out with air and a final QC check performed to ensure all foreign material was removed. The upper casing was rigged and leveled. The upper horizontal joint and all fits were coated with Loctite Heavy Duty Anti-Seize as were the aft CDC and forward exhaust casing vertical joints. The upper casing was positioned over the lower casing and lowered until it just engaged the fits. The body dowels were installed and then all of the other casing bolts installed. The horizontal joint bolts were torqued using the Hytorq equipment. After all of the turbine casing bolts were installed and torqued, the casing jacks were removed.

TURBINE SECTION

Exhaust Diffuser

Cone; Exhaust Flow Cone

During the outage, TECO decided to use the new Turbine Rotor of the latest design. To further improve unit rotor life/reliability, the exhaust frame was modified in conjunction with the rotor modification. This modification involves relocation of the exhaust frame cooling holes and replaces the current single wall cone assembly with a double wall cone assembly. These modifications were applied per drawing 143E5344G001.

The existing discourager seal was removed using pneumatic hand grinder and vacuum cleaner. The double wall cone modification also relocates the exhaust frame cooling holes to redirect airflow and pre-warming the air prior to impingement on rotor aft 3rd stage wheel. This results in increasing the operating temperature of the turbine rotor aft shaft, significantly reducing stresses in the third stage wheel to aft shaft rabbet due to more uniform turbine rotor temperature.

Along with the exhaust frame modification mentioned above, exhaust flow shields have been provided and were installed per drawing 114E1819G001. These flow shields will reduce the potential for liquid leakage through the bolted joints at the bottom vertical centerline of the exhaust diffuser.

Exhaust Diffuser

Flex Seals; All

The exhaust flex seals were inspected for damage during the outage. The seals were found to be in poor condition and were replaced with customer spares.

It was also noted that the right side sleeve for the exhaust frame was missing. A new one was ordered and welded in place. Refer to the attached picture.

Exhaust Diffuser

Strut; Strut

During the outage an inspection of the exhaust was performed and minor typical cracks were noted. The necessary repairs were performed and the exhaust section was cleaned out prior to closing.

TURBINE SECTION

1st Stage Bucket

Lockwire; All stages

All three stages of buckets were removed and replaced during the major inspection. Each stage was installed per GE procedure and the lockwire was installed and pinned per TIL 1214-3R3. Each individual pin was inspected by GE and verified to have 2 stake marks.

1st Stage Bucket

Assembly; 1-92

The first stage turbine buckets were removed and inspected by the GE representative. A GE Service Shop technician replaced them with customer spares. The spare set used was the style that utilized all 3 pins (1 platform and 2 seal pins).

Prior to installing the new first stage buckets, they were laid out by the wheel position specified on the moment weight chart and the wheel position identified using a sticker. The bucket specialist verified the bucket serial number and wheel position. The bucket sealing pins were glued into the platforms and the GE Service Shop technician installed the buckets. The buckets were confirmed to be installed according to the moment weight chart again after the buckets were all installed. No issues were encountered while installing the new buckets.

The removed 1st stage buckets should be sent to a GE Service Shop for refurbishment.

TURBINE SECTION

2nd Stage Bucket

Assembly; 1-92

The second stage turbine buckets were removed and inspected by GE. A GE Service Shop technician replaced them with customer spares at the Houston Service Shop while the rotor was there for repair.

Prior to installing the new second stage buckets, they were laid out by the wheel position specified on the moment weight chart and the wheel position identified using a sticker. The bucket specialist verified the bucket serial number and wheel position. The bucket sealing pins were glued into the platforms and the GE Service Shop technician installed the buckets. The buckets were confirmed to be installed according to the moment weight chart again after the buckets were all installed. No issues were encountered while installing the new buckets.

The removed 2nd stage buckets should be sent to a GE Service Shop for refurbishment.

3rd Stage Bucket

Assembly; 1-92

The third stage turbine buckets were removed and inspected by GE. A GE Service Shop technician replaced them with customer spares while the rotor was at the Houston Service Center for repair.

Prior to installing the new third stage buckets, they were laid out by the wheel position specified on the moment weight chart and the wheel position identified using a sticker. The bucket specialist verified the bucket serial number and wheel position. The bucket sealing pins were glued into the platforms and the GE Service Shop technician installed the buckets. The buckets were confirmed to be installed according to the moment weight chart again after the buckets were all installed. No issues were encountered while installing the new buckets.

The removed 3rd stage buckets should be sent to a GE Service Shop for refurbishment.

TURBINE SECTION

Turbine Rotor

Assembly;

The turbine wheel was visually inspected after the 1st and 2nd stage buckets were removed. The 1st and 2nd stage wheels were CO2 blasted for cleanliness after wiped free of oil. Then GE Life Extension Services inspected the 1st and 2nd stage wheels visually, using the eddy current array test and a PT test. There was an indication on the 1st stage wheel cooling hole slot 56. There were also minor indications of rub marks on the 1-2 and 2-3 spacer that warranted repair. The repair consisted of blending and flapper peening for stress relieve. The rotor was sent to the Houston Service Center for repair / replacement. The customer chose the option where the entire turbine rotor was replaced and married to the existing compressor rotor. The only other modification that was performed in the Houston Service Center was the biscuit modification on the R0 wheel. This modification allows for the removal and replacement of R0 blades without running out of staking room.

Turbine Rotor

Assembly;

A new GEN-4 Turbine Rotor (Serial # RM68078001) was used for this unit rotor rebuild. Customer supplied Stage 1, 2 and 3 buckets were sent to Houston for installation and balance.

Stage 1 Nozzle Arrangement

Assembly;

The 1st stage nozzle radial concentricity measurements were recorded prior to removal and after reassembly. GE inspected the nozzle for damage. The nozzle was replaced with a refurbished nozzle from the customer spares.

The removed 1st stage nozzle should be sent to a GE Service Shop for refurbishment.

TURBINE SECTION

Stage 2 Nozzle Arrangement
Assembly;
The 2nd stage nozzles were removed and GE visually inspected them for damage. They showed typical signs of wear for 24K hours. They were replaced with refurbished customer spares during reassembly.

The removed 2nd stage nozzles should be sent to a GE Service Shop for refurbishment.

Stage 3 Nozzle Arrangement
Assembly;
The 3rd stage nozzles were removed and GE visually inspected them for damage. They showed typical signs of wear. These components were replaced as part of the major inspection.

The removed 3rd stage nozzles should be sent to a GE Service Shop for refurbishment.

Stage 1 Turbine Shroud
Assembly; 1-32
The 1st stage shrouds were removed and GE visually inspected them for damage. They were replaced with refurbished customer spares during reassembly as part of the major inspection.

The removed 1st stage shroud blocks should be sent to a GE Service Shop for refurbishment.

Stage 2 Turbine Shroud
Assembly; 1-48
The 2nd stage shrouds were removed and GE visually inspected them for damage. They were replaced with refurbished customer spares during reassembly as part of the major inspection. The replacement set is a superseded part number, which requires a different seal between the shroud blocks.

The removed 2nd stage shrouds should be sent to a GE Service Shop for refurbishment.

TURBINE SECTION

Stage 3 Turbine Shroud

Assembly; 1-36

The 3rd stage shrouds were removed and GE visually inspected them for damage. They were replaced with refurbished customer spares during reassembly as part of the major inspection.

During reassembly it was noted that one of the shroud pin holes was severely damaged and warranted repair. Per GE Engineering via a PAC case the hole was drilled larger and plugged. Refer to attached picture for detail.

The removed 3rd stage shrouds should be sent to a GE Service Shop for refurbishment.

Stage 1 Support Ring

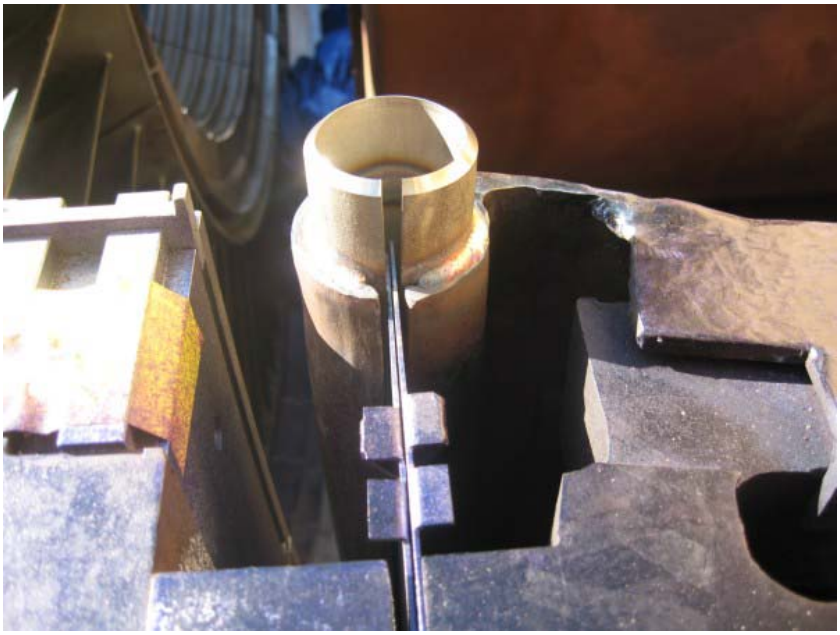
Assembly;

The support ring was removed and inspected. No serious problems were noted and the component was cleaned and used during reassembly.

TURBINE SECTION

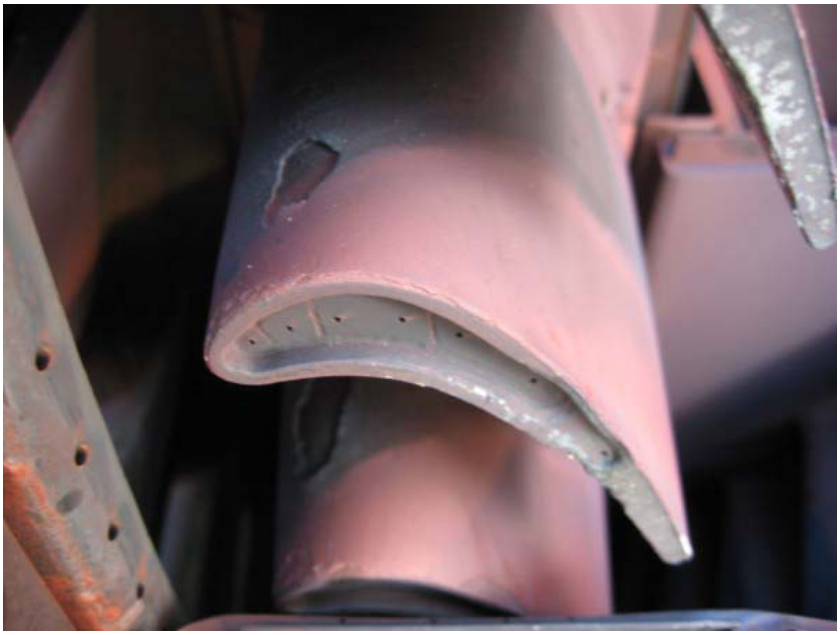
Double Wall Flow Cone

TURBINE SECTION



Sleeve - New

TURBINE SECTION



1st Stage Bucket - As Found

TURBINE SECTION

1st stage bucket - As Found Condition

TURBINE SECTION

1st stage bucket - New

INSPECTION REPORT
Gas Turbine Maintenance

MS 6001F, 7001F, 9001F

Turbine
Buckets, 1st Stage

Date	2/20/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes
		Data Type	As Found		

BUCKET S/N & POSITION
Serial number from bottom of bucket (if available) and position of bucket in wheel.

Kit Part Number Out _____
Kit Part Number In _____

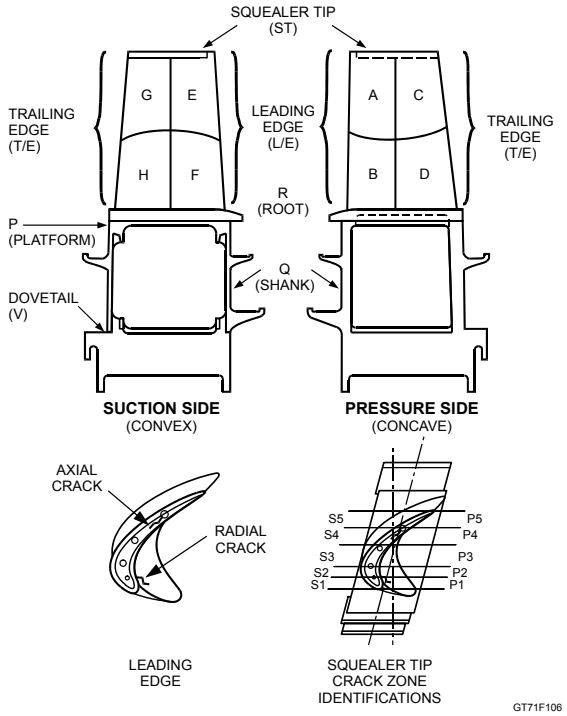
CRACKS
State if crack is:
AX - AXIAL **RD - RADIAL**
Use letters to indicate crack location and give length of crack.

TIP RUBS
Indicate tip rub severity as:
N - Normal **L -** Light
M - Moderate **H -** Heavy

EROSION / CORROSION
Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

FOREIGN OBJECT DAMAGE
Use letters to indicate location of damage.
CR - Cracked **M -** Missing Metal
P - Punctured **BT -** Bent
T - Torn

DISPOSITION CODES
N No repair or replacement necessary.
RG Repaired by GE
RC Repaired by Customer
RO Repaired by Other
RN Replaced with new component.
RR Replacement Recommended



Comments:	

Set was replaced with a customer spare set that had to be modified per the latest GE specs prior to installation. These buckets required all 3 seal pins.

GT9005_1st Stage Bkt Condition(a)

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor

1st Stg Buckets - As Found

Date 02/12/09 | Turbine S/N 296436 | Prepared by Barody, J
FSR # 357T1061 | Unit # 1 | Customer TECO
PART #: 109E9918P001

Position	Serial Number	Position	Serial Number	Position	Serial Number
1	C2NP004017	32	C2NM041848	63	C2NP006890
2	C2NM043575	33	C2NM047200	64	C2NM006848
3	C2NM041858	34	C2NP006666	65	C2NM046893
4	C2NM043171	35	C2NP006684	66	C2NM046807
5	C2NM041779	36	C2NP005621	67	C2NM047088
6	C2NP006852	37	C2NP005902	68	C2NP006860
7	C2NP006635	38	C2NM042146	69	C2NM047494
8	C2NM045488	39	C2NP006202	70	C2NM041867
9	C2NM041792	40	C2NM047470	71	C2NM04458
10	C2NM047492	41	C2NP005849	72	C2NP047573
11	C2NM040290	42	C2NM047065	73	C2NP006691
12	C2NP006688	43	C2NM005909	74	C2NM041393
13	C2NM047439	44	C2NM047125	75	C2NP008654
14	C2NM047159	45	C2NP004600	76	C2NP006679
15	C2NM047659	46	C2NP004775	77	C2NP005893
16	C2NP005884	47	C2NM047498	78	C2NM047052
17	C2NM047070	48	C2NP001636	79	C2NM040160
18	C2NP002027	49	C2NM041826	80	C2NM047452
19	C2NP005769	50	C2NM047017	81	C2NM047544
20	C2NM047546	51	C2NM041744	82	C2NP006197
21	C2NP006697	52	C2NM039705	83	C2NP005832
22	C2NP006636	53	C2NP006829	84	C2NP006693
23	C2NP006709	54	C2NP006710	85	C2NM047409
24	C2NM041846	55	C2NM041777	86	C2NP003607
25	C2NP001928	56	C2NP006184	87	C2NP006651
26	C2NM041947	57	C2NM042256	88	C2NP005793
27	C2NM047105	58	C2NM040292	89	C2NP003521
28	C2NM040462	59	C2NP005874	90	C2NP006837
29	C2NP006629	60	C2NM047149	91	C2NP006189
30	C2NM041651	61	C2NM047201	92	C2NP005876
31	C2NP006841	62	C2NM047158		

Comments:

1st Stg Bckt SN-AFOld 1st Stg Bckt SN

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor
1st Stg Buckets - NEW

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, J
FSR #	357T1061	Unit #	1	Customer	TECO

SCHENCK Balancing and Diagnostic Systems		SCHENCK Balancing and Diagnostic Systems
Operator: SF02204	**BladisNET** Revision 2.6 Copyright © 2003 by Schenck Trebel Corporation	02/06/2009 Page 1

Blade Type: Frame 7FA 1st

Engine type:	M7001-FA+1
Stage:	1st
Input from scale:	2
No. of blades:	92
No. of locking blades:	1
Positions of locking blades:	1
Moment of master blade or preload moment:	332720 g.m
Admissible variation for measurement:	3 digits
Type of matching:	None
Tolerance:	25 g.m
Predistribution Pattern:	4 - Quadr. Beam H/L, decr

Blade Set: 75219 M7FA+E 1ST STG BKTS

Generated by:	RG+RB
Order:	75219 M7FA+E 1ST STG
New reduced tolerance:	3 gm
Type of matching:	None
Predistribution Pattern:	4 - Quadr. Beam H/L, decr.
Calculated unbalance:	2 gm
Calculated Angle:	127 deg

State:
Blade Predistribution optimized.
Set in tolerance.
Set in reduced tolerance.

1st Stg Bckt New MWPg1

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor
1st Stg Buckets - NEW

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, J
FSR #	357T1061	Unit #	1	Customer	TECO

Operator: SF02204	**BladisNET** Revision 2.6 Copyright © 2003 by Schenck Trebel Corporation	02/06/2009 Page 2

Blade Type: **Frame 7FA 1st** Blade Set. **75219 M7FA+E 1ST STG BKTS**

Blade Distribution

Pos No.	Blade No.	Moment [gin]	Serial No.
1	1	286381	C2BM 211648
2	2	281453	C2BM 055905
3	63	284675	C2BM 237767
4	22	284075	C2BM 205125
5	15	284404	C2BM 237915
6	49	285168	C2BM 214329
7	55	283744	C2BM 237825
8	43	285870	C2BM 214354
9	69	283554	C2BM 238049
10	45	288208	C2BM 196165
11	73	283034	C2BM 237950
12	42	288442	C2BM 213829
13	72	282880	C2BM 237891
14	17	288960	C2BM 209752
15	48	282553	C2BM 207840
16	13	287397	C2BM 213314
17	53	291663	C2BM 237878
18	39	287978	C2DM 213594
19	38	29C086	C2BM 213 78
20	18	286324	C2BM 214426
21	41	280187	C2BM 206822
22	29	286459	C2DM 213217
23	78	288813	C2BM 213098
24	46	294664	C2BM 237826
25	26	282966	C2BM 058513
26	80	294468	C2DM 237732
27	34	284671	C2BM 030202
28	68	294318	C2BM 237950
29	82	285386	C2BM 215147
30	59	293696	C2BM 237874
31	36	285921	C2BM 214027
32	79	293887	C2BM 238033
33	8	286308	C2BM 213464
34	61	293024	C2BM 237816
35	37	286716	C2BM 212105
36	57	292756	C2BM 238133
37	21	287115	C2BM 213004

1st Stg Bckt New MWPg2

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor
1st Stg Buckets - NEW

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, J
FSR #	357T1061	Unit #	1	Customer	TECO

Operator: SF02204	**BladisNET** Revision 2.6 Copyright © 2003 by Schenck Trebel Corporation	02/06/2009 Page 3

Blade Type: **Frame 7FA 1st** Blade Set: **75219 M7FA+E 1ST STG BKTS**

Blade Distribution

Pos No	Blade No.	Moment [gin]	Serial No.
38	40	292257	C2BM 206334
39	3	288370	C2BM 206245
40	84	290984	C2BM 212334
41	32	288294	C2BM 212210
42	23	289490	C2BM 212539
43	44	288362	C2BM 214043
44	7	288913	C2BM 212261
45	12	288624	C2BM 206059
46	27	288738	C2BM 202754
47	25	288701	C2BM 207209
48	31	282680	C2BM 120367
49	87	294643	C2BM 237893
50	58	284610	C2BM 213500
51	62	294416	C2BM 237936
52	14	286196	C2BM 214213
53	51	293742	C2BM 237649
54	19	286689	C2BM 214434
55	81	293523	C2BM 238048
56	18	286286	C2BM 214574
57	90	293171	C2BM 237628
58	89	286603	C2BM 213698
59	57	292872	C2BM 237650
60	70	286986	C2BM 215163
61	67	292540	C2BM 238115
62	75	287432	C2BM 213802
63	77	291283	C2BM 237661
64	28	286198	C2BM 213071
65	4	289528	C2BM 199885
66	55	286356	C2BM 213292
67	30	286168	C2BM 212520
68	64	286585	C2BM 213186
69	91	288792	C2BM 212903
70	75	294759	C2BM 237877
71	10	283880	C2BM 214736
72	86	294385	C2BM 237968
73	35	284953	C2BM 214183
74	53	294108	C2BM 237741

1st Stg Bckt New MWPg3

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor
1st Stg Buckets - NEW

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, J
FSR #	357T1061	Unit #	1	Customer	TECO

Operator: SF02204	**BladisNET** Revision 2.6 Copyright © 2003 by Schenck Trebel Corporation	02/06/2009 Page 4

Blade Type: **Frame 7FA 1st** Blade Set: **75219 M7FA•E 1ST STG BKTS**

Blade Distribution

Pos No.	Blade No.	Moment [gm]	Serial No.
75	50	285486	C23M 213780
76	85	293550	C23M 237967
77	20	286032	C23M 214101
78	74	293276	C23M 237857
79	6	286348	C23M 202601
80	24	292973	C23M 206786
81	65	286933	C23M 213268
82	71	292756	C2BM 237854
83	47	287218	C2BM 207500
84	80	291734	C2BM 237976
85	64	287811	C2BM 211168
86	33	290424	C2BM 209863
87	11	288320	C2BM 212776
88	9	289309	C2BM 202541
89	92	287560	C2BM 213772
90	68	288880	C2BM 154032
91	5	288685	C2BM 207780
92	86	294912	C2SM 237776

1st Stg Bckt New MWPg4

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

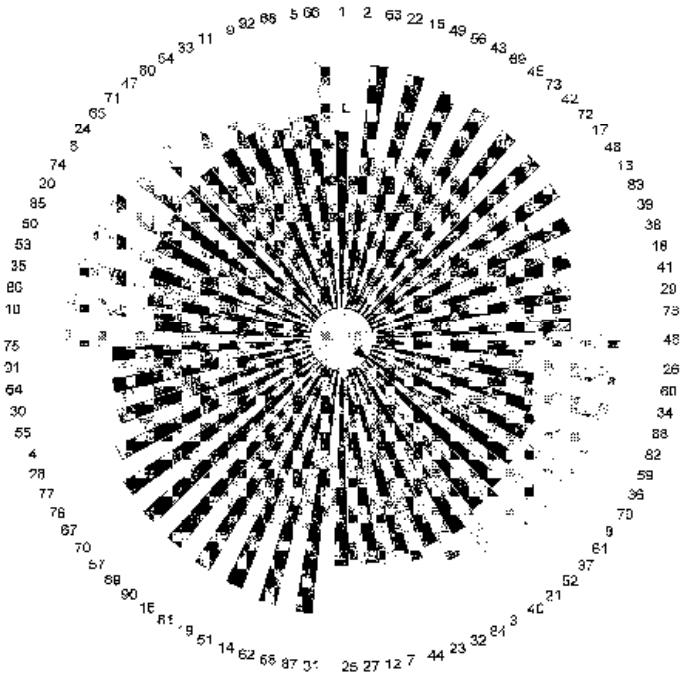
Turbine Rotor
1st Stg Buckets - NEW

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, J
FSR #	357T1061	Unit #	1	Customer	TECO

PART #: 109E9918P001

Operator: SF02204	**BladisNET** Revision 2.6 Copyright © 2003 by Schenck Trebel Corporation	02/06/2009 Page 5

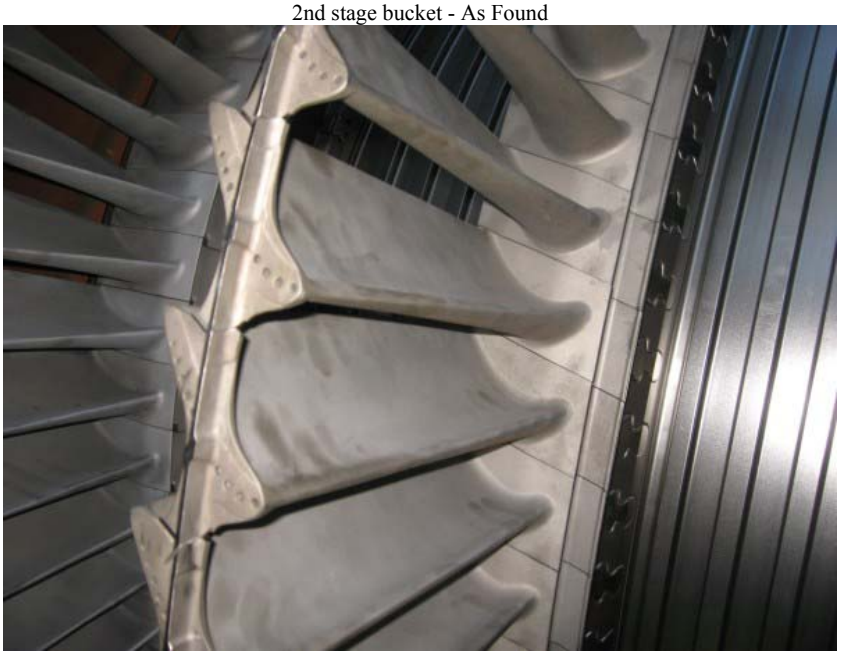
Blade Type: **Frame 7FA 1st** Blade Set **75219 M7FA+E 1ST STG BKTS**



Predistribution Pattern: 4 - Quadr. Beam H/L, decr.
Calculated Unbalance: 2 gin
Calculated Angle: 127 deg
State of Blade Set: In Tolerance (25 gin)
In reduced Tolerance (3 gin)

1st Stg Bckt New MWPg 5

2nd stage bucket - As Found



2nd stage bucket - New

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor

2nd Stg Buckets - As Found

Date 02/11/09 | Turbine S/N 296436 | Prepared by Barody, J
FSR # 357T1061 | Unit # 1 | Customer TECO
PART #: 116E2013P001

Position	Serial Number	Position	Serial Number	Position	Serial Number
1	K2BM024955	32	K2BP028721	63	K2BP016007
2	K2BM025598	33	K2BP015796	64	K2BM028402
3	K2BM028042	34	K2BP015356	65	K2BM026952
4	K2BP015996	35	K2BP023750	66	K2BP015715
5	K2BM028261	36	K2BM028298	67	K2BM026919
6	K2BM028079	37	K2BP025351	68	K2BP015381
7	K2BP027918	38	K2BP016013	69	K2BM015958
8	K2BP015707	39	K2BP015270	70	K2BM027116
9	K2BP026074	40	K2BM028162	71	K2BM027648
10	K2BP015842	41	K2BP015378	72	K2BM015271
11	K2BP015355	42	K2BM026748	73	K2BM028450
12	K2BP028394	43	K2BP015369	74	K2BP016003
13	K2BP015886	44	K2BP015359	75	K2BP025764
14	K2BP015441	45	K2BP015993	76	K2BP025018
15	K2BP016026	46	K2BP016020	77	K2BP015444
16	K2BP027404	47	K2BP015743	78	K2BM028743
17	K2BP025185	48	K2BM028437	79	K2BM028585
18	K2BP015251	49	K2BM028323	80	K2BM027812
19	K2BM028246	50	K2BP027069	81	K2BP015360
20	K2BP015504	51	K2BP025526	82	K2BP015992
21	K2BM028613	52	K2BM028427	83	K2BP015731
22	K2BP016010	53	K2BP020806	84	K2BP015423
23	K2BP15414	54	K2BP015248	85	K2BP015620
24	K2HP028648	55	K2BP025004	86	K2BP015989
25	K2BP027193	56	K2BM028171	87	K2BP015368
26	K2BM028257	57	K2BP015361	88	K2BP015354
27	K2BP028505	58	K2BM027702	89	K2BM027690
28	K2BP016011	59	K2BM028194	90	K2BP016027
29	K2BM027661	60	K2BP015263	91	K2BP015898
30	K2BP027176	61	K2BP028490	92	K2BP015256
31	K2BM028223	62	K2BP028542		

Comments:

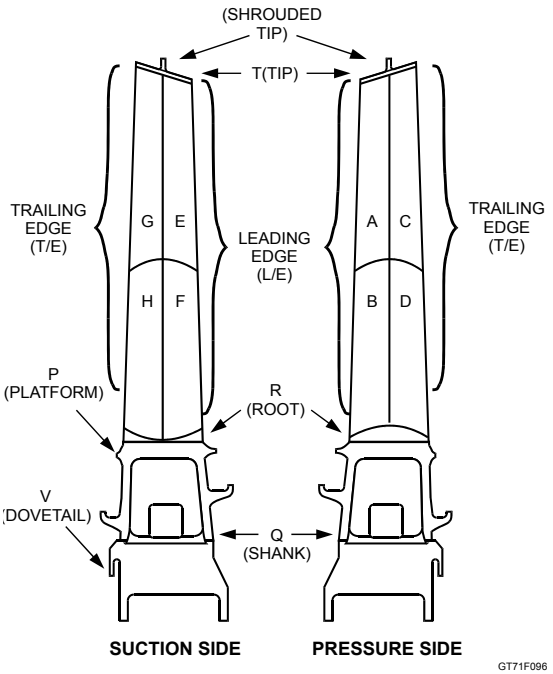
2nd Stg Bckt SN-AFOLD 2nd Stg Bckt SN

INSPECTION REPORT
Gas Turbine Maintenance
MS 6001F, 7001F, 9001F

Turbine
Buckets, 2nd Stage

Date	3/11/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes
		Data Type	As Found		

Kit Part Number Out NA
Kit Part Number In NA



BUCKET S/N & POSITION
Serial number from bottom of bucket (if available) and position of bucket in wheel.

CRACKS
State if crack is:
AX - AXIAL **RD - RADIAL**
Use letters to indicate crack location and give length of crack.

TIP RUBS
Indicate tip rub severity as:
N - Normal **L -** Light
M - Moderate **H -** Heavy

EROSION / CORROSION
Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

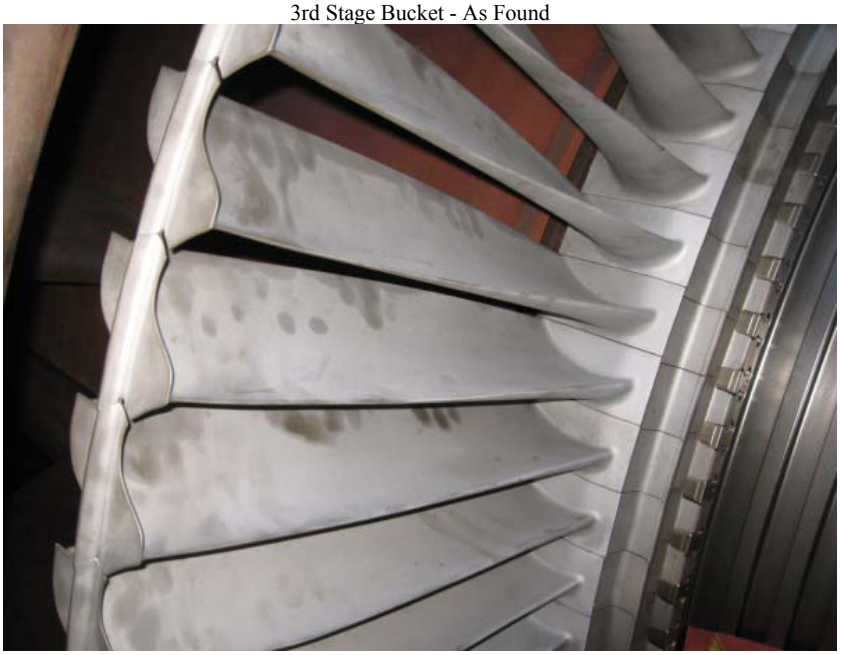
FOREIGN OBJECT DAMAGE
Use letters to indicate location of damage.
CR - Cracked **M -** Missing Metal
P - Punctured **BT -** Bent
T - Torn

DISPOSITION CODES
N - No repair or replacement necessary.
RG - Repaired by GE
R - Repaired by Customer
RO - Repaired by other
RN - Replaced with new component
RR - Replacement recommended

Comments	
The overall condition of the 2nd stage buckets were good with no major defects to note. All will be further inspected at the GE Service Center.	

GT9030_2nd Stage Bkt Condition(a)

3rd Stage Bucket - As Found



3rd Stage Bucket - New

INSPECTION REPORT
Gas Turbine Maintenance

MS7001FA

Turbine Rotor

3rd Stg Buckets - As Found

Date 02/10/09 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Unit # 1 | Customer TECO
PART #: 969E134P008 | AS FOUND

Position	Serial Number	Position	Serial Number	Position	Serial Number
1	C1XM071994	32	C1XM078883	63	C1XM080616
2	C1XM077054	33	C1XM072087	64	C1XM081027
3	C1XM078077	34	C1XM066176	65	C1XM064858
4	C1XM083496	35	C1XM080179	66	C1XM068136
5	C1XM066303	36	C1XM081523	67	C1XM078891
6	C1XM081205	37	C1XM082503	68	C1XM071366
7	C1XM079529	38	C1XM080969	69	C1XM070637
8	C1XM052930	39	C1XM070718	70	C1XM053996
9	C1XM053872	40	C1XM069884	71	C1XM054542
10	C1XM056340	41	C1XM067857	72	C1XM053710
11	C1XM080713	42	C1XM066370	73	C1XM083453
12	C1XM080101	43	C1XM064718	74	C1XM067334
13	C1XM069973	44	C1XM079170	75	C1XM072184
14	C1XM069817	45	C1XM081108	76	C1XM065145
15	C1XM067903	46	C1XM071404	77	C1XM076783
16	C1XM076554	47	C1XM065633	78	C1XM078921
17	C1XM070270	48	C1XM070734	79	C1XM082619
18	C1XM065277	49	C1XM061573	80	C1XM065137
19	C1XM078743	50	C1XM083348	81	C1XM081019
20	C1XM071706	51	C1XM067954	82	C1XM079944
21	C1XM079995	52	C1XM082724	83	C1XM082791
22	C1XM070513	53	C1XM070394	84	C1XM071234
23	C1XM080845	54	C1XM082953	85	C1XM082007
24	C1XM065889	55	C1XM081515	86	C1XM077380
25	C1XM060585	56	C1XM081566	87	C1XM081906
26	C1XM067946	57	C1XM079863	88	C1XM053171
27	C1XM072451	58	C1XM067962	89	C1XM070661
28	C1XM066389	59	C1XM079537	90	C1XM078964
29	C1XM082562	60	C1XM082384	91	C1XM054038
30	C1XM079189	61	C1XM069051	92	C1XM080152
31	C1XM083291	62	C1XM070173		

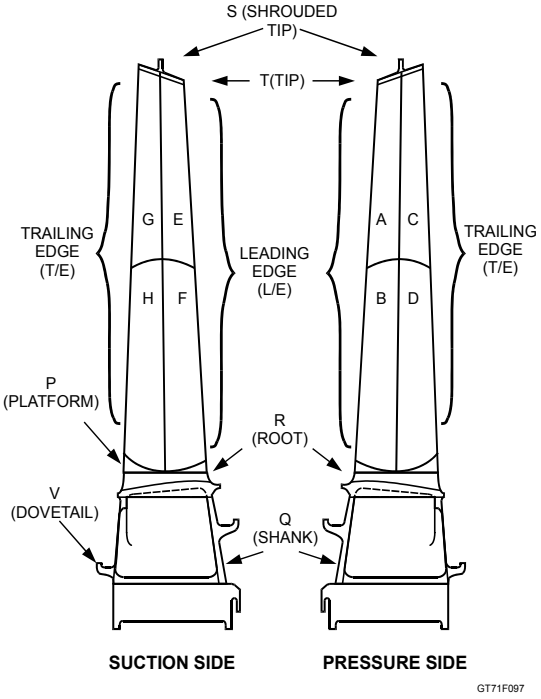
Comments:

3rd Stg Bckt SN-AFOLD 3rd Stg Bckt SN

INSPECTION REPORT
Gas Turbine Maintenance
MS 6001F, 7001F, 9001F

Turbine
Buckets, 3rd Stage

Date	2/10/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	No
Kit Part Number Out		Data Type	As Found		
Kit Part Number In					



BUCKET S/N & POSITION
Serial number from bottom of bucket (if available) and position of bucket in wheel.

CRACKS
State if crack is:
AX - AXIAL **RD - RADIAL**
Use letters to indicate crack location and give length of crack.

TIP RUBS
Indicate tip rub severity as:
N - Normal **L -** Light
M - Moderate **H -** Heavy

EROSION / CORROSION
Enter dimension from tip to edge of corrosion. Use letters to indicate principle zone affected by corrosion. Enter Height, width, & estimated depth of corrosion / erosion spot.

FOREIGN OBJECT DAMAGE
Use letters to indicate location of damage.
CR - Cracked **M -** Missing Metal
P - Punctured **BT -** Bent
T - Torn

DISPOSITION CODES
N - No repair or replacement necessary.
RG - Repaired by GE
R - Repaired by Customer
RO - Repaired by other
RN - Replaced with new component
RR - Replacement recommended

Comments	
No major issues to note.	

GT9080_3rd Stage Bkt Condition(a)

RO staking conditon - As Found

RO Biscuit Modification Completed in HSC

Rotor Shipping to HSC

1st stage nozzle - As Found

1st stage nozzle - As Found Condition

1st stage nozzle - NEW

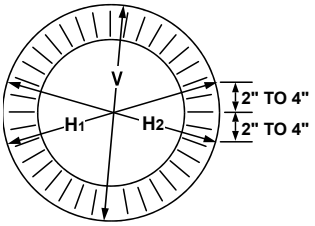
INSPECTION REPORT
Gas Turbine Maintenance

Turbine

MS 7001F, 9001F ***Nozzle, Ellipticity & Radial Concentricity Checks, 1st Stage***

Date 2/3/2009 Turbine S/N 296436 Prepared by Barody, J
FSR # 357T1061 Sketches Enclosed? N Photos Enclosed? N

ELLIPTICITY CHECK:



CLOSING

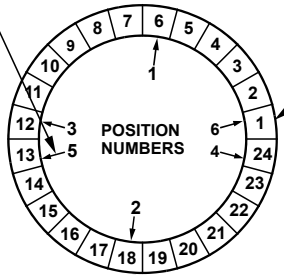
Vertical dimension V = NA
Horiz. dimension H = NA
(Average of H1 & H2)
Ellipticity (H - V) = NA

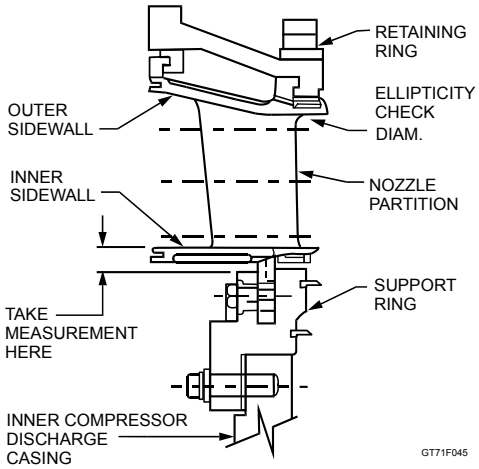
NOTE: Take diameter readings at the I.D. of the downstream end of the outer sidewall and at the center of the nozzle segment.

RADIAL CONCENTRICITY CHECK:

NOTE:
TAKE MEASUREMENT
TO CENTER OF
NOZZLE SEGMENT

NOZZLE SEGMENT
NOS. LOOKING
DOWNSTREAM





PART #: 109E9111P002

CONDITION	NOZZLE TO SUPPORT RING DIMENSION						MAXIMUM
	POS. #1	POS. #2	POS. #3	POS. #4	POS. #5	POS. #6	ECC.
DISASSEMBLY	1.072	0.977	0.849	0.899	0.816	0.849	0.048
REASSEMBLY	0.906	0.832	0.825	0.903	0.828	0.926	0.044

MAX ECC. = 1/2 DIFFERENCE BETWEEN #1 AND #2
OR MAX ECC. = 1/2 DIFFERENCE BETWEEN (#3+#5)/2 AND (#4+#6)/2
WHICHEVER IS LARGER.

Comments:
GE SPEC: .050" for maximum

1st stg nozz Concentricity(a)

INSPECTION REPORT
Gas Turbine Maintenance

Turbine

MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Nozzle - General Condition, 1st Stage

Date 2/10/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? Yes
Data Type As Found

Component S/N (on outer ring) NA | Nozzle Arrangement Dwg. No. NA
Has this nozzle stage been replaced during the life of the gas turbine unit ? Y
If "YES" at how many fired hours? NA

GENERAL SURFACE EFFECTS Mark (X) in appropriate column.

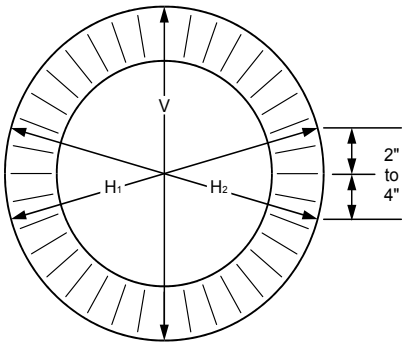
	None	Light	Medium	Heavy	Comments
Deposits				X	
Corrosion		X			
Erosion			X		
Nicks & Dents				X	

ELLIPTICITY

Vertical (V)	NA
Horizontal (H1)	NA
Horizontal (H2)	NA
Horizontal, Avg.	NA
Ellipticity	NA

NOTE:
Take diameter readings at the center line of the nozzle segment.

Ellipticity

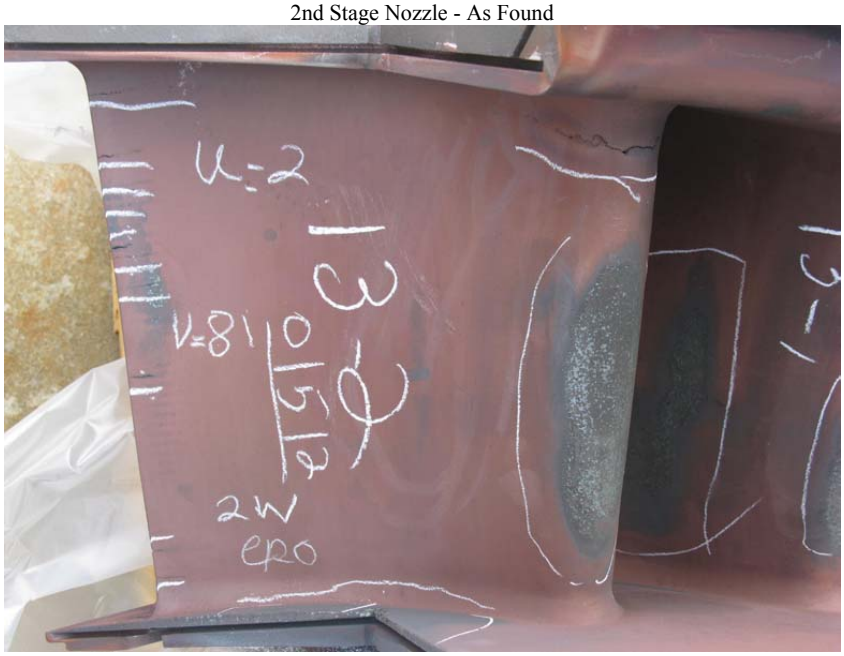


DISPOSITION OF NOZZLE

	Comments
No repair or replacement necessary.	
Repaired.	
NOTE: If nozzle repaired, specify weld rod used	
Repaired (On-site, Vendor or GE Serivce Shop).	
Replaced with new component.	**Replaced with new component**

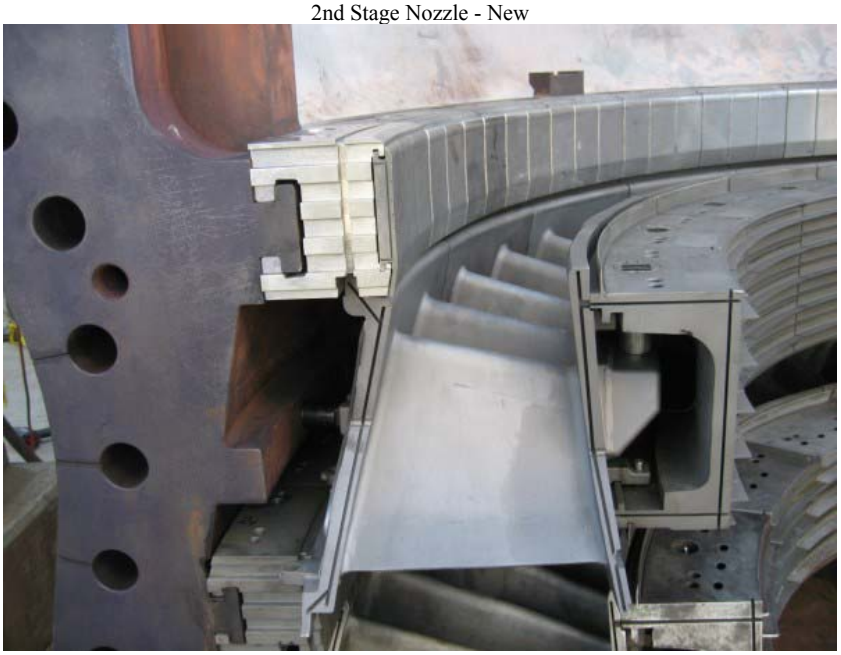
Comments:
The 1st stage nozzle has typical cracking with deposits. Refer to pictures.

2nd Stage Nozzle - As Found



2nd Stage Nozzle - Typical Cracking

2nd Stage Nozzle - New



2nd Stage Nozzle - New Installed

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001, 7001F, 9001, 9001F

Turbine

Nozzle - General Condition, 2nd Stage

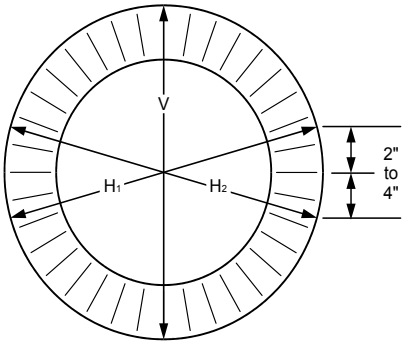
Date 2/10/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? Yes
Data Type As found

Component S/N (on outer ring) NA | Nozzle Arrangement Dwg. No. NA
Has this nozzle stage been replaced during the life of the gas turbine unit ? Y
If "YES" at how many fired hours? NA

GENERAL SURFACE EFFECTS Mark (X) in appropriate column.

	None	Light	Medium	Heavy	Comments
Deposits		x			
Corrosion		x			
Erosion		x			
Nicks & Dents			x		

Ellipticity



ELLIPTICITY

Vertical (V)	NA
Horizontal (H1)	NA
Horizontal (H2)	NA
Horizontal, Avg.	NA
Ellipticity	NA

NOTE:
Take diameter readings at the center line of the nozzle segment.

DISPOSITION OF NOZZLE

	Comments
No repair or replacement necessary.	
Repaired.	
NOTE: If nozzle repaired, specify weld rod used -	
Repaired (On-site, Vendor or GE Serivce Shop).	
Replaced with new component.	**Replaced with new component**

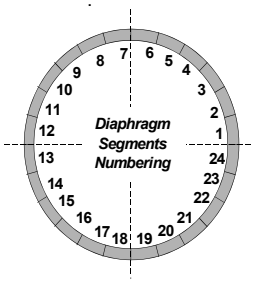
Comments:
The 2nd stage nozzles showed typical signs of wear and cracking.

GT9265_2nd Stage Nozzle Condition(a)

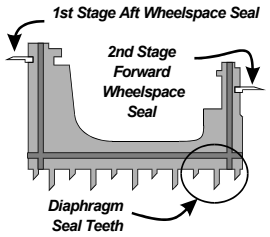
INSPECTION REPORT
Gas Turbine Maintenance
MS 7001F, 9001F

Turbine
Diaphragm Seals, 2nd Stage

Date 2/13/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? Yes
Data Type As Found



LOOKING DOWNSTREAM



DEFECT CODES
WR - Worn/Rubbed
CO - Corroded
BT - Bent
ER - Eroded
MP - Missing Pieces
NW - No Wear/Rub

DISPOSITION CODES
N - No repair or replacement necessary.
RN - Replaced with new component.
RR - Replacement Recommended
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other

Diaphragm	Diaphragm Seal Radial Teeth		Wheelspace Seal 1st Stage Aft		Wheelspace Seal 2nd Stage Fwd		
Segment	Condition	Disposition	Condition	Disposition	Condition	Disposition	Comments
1		RN		RN		RN	
2		RN		RN		RN	
3		RN		RN		RN	
4		RN		RN		RN	
5		RN		RN		RN	
6		RN		RN		RN	
7		RN		RN		RN	
8		RN		RN		RN	
9		RN		RN		RN	
10		RN		RN		RN	
11		RN		RN		RN	
12		RN		RN		RN	
13		RN		RN		RN	
14		RN		RN		RN	
15		RN		RN		RN	
16		RN		RN		RN	
17		RN		RN		RN	
18		RN		RN		RN	
19		RN		RN		RN	
20		RN		RN		RN	
21		RN		RN		RN	
22		RN		RN		RN	
23		RN		RN		RN	
24		RN		RN		RN	

Comments:
The seal teeth were in good overall condition.

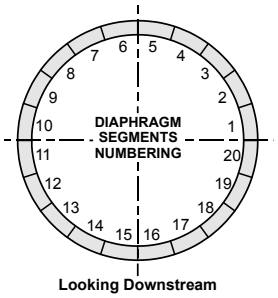
3rd Stage Nozzle - New

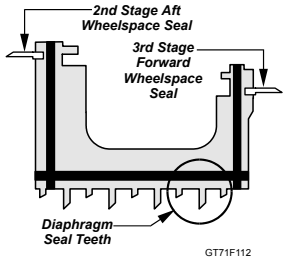
3rd Stage Nozzle - As Found

INSPECTION REPORT
Gas Turbine Maintenance
MS7001F

Turbine
Diaphragm Seals, 3rd Stage

Date	2/11/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes
		Data Type	As Found		





DEFECT CODES
WR - Worn/Rubbed
CO - Corroded
BT - Bent
ER - Eroded
MP - Missing Pieces

DISPOSITION CODES
N - No repair or replacement necessary
RN - Replaced with new component.
RR - Replacement Recommended
RG - Repaired by GE
RC - Repaired by Customer
RO - Repaired by Other

Diaphragm Segment	Diaphragm Seal Radial Teeth		Wheelspace Seal				Comments
			2nd Stage Aft		3rd Stage Fwd		
	Condition	Disposition	Condition	Disposition	Condition	Disposition	
1		RN		RN		RN	
2		RN		RN		RN	
3		RN		RN		RN	
4		RN		RN		RN	
5		RN		RN		RN	
6		RN		RN		RN	
7		RN		RN		RN	
8		RN		RN		RN	
9		RN		RN		RN	
10		RN		RN		RN	
11		RN		RN		RN	
12		RN		RN		RN	
13		RN		RN		RN	
14		RN		RN		RN	
15		RN		RN		RN	
16		RN		RN		RN	
17		RN		RN		RN	
18		RN		RN		RN	
19		RN		RN		RN	
20		RN		RN		RN	

Comments:
The overall condition of the diaphram seals was good.

GT9185_3rd Stg Turbine Diaphram Seal(a)

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001, 7001F, 9001, 9001F

Turbine

Nozzle - General Condition, 3rd Stage

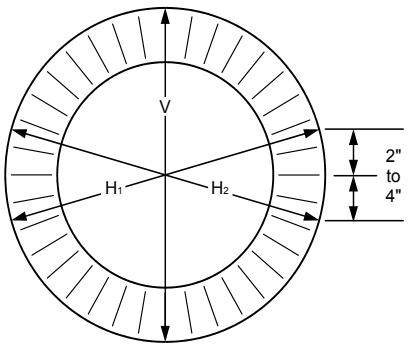
Date 2/16/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? Yes
Data Type As Found

Component S/N (on outer ring) NA | Nozzle Arrangement Dwg. No. NA
Has this nozzle stage been replaced during the life of the gas turbine unit ? Y
If "YES" at how many fired hours? NA

GENERAL SURFACE EFFECTS Mark (X) in appropriate column.

	None	Light	Medium	Heavy	Comments
Deposits	x				
Corrosion	x				
Erosion	x				
Nicks & Dents	x				

Ellipticity



ELLIPTICITY

Vertical (V)	
Horizontal (H1)	
Horizontal (H2)	
Horizontal, Avg.	
Ellipticity	

NOTE:
Take diameter readings at the center line of the nozzle segment.

DISPOSITION OF NOZZLE

	Comments
No repair or replacement necessary.	
Repaired.	
NOTE: If nozzle repaired, specify weld rod used -	
Repaired (On-site, Vendor or GE Serivce Shop).	
Replaced with new component.	**Replaced with new component**

Comments:
The 3rd stage nozzles were in great condition and were replaced as part of the major inspection. The removed nozzles will be further inspected at a GE Service Center.

1st Stage Shroud - As Found

1st Stage Shroud - New

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001F, 9001F

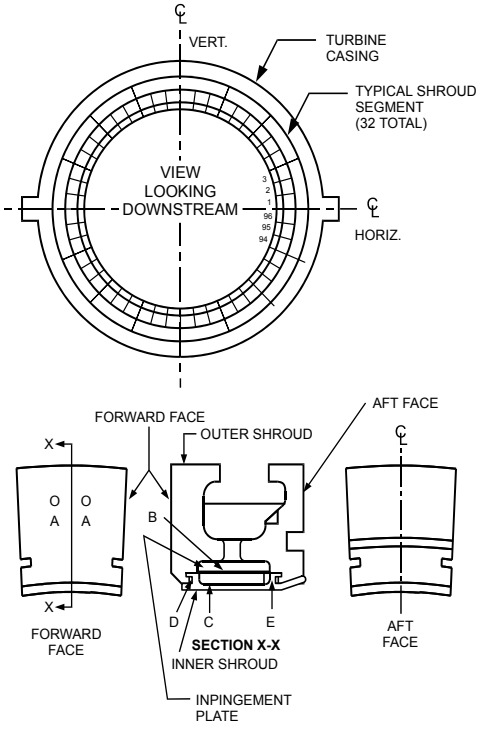
Turbine
Bucket Shroud - General Condition, 1st Stage

Date	2/11/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	Yes
		Data Type	As Found		

GENERAL SURFACE EFFECTS - Put "X" where applicable.

	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits		x			
Corrosion		x			
Erosion		x			
Cracks		x			
Nicks & Dents		x			
Rubs/Wear		x			

SHROUD ARRANGEMENT



TYPICAL 1ST STAGE SHROUD

Disposition

	No repair or replacement necessary
	Repaired
x	Replaced with new component
	Recommended replace/repair at next outage

Comments	
Replaced as part of the major inspection. Removed hardware to be sent to the GE HSC for further inspection and refurbishment.	

Hole Identification	*Percent Plugged			
	0	0-25	25-50	50-100
A				
B				
C				
D				
E				

Check applicable box (X)

Comments	

GT9110_1st Stage Shroud Condition(a)

2nd Stage Shroud - As Found

2nd Stage Shroud - Cracks

2nd Stage Shrouds - Cracking

2nd Stage Shroud - New

INSPECTION REPORT
Gas Turbine Maintenance

MS7001F

Turbine

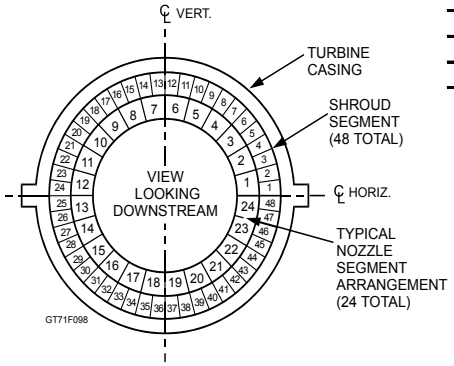
Bucket Shroud - General Condition, 2nd Stage

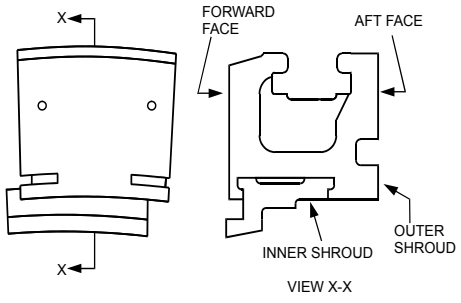
Date 2/13/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? No | Photos Enclosed? Yes
Data Type As Found

GENERAL SURFACE EFFECTS - Put "X" where applicable.

	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits		x			
Corrosion		x			
Erosion			x		
Cracks		x			

SHROUD ARRANGEMENT





SECOND STAGE SHROUD

Disposition

	No repair or replacement necessary
	Repaired
X	Replaced with new component
	Recommended replace/repair at next outage

Comments	
The 2nd stage shrouds were replaced with a spare set as part of the major inspection.	

Seal Condition

	Cracks
	Distortion
x	Wear/Rubs
	Missing Pieces

Comments	

GT9130_2nd Stage Shroud Condition(a)

3rd Stage Shroud - As Found

3rd Stage Shroud - New

3rd Stage Shroud Pin Repair

INSPECTION REPORT
Gas Turbine Maintenance

MS 7001F, 9001F

Turbine

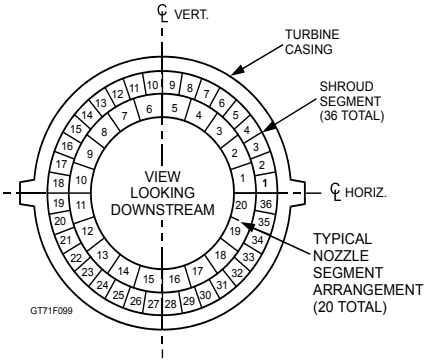
Bucket Shroud - General Condition, 3rd Stage

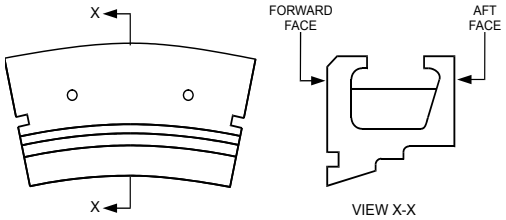
Date 2/12/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? | Photos Enclosed? Yes
Data Type As Found

GENERAL SURFACE EFFECTS - Put "X" where applicable.

	NONE	LIGHT	MEDIUM	HEAVY	COMMENTS
Deposits		x			
Corrosion		x			
Erosion			x		
Cracks			x		

SHROUD ARRANGEMENT





THIRD STAGE SHROUD

Disposition

	No repair or replacement necessary
	Repaired
X	Replaced with new component
	Recommended replace/repair at next outage

Comments	
The 3rd stage shrouds were replaced with a spare set as part of the major inspection.	

Seal Condition

	Cracks
	Distortion
x	Wear/Rubs
x	Missing Pieces

Comments	

GT9140_3rd Stage Shroud Condition(a)

BEARINGS

Journal Bearing

Assembly; #1 and #2

The #1 and #2 journal bearings (tilting pad) were removed from the unit during the outage. The bearings were cleaned and visually inspected by GE.

All flexible hydraulic lift oil hoses for the turbine and generator bearings were replaced as part of the major inspection.

Journal Bearing

Deflector - Air; T1 Bearing

The #1 bearing air seals were removed, cleaned and visually inspected. The seals were measured for clearance versus the shaft and found to be acceptable. These seals were re-installed in the machine at reassembly.

Journal Bearing

Deflector - Air; T2 Bearing

The #2 bearing air seals were removed, cleaned and visually inspected. The seals were measured for clearance versus the shaft and found to be acceptable. These seals were re-installed in the machine at reassembly.

Journal Bearing

Deflector - Oil; T1 Bearing

The #1 bearing oil seals were removed, cleaned and visually inspected. They were measured for clearance to the shaft. The clearance measured was acceptable and they were installed in the machine at reassembly.

Journal Bearing

Deflector - Oil; T2 Bearing

The #2 bearing oil seals were removed, cleaned and visually inspected. The seals were replaced with new seals due to the babbitt wear. The new seals were measured for clearance to the shaft. The clearance measured was acceptable and they were installed in the machine at reassembly.

The removed T2 bearing oil seals should be sent to a GE Service Shop for refurbishment.

BEARINGS

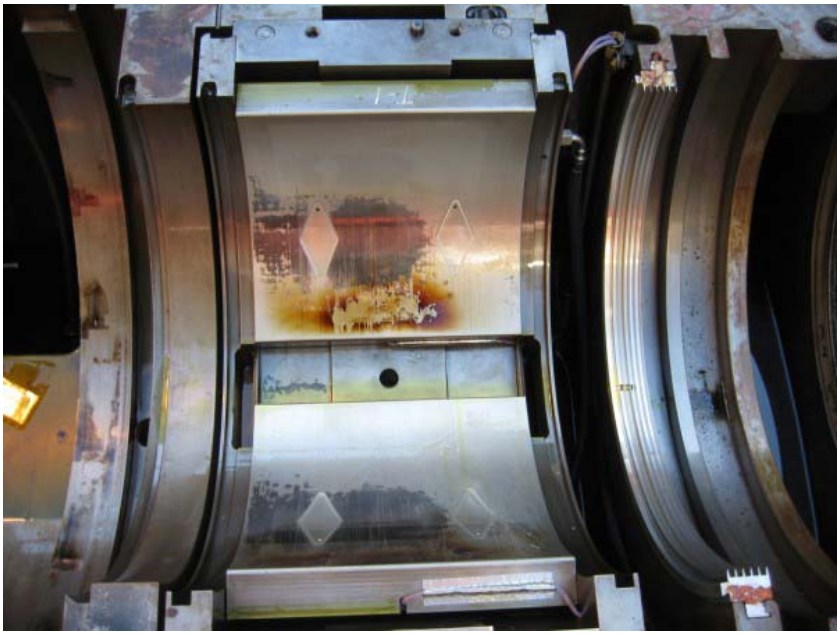
Thrust Bearing
Assembly;
The thrust bearing was removed from the unit during the outage. The thrust bearing was cleaned and visually inspected by GE. There was a recommendation from the outage in 2006 to replace the forward thrust pads. These pads were replaced at this outage. Refer to the attached data sheets for further details.

The thrust bearing thermocouple modification was also performed on this unit. There was a groove machined into the casing on the left side to allow the thermocouple wiring to lie. This modification prevents the wires from possibly getting cut while the unit is running.

Thrust Bearing
Assembly;
The thrust bearing oil seals were removed, cleaned and visually inspected. The seals were also measured for clearance to the shaft. The clearance measured was acceptable and they were re-installed in the machine at reassembly.

Thrust Bearing
Assembly;
A closing thrust bump check was performed per GE procedure. Physical thrusting of the shaft/rotor indicated the actual clearance of the thrust bearing to be .015". At this time, the axial position probes were set.

BEARINGS

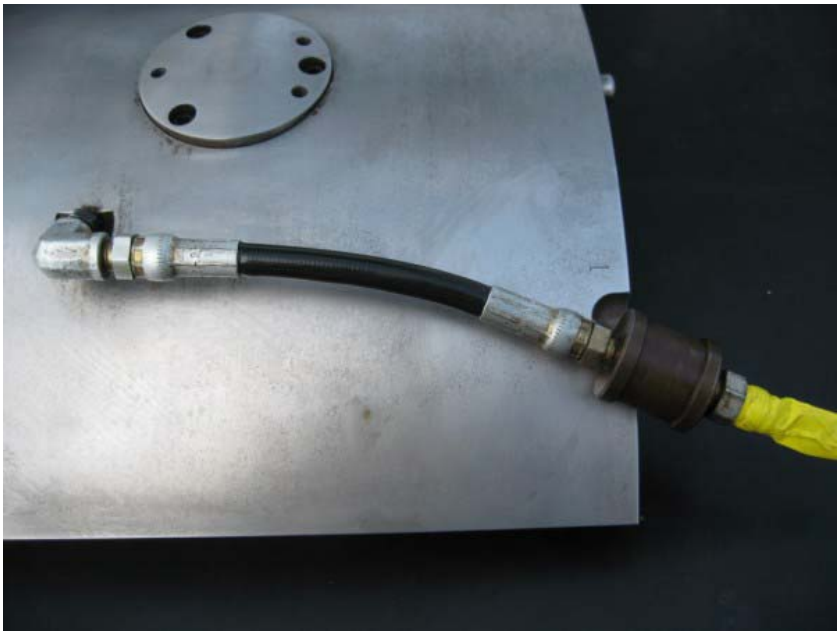


T1 Bearing As Found

BEARINGS

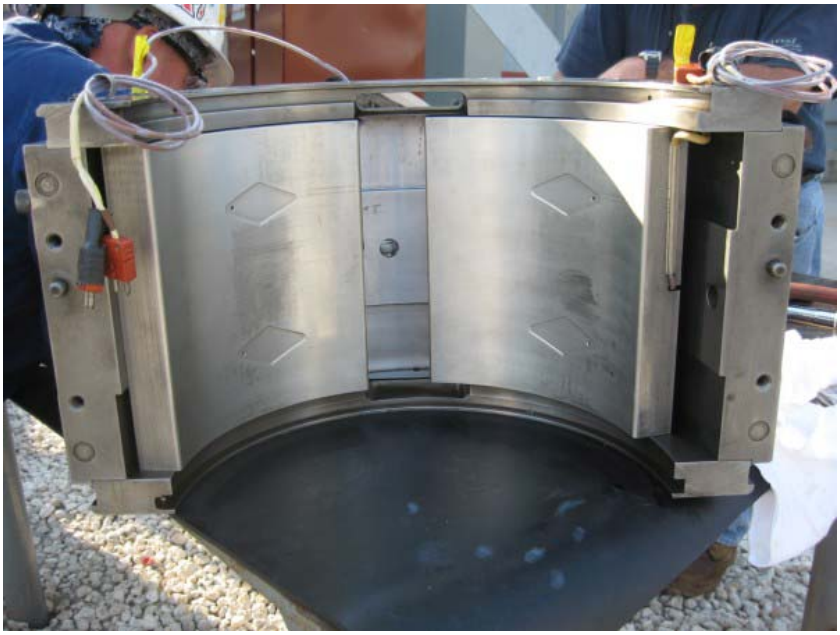
T1 bearing inspection

BEARINGS



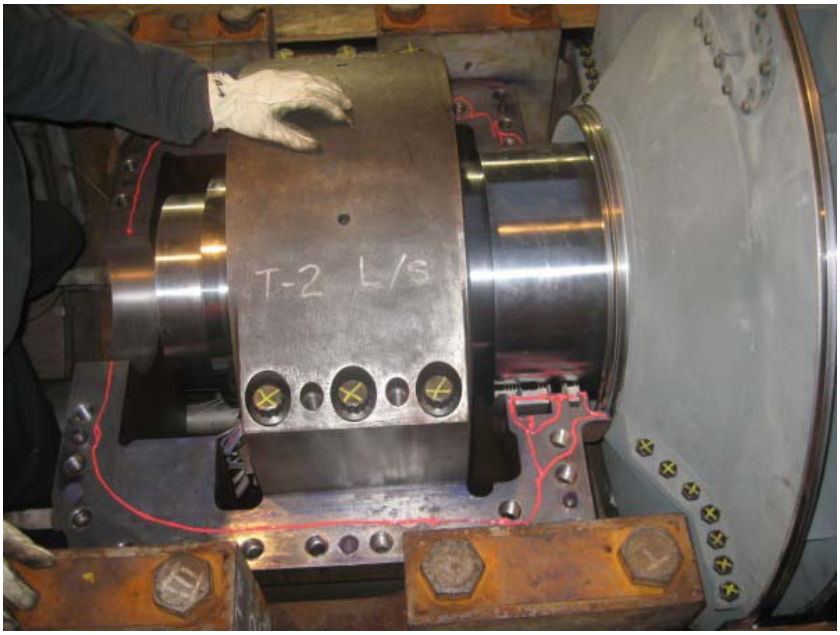
T1 bearing pads with lift oil hose assembly

BEARINGS



T2 bearing inspection

BEARINGS



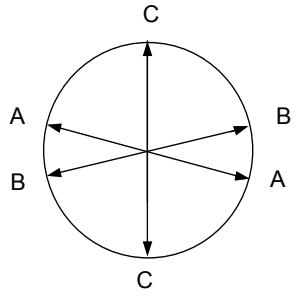
T2 bearing final assembly

Air Seals

As Found ***Turbine***

Date 2/7/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS				CODE	
Teeth Inspected	x			**X**	Work Carried Out
Journals inspected	x			**N**	Not Done
Drain Holes Inspected	x			**NA**	Not Applicable
Inspected for rubs	x			**C**	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Location	Oil Deflector			Journal	Clearance			Condition
Number	A-Dia	B-Dia	C-Dia	Dia	Average	Min.	Max.	Comment
1S1	18.5510	18.5520	18.5560	18.500	0.0530	0.0510	0.0560	Visually Ok
1S2	18.5500	18.5530	18.5570	18.500	0.0533	0.0500	0.0570	Visually Ok
1WF1	17.5530	17.5480	17.5720	17.500	0.0577	0.0480	0.0720	Visually Ok
1S3	17.5490	17.5480	17.5010	17.500	0.0327	0.0010	0.0490	Visually Ok
1S4	18.5530	18.5530	18.5540	18.500	0.0533	0.0530	0.0540	Visually Ok
1S5	18.557	18.554	18.559	18.500	0.057	0.054	0.059	Visually Ok
2S1	18.590	18.590	18.542	18.500	0.074	0.042	0.090	Visually Ok
2S2	18.589	18.586	18.551	18.500	0.075	0.051	0.089	Visually Ok

Comments:

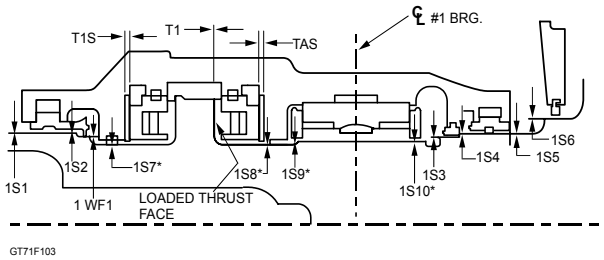
Air Seal DimensionsAs Found

INSPECTION REPORT
Gas Turbine Maintenance
MS 6001, 6001F, 7001F, 9001F

Bearings
Bearing & Seal Clearances, No. 1

Date
FSR # 357T1061
Turbine S/N 296436
Sketches Enclosed? No
Data Type Opening
Prepared by Barody, Jason
Photos Enclosed? N

• All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.
• All views with turbine flow.



CONDITION CODE
M - Missing Metal
W - Worn
CR - Cracked

DISPOSITION CODE
N - No Repair or Replacement Necessary
R - Repaired
RN - Replaced with New Component

SEAL INSPECTION

	Clearances				Visual Inspection		
DIM	**Left**	**Right**	**Top**	**Bottom**	**Condition**	**Disposition**	**Comments**
1S1	0.057	0.035	0.073			N	Visually OK
1S2	0.053	0.035				N	Visually OK
1S3	0.027	0.021				N	Visually OK
1S4	0.028	0.054				N	Visually OK
1S5	0.029	0.021	NA			N	Visually OK
1S6	0.029	0.028				N	Visually OK
1S7*	0.011	0.011	0.006			N	Visually OK
1S8*	0.006	0.008	0.010			N	Visually OK
1S9*	0.007	0.004	0.000			N	Visually OK
1S10*	0.005	0.005	0.005			N	Visually OK
1WF1	0.034	0.024				N	Visually OK

DIM	Description	Measurement		Insp. Date
T1	Rotor Float		0.017	2/4/2009
T1S	Inactive Thrust	U.H.	0.447	2/4/2009
	Shim Thickness	L.H.	0.447	
TAS	Active Thrust	U.H.	0.553	2/4/2009
	Shim Thickness	L.H.	0.553	

*** Measure total ring clearance at each location.**

Comments:	

GT2025 #1 Brg Clearances Open & ClosingAS FOUND

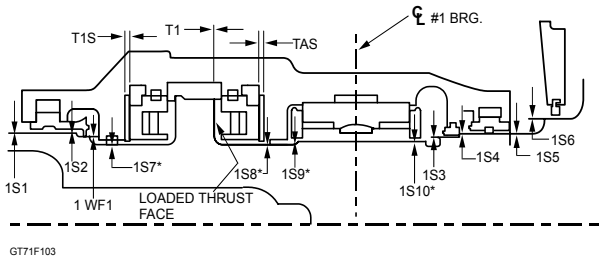
INSPECTION REPORT
Gas Turbine Maintenance
MS 6001, 6001F, 7001F, 9001F

Bearings

Bearing & Seal Clearances, No. 1

Date 3/8/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type Closing

• All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.
• All views with turbine flow.



CONDITION CODE
M - Missing Metal
W - Worn
CR - Cracked

DISPOSITION CODE
N - No Repair or Replacement Necessary
R - Repaired
RN - Replaced with New Component

SEAL INSPECTION

	Clearances				Visual Inspection		
DIM	**Left**	**Right**	**Top**	**Bottom**	**Condition**	**Disposition**	**Comments**
1S1	0.070	0.022	0.041			N	Visually OK
1S2	0.024	0.025				N	Visually OK
1S3	0.028	0.025				N	Visually OK
1S4	0.032	0.029				N	Visually OK
1S5	0.032	0.029				N	Visually OK
1S6	0.030	0.030				N	Visually OK
1S7*	0.010	0.011	0.004			N	Visually OK
1S8*	0.008	0.009	0.006			N	Visually OK
1S9*	0.006	0.006	0.000			N	Visually OK
1S10*	0.006	0.006	0.005			N	Visually OK
1WF1	0.056	0.032				N	Visually OK

DIM	**Description**	**Measurement**		**Insp. Date**
T1	Rotor Float		0.015	3/15/2009
T1S	Inactive Thrust	U.H.	0.521	3/15/2009
	Shim Thickness	L.H.	0.521	
TAS	Active Thrust	U.H.	0.483	3/15/2009
	Shim Thickness	L.H.	0.483	

*** Measure total ring clearance at each location.**

Comments:	

.

INSPECTION REPORT
Gas Turbine Maintenance
MS 6001F, 7001F, 9001F

Bearings

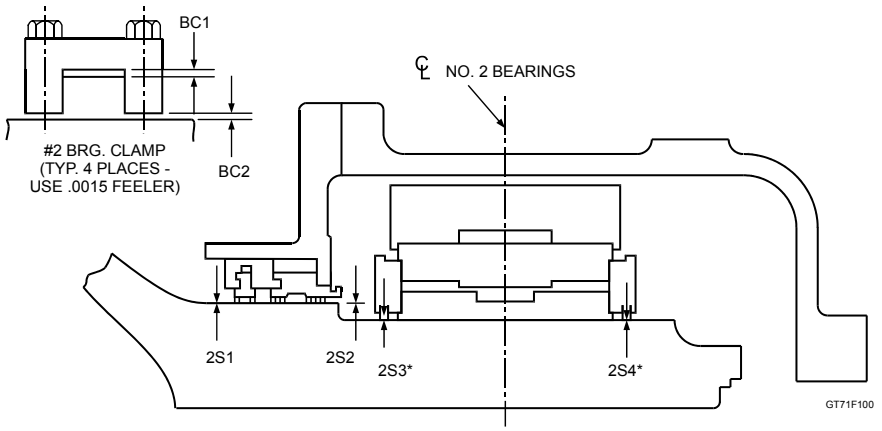
Bearing & Seal Clearances, No. 2

Date 2/5/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? NA | Photos Enclosed? NA
Data Type Opening

All Views with Turbine Flow

CONDITION CODE:
M - Missing Metal
W - Worn
CR - Cracked

DISPOSITION CODE:
N - No Repair or Replacement Necessary
R - Repaired
RN - Replaced with New Component



SEAL INSPECTION

	Clearances				Visual Inspection		
DIM	Left	Right	Top	Bottom	Condition	Disposition	Comments
2S1	0.049	0.051	NA			N	Visually OK
2S2	0.039	0.042	NA			N	Visually OK
2S3*	0.007	0.007	0.007		W	RN	Needs Replacement
2S4*	0.006	0.006	0.005			N	Visually OK

FWD STRAP		AFT STRAP	
LEFT	RIGHT	LEFT	RIGHT

*** Measure total ring float at each location.**

Comments:	

GT2060 #2 Brg Clearances Open & CloseAs Found

INSPECTION REPORT
Gas Turbine Maintenance
MS 6001F, 7001F, 9001F

Bearings

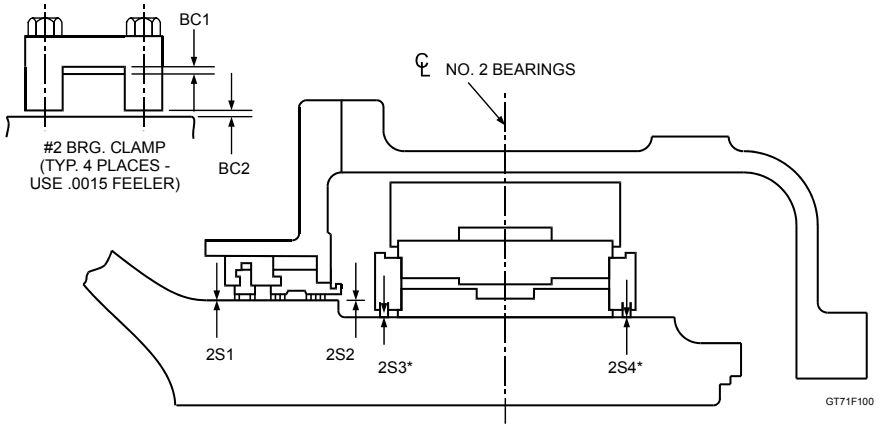
Bearing & Seal Clearances, No. 2

Date	3/8/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	No	Photos Enclosed?	N
		Data Type	Closing		

All Views with Turbine Flow

CONDITION CODE:
M - Missing Metal
W - Worn
CR - Cracked

DISPOSITION CODE:
N - No Repair or Replacement Necessary
R - Repaired
RN - Replaced with New Component



SEAL INSPECTION

	Clearances				Visual Inspection		
DIM	Left	Right	Top	Bottom	Condition	Disposition	Comments
2S1	0.048	0.048	NA	NA		N	Visually OK
2S2	0.039	0.039	NA	NA		N	Visually OK
2S3*	0.006	0.006	0.008	NA		RN	REPLACED WITH NEW
2S4*	0.006	0.007	0.005	NA		N	Visually OK

Comments:	

GT206

0 #2 Brg Clearances Open & CloseFinal

INSPECTION REPORT
Gas Turbine Maintenance

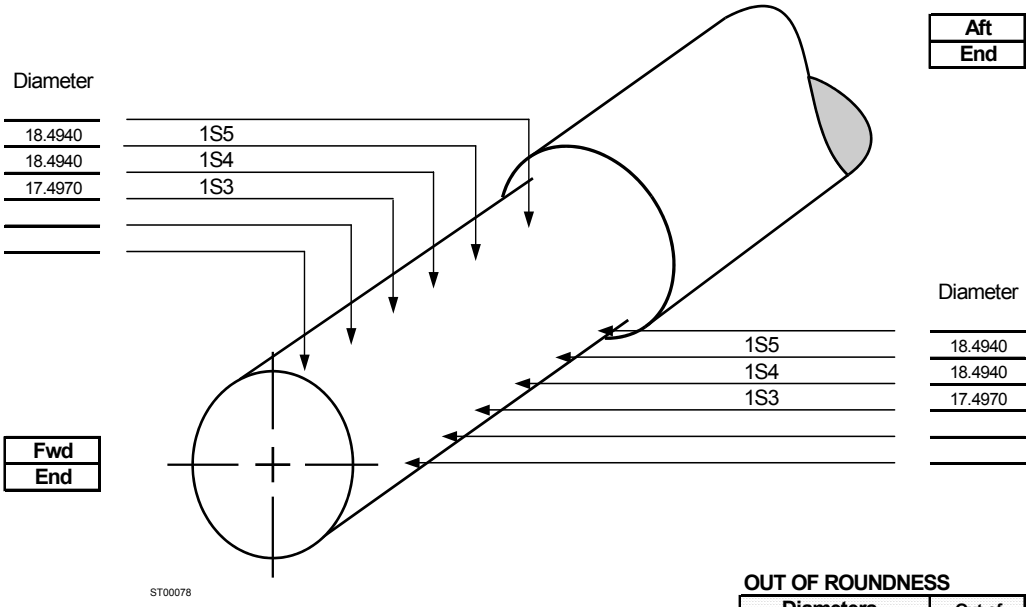
MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Bearings

#1 Rotor Journal Condition

Date 3/9/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? NO | Photos Enclosed?
Data Type As found
Journal Number T1

NOTE: **Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.**



JOURNAL SIZES

	0º	90º	All
Maximum			
Minimum			
Difference			
Average			

OUT OF ROUNDNESS

Diameters		Out of
0º	90º	Round

Comments:	

GT

2130 Brg Journal Dims Final#1 Air Seal

INSPECTION REPORT
Gas Turbine Maintenance

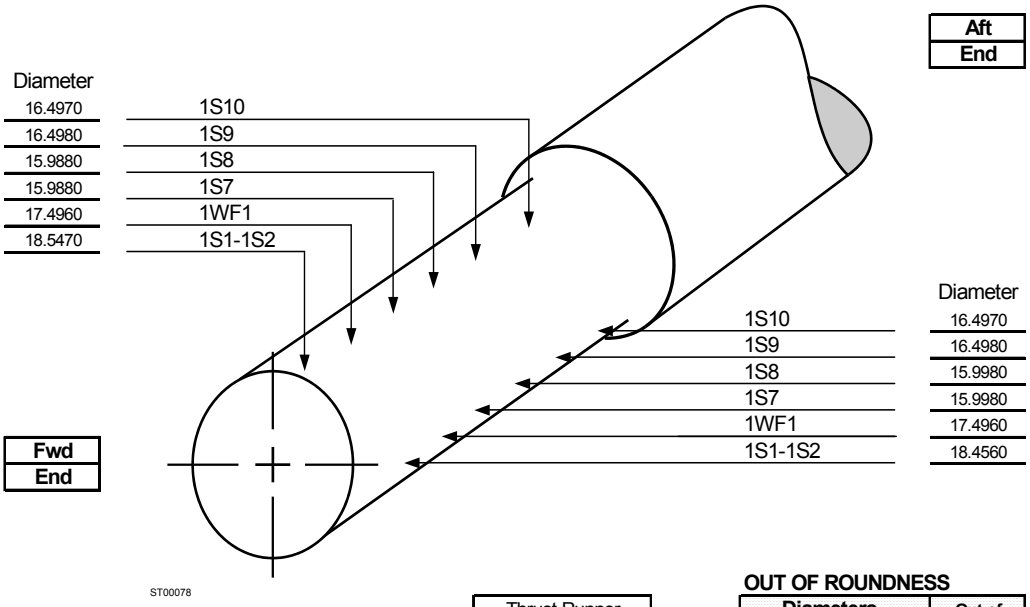
MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Bearings

#1 Rotor Journal Condition

Date 3/9/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type As found
Journal Number T1

NOTE: **Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.**



Thrust Runner
4.230

JOURNAL SIZES

	0º	90º	All
Maximum			
Minimum			
Difference			
Average			

OUT OF ROUNDNESS

Diameters		Out of
0º	90º	Round

Comments:	

GT

2130 Brg Journal Dims Final#1
Journal

INSPECTION REPORT
Gas Turbine Maintenance

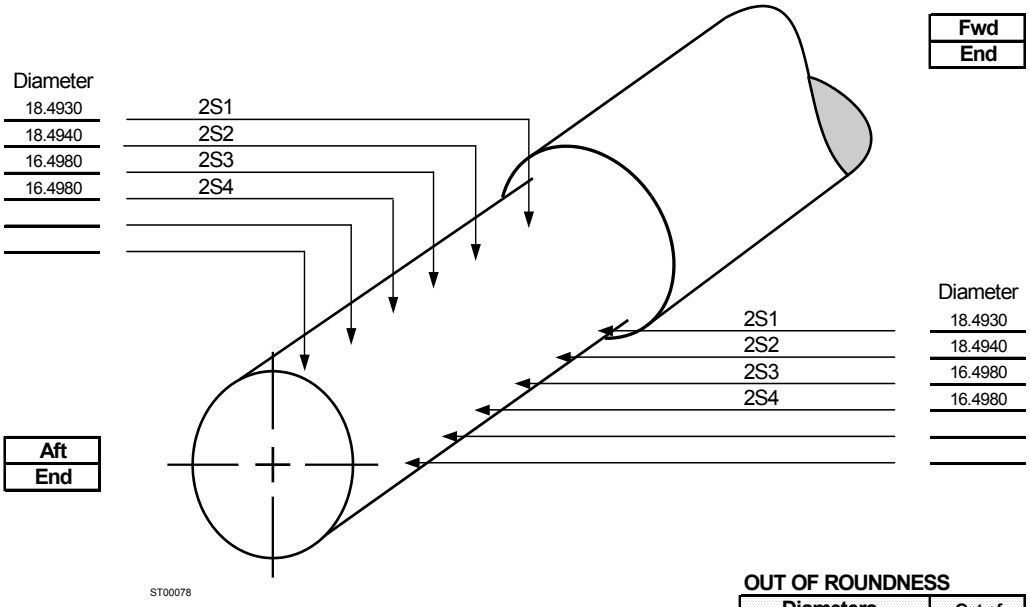
MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Bearings

#2 Rotor Journal Condition

Date 2/7/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? NO | Photos Enclosed?
Data Type As found
Journal Number T2

NOTE: **Mark on sketch to show grooving, discoloration, carbon inclusions, or irregularities in the journal surface.**



JOURNAL SIZES

	0º	90º	All
Maximum			
Minimum			
Difference			
Average			

OUT OF ROUNDNESS

Diameters		Out of
0º	90º	Round

Comments:	

GT

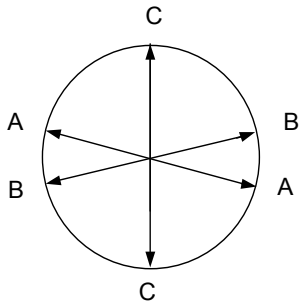
2130 Brg Journal Dims Final#2
Journal

Journal Bearing

As Found ***Oil Ring Clearances***

Date 2/9/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS				CODE	
Ring Inspected	X			**X**	Work Carried Out
Journals Inspected	X			**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Location	Oil Rings			Journal	Clearance			Condition
Number	A-Dia	B-Dia	C-Dia	Dia	Average	Min.	Max.	Comment
#1 FWD	16.508	16.507	16.504	16.500	0.0063	0.0040	0.0080	Visually ok
#1 AFT	16.503	16.503	16.510	16.500	0.0053	0.0030	0.0100	Visually ok
#2 FWD	16.505	16.504	16.510	16.500	0.0063	0.0040	0.0100	Warrants Replacement
#2 AFT	16.507	16.507	16.508	16.500	0.0073	0.0070	0.0080	Visually ok
Thrust-F	16.014	16.014	16.007	16.000	0.012	0.007	0.014	Visually ok
Thrust-A	16.011	16.014	16.011	16.000	0.012	0.011	0.014	Visually ok

Comments:

These data are as found.

Jou

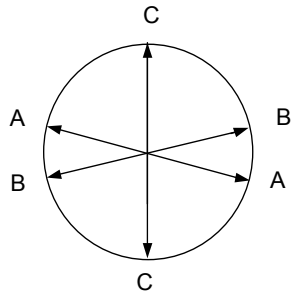
rnal Brg Oil Seals-As FoundAs

Oil Seal

Final - NEW T2 ***Turbine***

Date 2/7/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

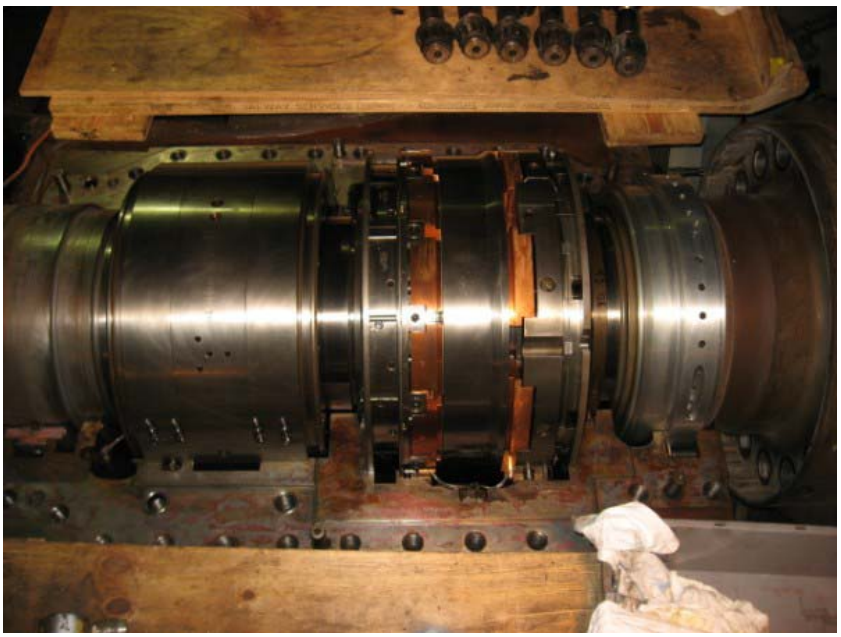
INSPECTIONS & CHECKS				CODE	
Teeth Inspected	x			**X**	Work Carried Out
Journals inspected	x			**N**	Not Done
Drain Holes Inspected	x			**NA**	Not Applicable
Inspected for rubs	x			**C**	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Location	Oil Deflector			Journal	Clearance			Condition
Number	A-Dia	B-Dia	C-Dia	Dia	Average	Min.	Max.	Comment
T2 NEW	16.5050	16.5060	16.5080	16.500	0.0063	0.0050	0.0080	NEW

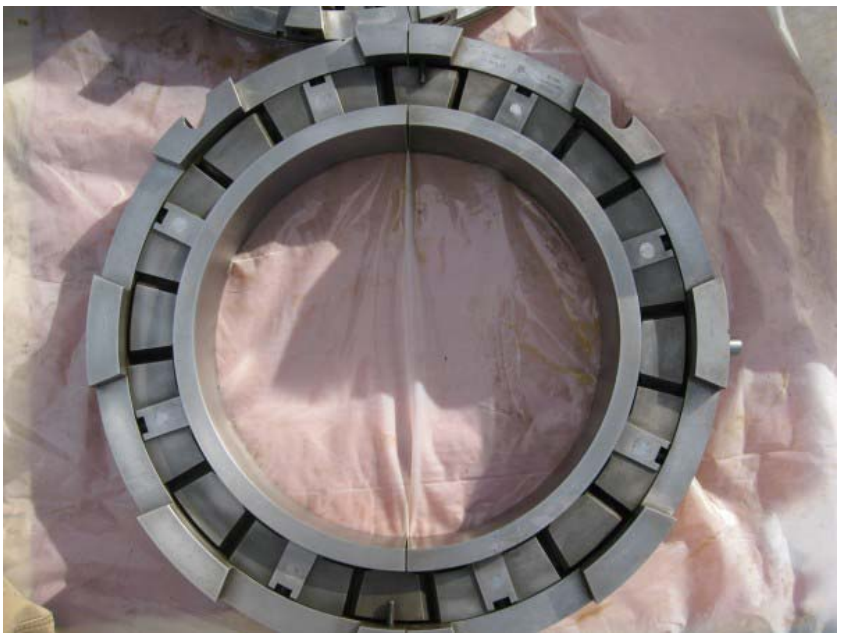
Comments:	

Found oi
l seal--new t2 DimensionsAs Found



As Found Thrust Bearing

Aft Thrust Bearing Cage



Forward Thrust Cage Assembly

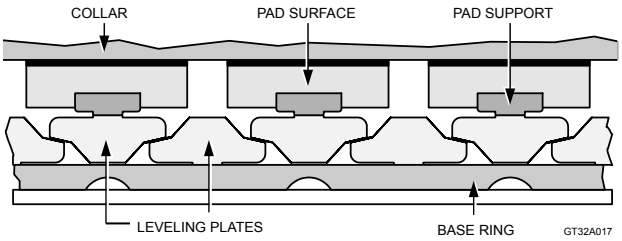
Thrust Pad

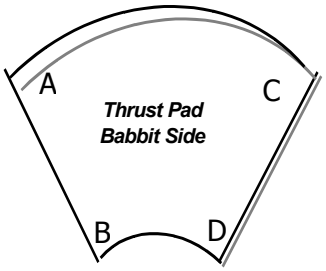
In-Active Thrust Pad Data Sheet

Date 2/8/2009 Turbine S/N 296436 Prepared by Barody, Jason

Data Type: ***In Active - Closing - AFT***

In-Active
Kingsbury Tilting Thrust Pad Bearing





PAD	A	B	C	D
1	2.102	2.101	2.101	2.099
2	2.103	2.101	2.102	2.101
3	2.101	2.100	2.100	2.099
4	2.101	2.102	2.100	2.101
5	2.101	2.099	2.101	2.099
6	2.100	2.100	2.101	2.099
7	2.100	2.100	2.100	2.099
8	2.100	2.100	2.102	2.101
9	2.100	2.099	1.606	1.602
10	2.105	2.098	2.102	2.100
11	2.101	2.101	2.101	2.101
12	2.101	2.100	2.100	2.099
13	2.102	2.100	2.101	2.100
14	2.102	2.102	2.102	2.102
Average	2.101	2.100	2.101	2.100

In active thrust pad(c)

Refer to ML404 to confirm rotor position.

Thrust Collar	4.230
Inactive Shim	
Active Shim	
Thrust Bump	

Pad # 9 is machined different than all other pads and reading should be ignored when compared to others.

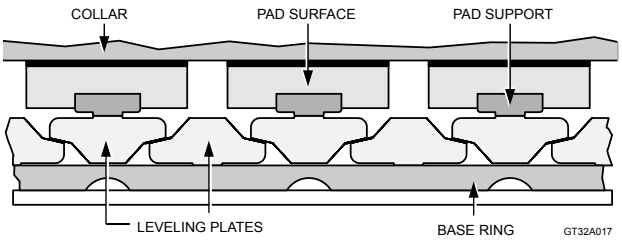
Thrust Pad

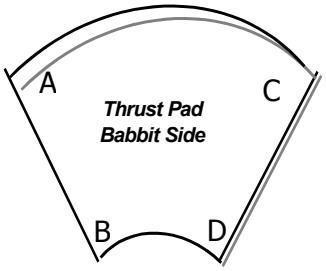
Active Thrust Pad Data Sheet

Date 2/12/2009 Turbine S/N 296436 Prepared by Barody, Jason

Data Type: ***Active -AS FOUND***

Active
Kingsbury Tilting Thrust Pad Bearing





PAD	A	B	C	D
1	1.619	1.620	1.617	1.619
2	1.619	1.619	1.618	1.619
3	1.620	1.619	1.618	1.620
4	1.619	1.618	1.617	1.618
5	1.619	1.619	1.618	1.619
6	1.619	1.619	1.618	1.620
7	1.620	1.619	1.618	1.619
8	1.620	1.620	1.618	1.620
Average	1.619	1.619	1.618	1.619

Refer to ML404 to confirm rotor position.

Thrust Collar	
Inactive Shim	
Active Shim	
Thrust Bump	

Groove marks on each pad. Replaced as part of the recommendation in 2006.

active thrust pads- as found and finalAs Found

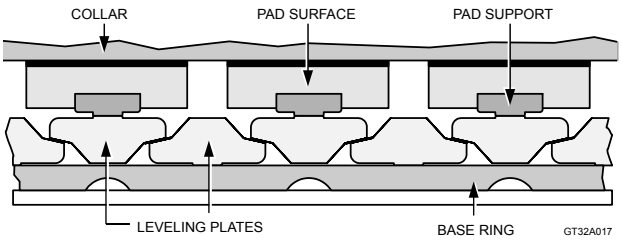
Thrust Pad

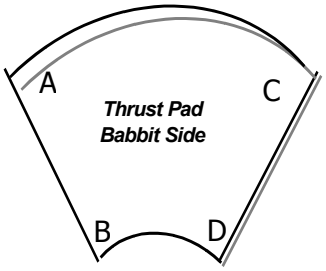
Active Thrust Pad Data Sheet

Date 2/12/2009 Turbine S/N 296436 Prepared by Barody, Jason

Data Type: ***Active -FINAL***

Active
Kingsbury Tilting Thrust Pad Bearing





PAD	A	B	C	D
1	1.619	1.618	1.617	1.618
2	1.619	1.619	1.618	1.619
3	1.620	1.619	1.618	1.620
4	1.619	1.620	1.617	1.619
5	1.619	1.619	1.618	1.619
6	1.620	1.620	1.618	1.620
7	1.620	1.619	1.618	1.619
8	1.619	1.619	1.618	1.620
Average	1.619	1.619	1.618	1.619

Refer to ML404 to confirm rotor position.

Thrust Collar	
Inactive Shim	
Active Shim	
Thrust Bump	

New Pads installed in existing cage
S/N: OR10509530-1
151B226

active thrust pads- as found and finalFinal

In active thrust padtestp

INLET SYSTEM

Inlet Silencer

Silencer; Duct Section

Donaldson was contracted to replace the inlet silencer duct section. The current silencer duct is severely corroded and warrants replacement. After the duct was replaced it was sealed and the entire inlet system was cleaned and partially repainted per TECO direction.

COOLING & SEALING AIR SYS

Exhaust Frame Blower

90TS-1; Roof

During the green rotor run-in, the unit had a fired shut down due to the 90TS-1 valve not opening. The valve was then investigated and it was noted that the valve was trying to open, but appeared to be stuck. The valve was then removed from the unit, cleaned and reset. Once the valve was reinstalled, it was functionally tested and no more issues to note.

Piping/Components (CA)

Valve; 9th and 13th Extract

During the outage all the manual compressor extraction valves were replaced. The 9th and 13th stage extraction valves were replaced, piping faces cleaned, and installed with new gaskets. All the bolts were cleaned and properly torqued. Each valves was functionally tested with no issues to note.

GAS FUEL SYSTEM

Piping/Components (GF)

Hose - Flexible; All

All gas turbine flexible hoses were removed during the major inspection and pressure tested per TIL 1547-2. There were no major issues to note and a few gaskets that were found to be leaking. All in question were replaced. See attached data sheet for further details.

All flexible metal hoses should be inspected at each outage.

Piping/Components (GF)

Hose - Flexible; All

All gas turbine flexible hoses were removed during the major inspection and pressure tested per TIL 1547-2. There were no major issues to note and a few gaskets that were found to be leaking. All in question were replaced. See attached data sheet for further details.

All flexible metal hoses should be inspected at each outage.

Piping/Components (GF)

Hose - Flexible; Multiple

The fuel gas flexible hoses were removed during this outage to allow for the disassembly of the combustion components. Plastic flange covers were immediately installed as part of a foreign matter exclusion program that was adhered to during the outage.

Prior to reassembly, the pigtails were blown out with compressed air and visually inspected for wear and fretting. The fuel gas flanges were verified to have the correct gaskets and bolts and then they were properly torqued. The pigtails were clocked to ensure that they did not contact other pigtails. After the pigtail installation was completed, a QC check was performed to ensure that the correct bolts and gaskets were installed, the flanges square and the bolts properly torqued.

There were a few damaged gas and nitrogen piping flex hoses that TECO decided to replace during the outage.

The fuel gas pigtails should be inspected for fretting and wear at the next outage.

GAS FUEL SYSTEM

Control Valve (VGC)

Actuator; ALL

Prior to start up a GE Controls Specialist calibrated the gas and nitrogen control valves.

LIQUID FUEL SYSTEM

Liquid Fuel Piping

Tubing; All

During the outage, a sub-contractor (Voom) replaced all the liquid fuel and water injection tubing from the bulkheads to the combustion cans. All tubing and necessary fittings were replaced and pressure tested prior to start up. In order to complete this process, the unit was partially rebuilt to give Voom access to run all new tubing without interfering with the base piping and hardware.

The fuel purge air system was also re-tubed during the outage. The purge valve was moved downstairs in hopes that the temperature will be cooler and the switches would last longer. This system was also pressure tested prior to start up.

LF Tubing

LIQUID FUEL SYSTEM

Purge Valve Re Located

LUBE OIL SYSTEM

Piping/Components (LO)

Hose; T1 Lift Oil Lines

The T1 bearing hydraulic hoses were replaced with new hydraulic hoses. In the process of replacing the hydraulic hoses, the dresser coupling gasket, lube oil drain piping gasket and all associated O-rings for the lube oil feed piping were replaced.

Piping/Components (LO)

Hose; T3 & T4

The generator bearing hydraulic lift oil hoses were replaced during the outage. There were minor fretting and missing protective sleeve material found on the hydraulic lines removed. There were two hoses out of the four that were leaking as well. The purpose of this replacement is to assure the hose life will last until the next major inspection.

Piping/Components (LO)

O-ring; Multiple in System

Prior to the outage, the customer was having issues with lift oil pressure. In the past the system was checked out, lift oil pump replaced and not much was found. During this outage we had the time and resources to fully investigate the lift oil system. We pressurized the system utilizing a hytorq pump from a connection close to the pumps and capped off all bearing locations. Multiple leaks were recognized and corrected. These leaks included faulty fittings (T2), damaged flex hoses (T1, T4, and T3) and damaged o-rings (JB #1). After all the leaks were corrected the system was checked and held pressure for minutes. The TECO customer representative witnessed this.

Piping/Components (LO)

Hose; T2 Lift Oil Lines

The T2 bearing hydraulic lift oil hoses were replaced during the outage. There were no defects to note on the hydraulic lines removed. The purpose of this replacement is to assure the hose life will last until the next major inspection.

PURGE AIR SYSTEM

Liquid Purge Valve (VA19)

Assembly; 1-14

The liquid fuel purge valves were functionally tested during the pre-start checks.

A complete set of liquid fuel purge valves should be kept in storage for emergency situations.

STARTING MEANS

Turning Gear

Assembly;

The turning gear assembly was visually inspected during the major inspection for any major defects. There were no issues to note at this time.

DEVICE SUMMARY

Magnetic Pick-Up's

77it Speed Pick-up Int Shaft;

During the outage the magnetic speed pickups were inspected for damage and wear. There were no defects to note. Each probe was then set at 0.050" +/- 0.005".

Thermocouples/RTD's

Tt-ws1 Turb Temp-Whlspc 1st Stg; Left and Right

The thermocouple guide tubes for the TT-WS-FO were both found to be in good condition. There was 1 clamp on the right side that was replaced during the outage.

These areas should be inspected at the next opportunity for any damage or missing parts.

Check Valves

Vck4 Pfd Liq Fuel Check Vlv; 1-14

The liquid fuel check valves were pressure tested before reassembly of the liquid fuel tubing began. The fourteen check valves were replaced with customer spares. The new valves were also pressure tested, and the test proved satisfactory. The new check valves and the new O-rings were then installed onto the unit.

A complete set of liquid fuel check valves and o-rings should be kept in storage for emergency situations.

COUPLINGS

Load Coupling Assembly; Turbine End
The load coupling and mating compressor and generator couplings were cleaned and dimensionally checked. Refer to the attached data for further details. There were no issues to note.

Coupling Inspection

Date(m/d/y) 2/9/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

Rotor Identification Compressor/Load Shaft Coupling Load coupling
(Compressor End or Generator End)

INSPECTIONS & CHECKS				CODE	
				X	Work Carried Out
Bolt Covers & Screws	**NA**	Coupling Runouts		**N**	Not Done
Lockplates	**NA**	Bolt Extension Measurements	**x**	**NA**	Not Applicable
Coupling Bolts/Studs	**x**			**C**	See Comments
Coupling Mating Surface	**x**			**V**	Visual Inspection
Rabbet	**x**			**MP**	Mag. Particle
Dimensional Checks	**x**			**UT**	Ultrasonic
Coupling Flatness				**PT**	Penetrant

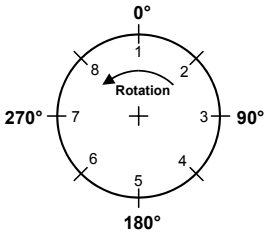


Fig. 1

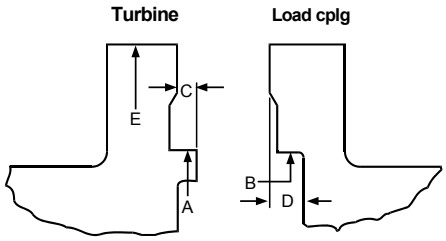


Fig. 2

ST00100a

COUPLING DIMENSIONAL CHECKS Readings in Inches

	Position Number			
	1	2	3	4
Location	0°	45°	90°	135°
Male Rabbet O.D. (A)	18.300	18.300	18.300	18.300
Female Rabbet I.D. (B)	18.297	18.297	18.297	18.297
Rabbet Interference (A-B)	0.003	0.003	0.003	0.003
Male Rabbet Length (C)	1.091	1.090	1.090	1.091
Female Rabbet Depth (D)	0.590	0.590	0.590	0.592
Coupling O.D. (E)	30.625	30.625	30.625	30.625

** Rabbet Interference - Positive value means there is an interference fit.

Comments:

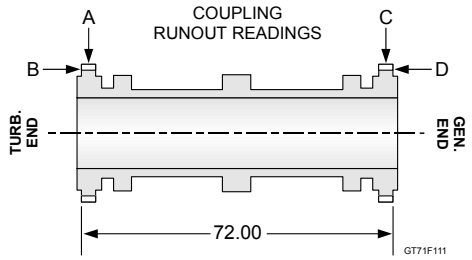
Load Coupling-Cpsr end-as foundLoad to Turbine

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001, 7001F, 9001

Coupling
Load

Date 3/1/2009 Turbine S/N 296436 Prepared by Barody, Jason
FSR # 357T10161 Sketches Enclosed? N Photos Enclosed? N
Data Type Opening

Vendor Serial # **NA** *GE Part #* **NA**



NOTE: Runouts are to be taken at free end after load coupling is final bolted at other end.

COUPLING RUNOUT READINGS			
Turbine End		Generator End	
Rim (A)	Face (B)	Rim (C)	Face (D)
NA	NA	NA	NA

COUPLING INTERFERENCE FIT DIMENSIONS		
	Turbine End	Generator End
Male Dimension		
Female Dimension		
Fit	0.000	0.000

COUPLING BOLT ELONGATION DATA

TURBINE END				GENERATOR END			
Bolt No.	Bolt Length			Bolt No.	Bolt Length		
	Initial	Final	Elongation		Initial	Final	Elongation
A1-1	10.730	10.745	0.015	Not Disassembled			
A1-2	10.730	10.744	0.014	Not Disassembled			
A2-1	10.732	10.746	0.014	Not Disassembled			
A2-2	10.729	10.736	0.007	Not Disassembled			
A3-1	10.730	10.744	0.014	Not Disassembled			
A3-2	10.731	10.747	0.016	Not Disassembled			
A4-1	10.729	10.743	0.014	Not Disassembled			
A4-2	10.730	10.744	0.014	Not Disassembled			
A5-1	10.733	10.747	0.014	Not Disassembled			
A5-2	10.731	10.745	0.014	Not Disassembled			
A6-1	10.733	10.746	0.013	Not Disassembled			
A6-2	10.726	10.741	0.015	Not Disassembled			
A7-1	10.729	10.743	0.014	Not Disassembled			
A7-2	10.737	10.751	0.014	Not Disassembled			
A8-1	10.732	10.747	0.015	Not Disassembled			
A8-2	10.733	10.747	0.014				
A9-1	10.732	10.746	0.014				
A9-2	10.735	10.749	0.014				

Comments:	

Load Cpl GT5015(a)

GENERATOR STATOR

End Shield

Assembly;

The generator stator hardware was inspected during this outage per TIL - 1398-2R1. A GE Generator Specialist performed this inspection and found no major issues. The area was cleaned with denatured alcohol. Refer to generator report for further details.

End Shield

Assembly;

All the old endshield sealant was removed and new DOW Corning Fluorosilicone was pumped into the TE and CE end shields. After the outage a generator air test was completed and was satisfactory.

End Shield

Assembly; TE and CE

The TE and CE outer end shields (upper and lower) were removed during the outage in order to remove the Generator field. The components were cleaned and inspected for damage. The overall condition was good.

End Shield

Hydrogen Seal Casing; TE and CE

The hydrogen seal casings for each end of the generator were removed during the outage. Each was cleaned and visually inspected for damage. The collector end casing when bolted together had a step in the joint between the upper and lower half. Honing the sealing surface joint rectified this issue.

The hydrogen seals were also cleaned and inspected during the outage. These seals are the bolted style. A contact check was performed between the sealing surface of the hydrogen seals and the seal casing. The TE and CE were lapped in as an assembly. The final 100% contact check of .125" was achieved and a picture was taken of each seal for documentation.

GENERATOR STATOR

Stator

Bearing; T3 and T4

The generator bearings were removed during the outage. Each was cleaned and inspected for wear, damage, and clearance and babbitt separation. Both were found to have babbitt issues and were also missing a T/C. The bearings were shipped to a certified GE service center for repair. The bearings returned to site and were visually inspected. The bearings were reinstalled in the generator and a final pinch check was performed. All checks were within GE specification.

Stator

Oil Deflector; T3 and T4

The inner and outer oil deflectors were removed from each end of the generator during the outage. Each was cleaned and dimensionally checked per drawing. No defects were noted. During reassembly the oil deflectors were installed and set to the proper clearance per the generator clearance diagram. Refer to the attached data sheets for further details.

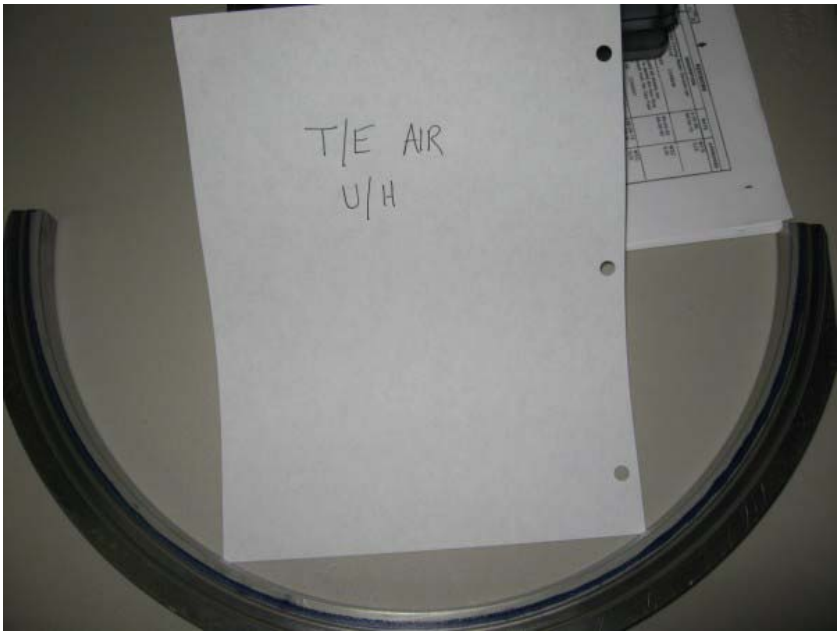
Stator

Shield; Inner Gas Shields

The CE inner gas shield were removed, cleaned and inspected during the outage. The inner gas shield was found free of defects.

GE Energy Services

GENERATOR STATOR



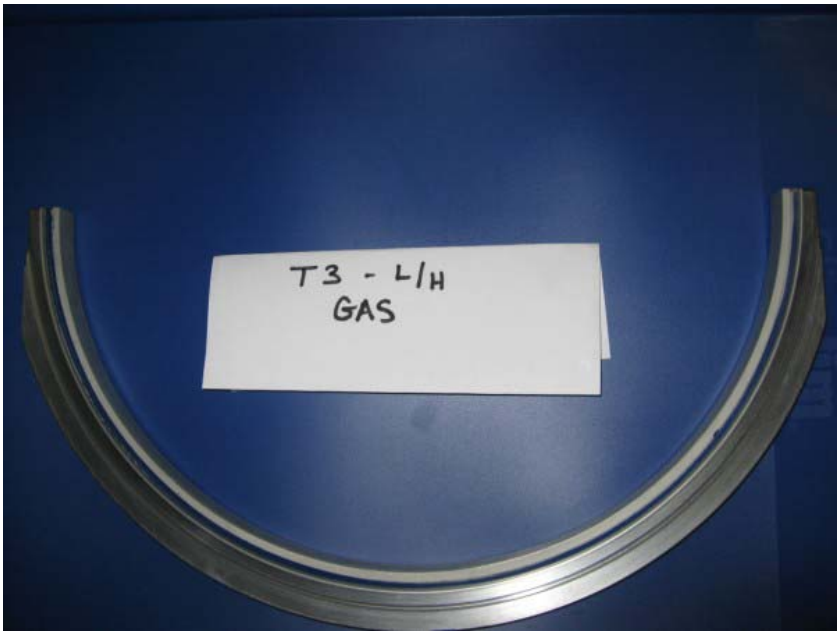
TE UH Air Seal

GENERATOR STATOR

TE LH Air Seal

GE Energy Services

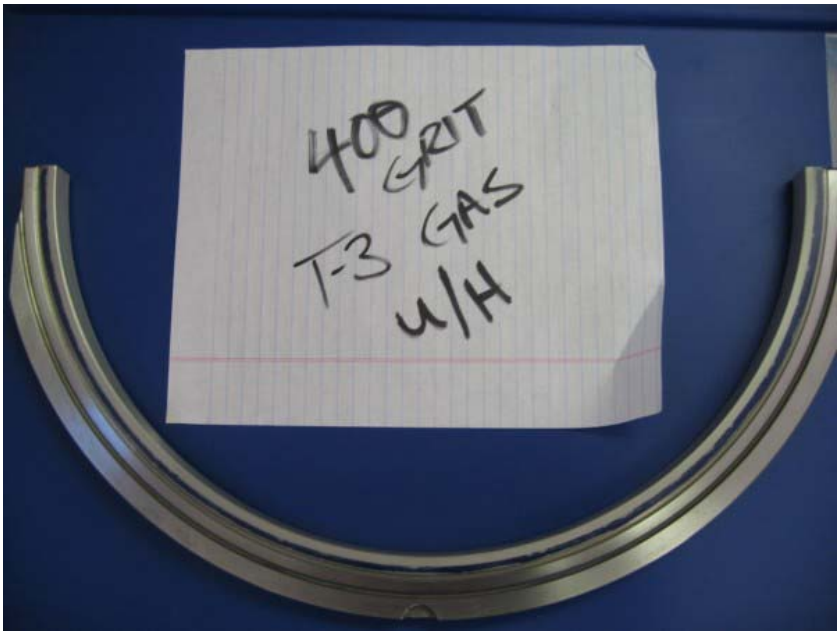
GENERATOR STATOR



TE LH Gas Seal

GE Energy Services

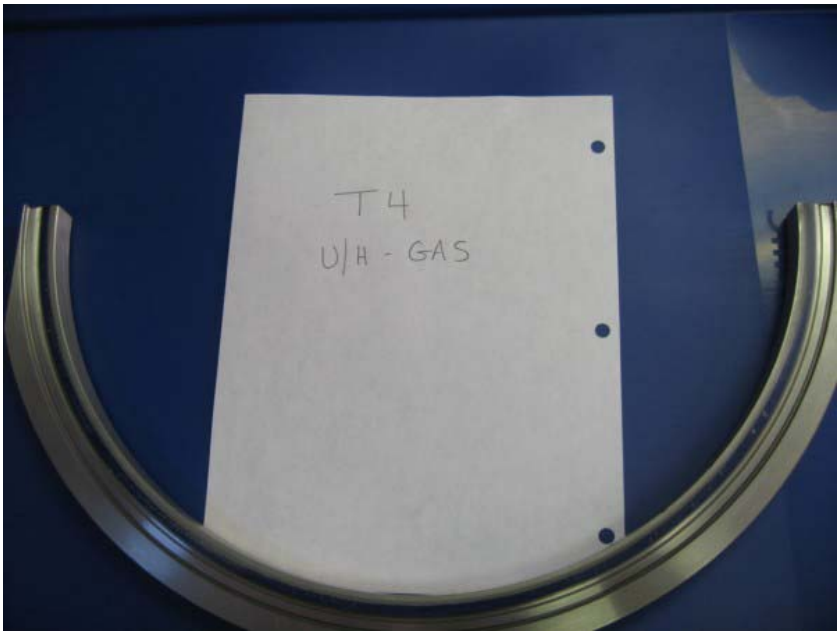
GENERATOR STATOR



TE UH Gas Seal

GE Energy Services

GENERATOR STATOR



CE UH Gas Seal

GENERATOR STATOR

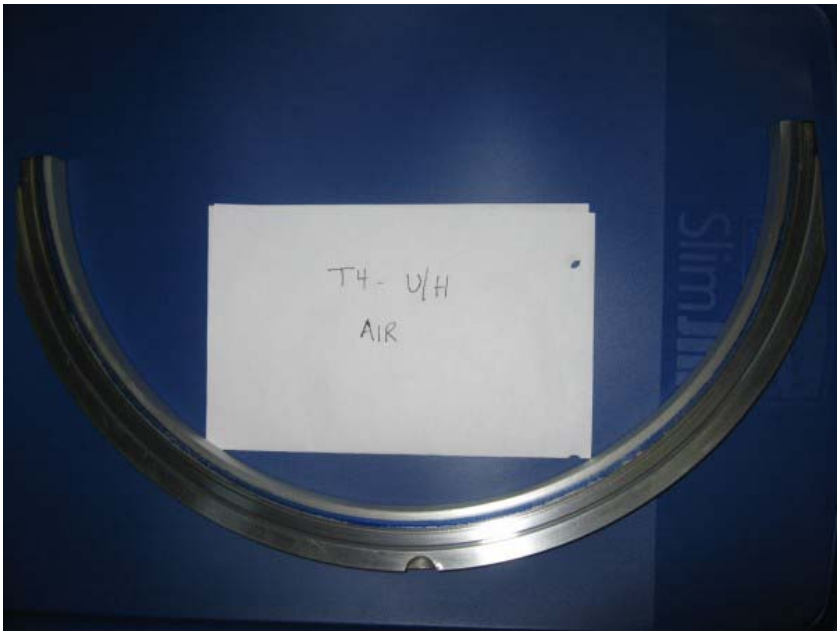
CE LH Gas Seal

GENERATOR STATOR

CE LH Air Seal

GE Energy Services

GENERATOR STATOR



CE UH Air Seal

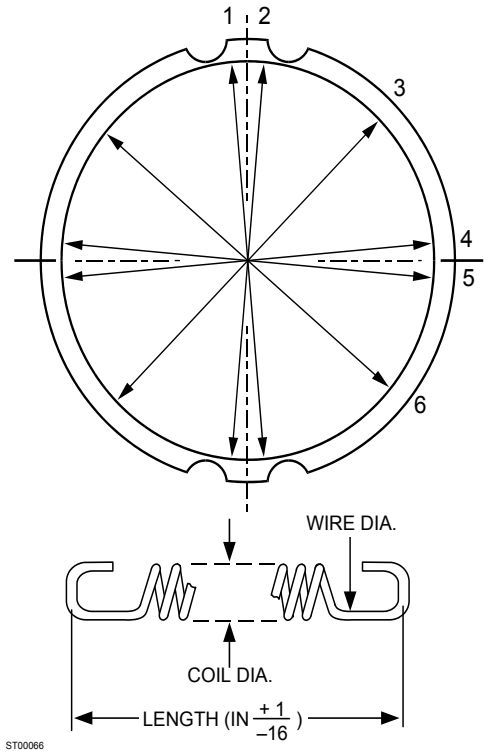
Seal Oil System

Date(m,d,y) 2/9/2009 Serial No. 337X011 Prepared by Barody, Jason

INSPECTIONS & CHECKS			
Main Seal Oil Pump		Seal Oil Press. Gages	
Emerg. Seal Oil Pump		at Unit Centerline	
Gas Side Drain Float,		High Level Alarm on Hydrogen	
Trap and Valves		Detraining Tank	
Vacuum Pump		Gage Calibration	
Drain Enlargement		Seal Casing Assembly	
Relief Valves		* Joint Clearances	
Liquid Detectors		* Oil Grooves Clear?	
and Alarm		Pressure Switches	
Auto Pump Start &		Motor to Pump Align.	
Alarm Test		Clean Feed Line	
Regulating Valves		Strainer	
Oil Filters			

CODE		
X	-	Work Carried Out
N	-	Not Done
NA	-	Not Applicable
C	-	See Comments
V	-	Visual Inspection
S	-	Satisfactory
U	-	Unsatisfactory

SYSTEM TYPE _____
(Vacuum or Scavenging)

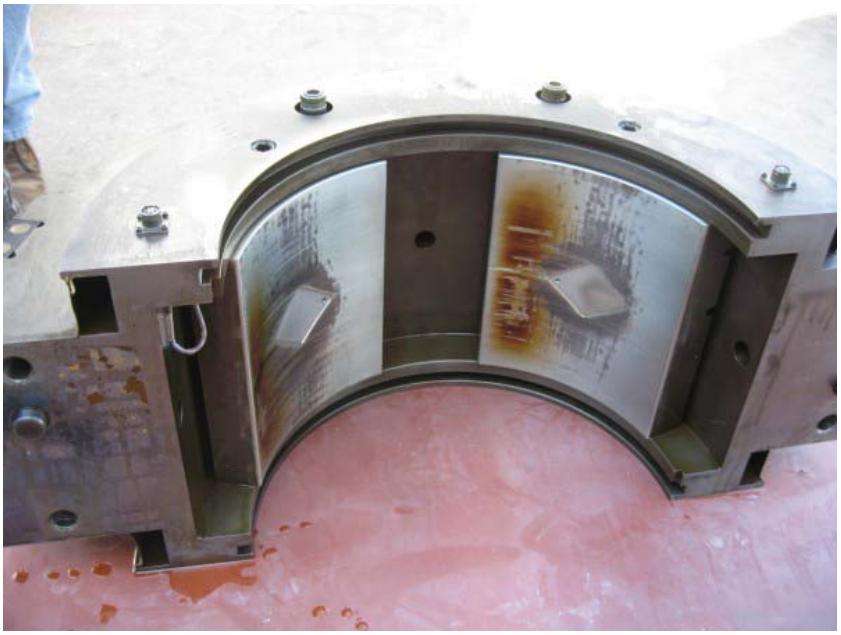


SEAL MEASUREMENTS (TO NEAREST .001")				
	TURBINE END		COLL. END	
POSITION	AIR	HYD	AIR	HYD
1	16.008	16.002	16.012	16.008
2	16.008	16.002	16.013	16.008
3	16.009	16.004	16.011	16.006
4	16.011	16.009	16.006	16.005
5	16.012	16.009	16.008	16.006
6	16.009	16.005	16.011	16.008
AVERAGE	16.010	16.005	16.010	16.007
SHAFT DIA.	16.000	16.000	16.000	16.000
CLEARANCE	0.009	0.005	0.010	0.007

HYDROGEN SEAL SPRING MEASUREMENTS				
	TURBINE END		COLL. END	
	UPPER	LOWER	UPPER	LOWER
LENGTH (IN.±1/16)	27.250	27.125	27.125	27.187
WIRE DIA.	0.120	0.120	0.120	0.120
COIL DIA.	0.615	0.611	0.611	0.610
GRADIENT (#/IN)				

Testing Data
a. Seal Oil Flow _____ G.P.M.
b. Hydrogen Pressure _____ P.S.I.
c. Unit Speed _____ R.P.M.

H2 Seal Inspection D316501(a)



CE LH bearing - as found

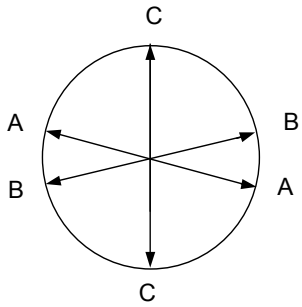
Generator Bearing prior to installation

Generator Oil Slingers
FINAL

Journal Bearing
Oil Ring Clearances

Date 2/11/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS				CODE	
Ring Inspected	X			**X**	Work Carried Out
Journals Inspected	X			**N**	Not Done
				NA	Not Applicable
				C	See Comments
				V	Visual Inspection
				MP	Mag. Particle
				UT	Ultrasonic
				PT	Penetrant



Location	Oil Rings			Journal	Clearance			Condition
Number	A-Dia	B-Dia	C-Dia	Dia	Average	Min.	Max.	Comment
T3 Outer	16.020	16.018	16.012	15.999	0.018	0.013	0.021	Visually OK
T3 Inner	16.018	16.019	16.010	15.999	0.017	0.011	0.020	Visually OK
T4 Outer	16.011	16.011	16.009	15.999	0.011	0.010	0.012	Visually OK
T4 Inner	16.015	16.016	16.003	15.999	0.012	0.004	0.017	Visually OK

Comments:
Springs were in good condition and no serious signs of any defects on the oil seals. Seals were cleaned and reinstalled.

Generator Oil Seals- FinalFinal

CONFIDENTIAL MATERIAL REDACTED

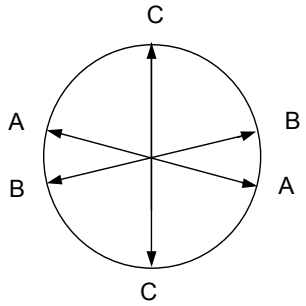
BATES STAMPED PAGES 622

Oil Deflector

As Found ***GENERATOR***

Date 2/9/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS	CODE	
	X	Work Carried Out
	N	Not Done
	NA	Not Applicable
	C	See Comments
	V	Visual Inspection
	MP	Mag. Particle
	UT	Ultrasonic
	PT	Penetrant



Location	Oil Deflector				Clearance			Condition
Number	A-Dia	B-Dia	C-Dia		Average	Min.	Max.	Comment
T4 Outer	18.026	18.023	18.024	18.000	0.0243	0.0230	0.0260	Slightly worn
T4 Outer	18.026	18.027	18.026	18.000	0.0263	0.0260	0.0270	Slightly worn
T3 Outer	18.009	18.015	18.032	18.000	0.0187	0.0090	0.0320	Slightly worn
T3 Outer	18.012	18.016	18.030	18.000	0.019	0.012	0.030	Slightly worn

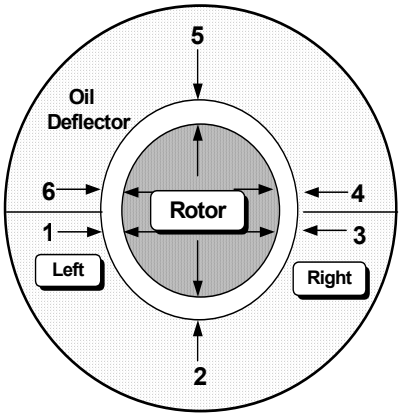
Comments:	

Generator Oil Deflector TE AND CETE

INSPECTION REPORT
Gas Turbine Maintenance
MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Bearings
Oil Deflectors, Alignment

Date	02/08/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	NO	Photos Enclosed?	
		Data Type	AS FOUND		



Deflector	POSITION (Mils)						CLEARANCE			IDEAL POSITION		
Location	1	2	3	4	5	6	Median	Min.	Max	Top	Bottom	Sides
T4 Outer	0.006	0.002	0.008	0.006	0.024	0.004	0.006	0.002	0.024	0.017	0.009	0.006
T4 Inner	0.016	0.013	0.015	0.015	0.018	0.016	0.016	0.013	0.018	0.021	0.010	0.016
T3 Outer	0.005	0.005	0.003	0.004	0.027	0.004	0.005	0.003	0.027	0.021	0.011	0.004
T3 Inner	0.017	0.003	0.016	0.017	0.032	0.019	0.017	0.003	0.032	0.023	0.012	0.017

Comments:

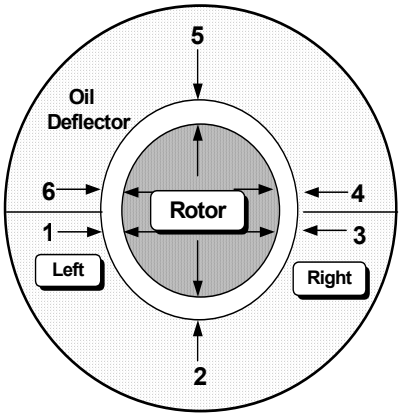
Bearing Cap - Pinch C/E = 0.001"
Bearing Cap - Pinch T/E = 0.002"

GT2125 Oil Deflector AlignAs Found

INSPECTION REPORT
Gas Turbine Maintenance
MS 3002, 5001, 5002, 6001, 7001, 7001F, 9001, 9001F

Bearings
Oil Deflectors, Alignment

Date	2/22/2009	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	NO	Photos Enclosed?	
		Data Type	FINAL		



Deflector	POSITION (Mils)						CLEARANCE			IDEAL POSITION		
Location	1	2	3	4	5	6	Median	Min.	Max	Top	Bottom	Sides
T4 Outer	0.010	0.005	0.010	0.012	0.024	0.008	0.010	0.005	0.024	0.019	0.010	0.010
T4 Inner	0.016	0.011	0.015	0.015	0.020	0.016	0.016	0.011	0.020	0.021	0.010	0.016
T3 Outer	0.005	0.005	0.003	0.004	0.027	0.004	0.005	0.003	0.027	0.021	0.011	0.004
T3 Inner	0.017	0.012	0.016	0.017	0.023	0.019	0.017	0.012	0.023	0.023	0.012	0.017

Comments:

Bearing Cap - Pinch C/E = 0.001"
Bearing Cap - Pinch T/E = 0.002"

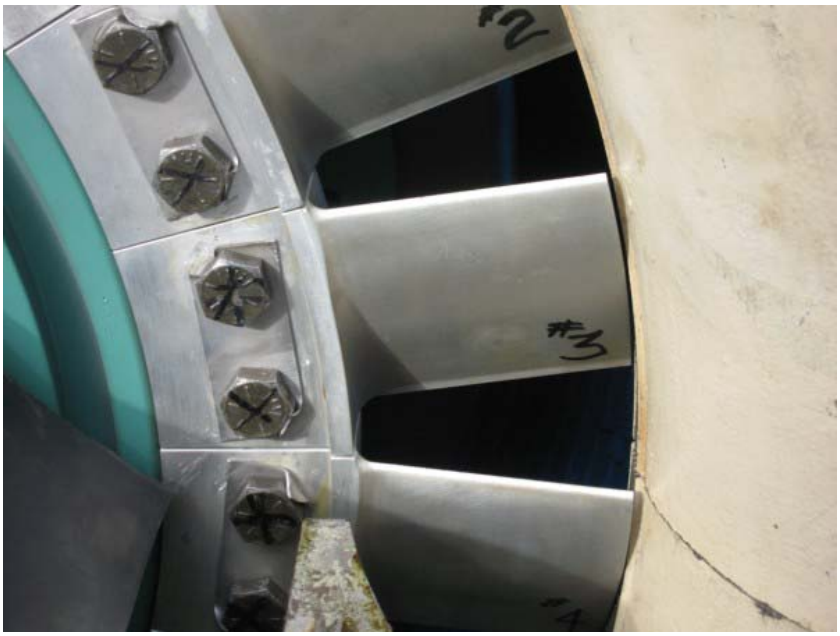
GT2125 Oil Deflector AlignFinal

GENERATOR FIELD

Fan

Fan Blade; TE and CE

The TE and CE fan blades were removed during the outage in order to remove the inner gas shields. Each fan blade numbered, cleaned and visually inspected for damage. No defects were found. The blades were reinstalled on the field with new lock plates and torqued.



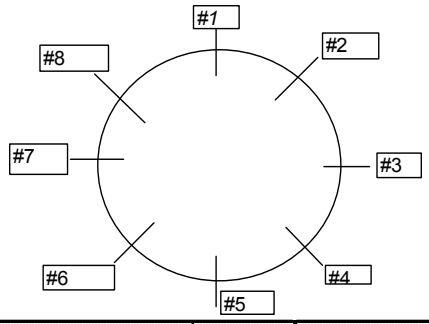
CE Fan Blades

Collector End Fan Tip Clearances

As Found ***GENERATOR***

Date 2/8/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS		CODE	
		X	Work Carried Out
		N	Not Done
		NA	Not Applicable
		C	See Comments
		V	Visual Inspection
		MP	Mag. Particle
		UT	Ultrasonic
		PT	Penetrant



Location Number	Clearance				Clearance			Condition Comment
					Average	Min.	Max.	
1	0.073							
2	0.072							
3	0.063							
4	0.043							
5	0.042							
6	0.051							
7	0.056							
8	0.062							
9	0.051							
10	0.055							

Comments:	

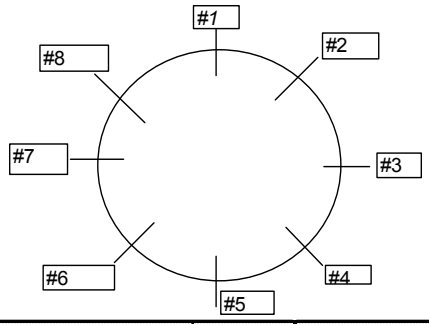
Generator End Fan Tip ClearancesCE As Found

Collector End Fan Tip Clearances

CLOSING OR FINAL ***GENERATOR***

Date 2/21/2009 Turbine Serial No. 296436 Prepared by Barody, Jason

INSPECTIONS & CHECKS	CODE	
	X	Work Carried Out
	N	Not Done
	NA	Not Applicable
	C	See Comments
	V	Visual Inspection
	MP	Mag. Particle
	UT	Ultrasonic
	PT	Penetrant



Location Number	Clearance				Clearance			Condition Comment
					Average	Min.	Max.	
1	0.038							
2	0.039							
3	0.033							
4	0.040							
5	0.041							
6	0.045							
7	0.030							
8	0.036							
9	0.044							
10	0.045							

Comments:	
Blade tip clearance specifications per 108E6916: 0.030-0.090"	

Generator End Fan Tip ClearancesCE FINAL

TURBINE ALIGNMENT & CLEARANCES

Alignment - Coupling

Summary; Generator to Turbine

An alignment check was performed at re-assembly, by rotating both shafts and reading the generator. The results were compared to the latest design values per TIL 1611. The generator was then moved to correct the mis-alignment per the GE field alignment instructions. GE verified the final alignment readings. The results of the inspection are documented on the following pages.

Alignment - Coupling

Summary; Turning Gear

An alignment check was performed at reassembly, by rotating the turning gear and reading the generator. The results were compared to design values and indicated the turning gear was mis-aligned. The turning gear was then moved in order to achieve the recommended specification, per the GE field alignment instructions. GE verified the final alignment readings. The results of the inspection are documented on the following pages.

Clearances - Turbine

Summary;

An opening and closing turbine rotor clearance check was performed and results were compared to design values. All measurements indicate that the clearances are acceptable and most are within the recommended tolerances on GE drawing 201E3476. The opening thrust measurement was recorded at 0.017" while the closing was recorded at 0.015".

A detailed report of the opening and closing clearances can be found on the GE turbine rotor clearances inspection form. The unit rotor was thrust against the "XA" face as noted in the clearance drawing and the nozzles were wedged downstream before measurements were recorded.

TURBINE ALIGNMENT & CLEARANCES

Clearances - Compressor

Summary:

An opening and closing compressor rotor clearance check was performed and results were compared to design values. All measurements indicate that the clearances are acceptable and most are within the recommended tolerances on GE drawing 201E3476. A detailed report of the opening and closing clearances can be found on the GE compressor rotor clearances inspection form.

INSPECTION REPORT
Gas Turbine Maintenance

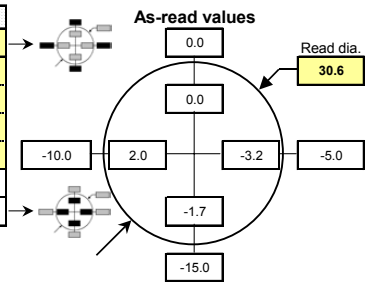
Alignment (a)
Data Collection Sheet

Date 13-Mar-09 | Serial Number 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type Closing

Alignment Readings (Insert as-read values in mils)

Position	Top	Left	Bottom	Right
Rim	0.0	-10.0	-15.0	-5.0
Face 0º	787.0	787.0	782.0	782.0
Face 90º	772.0	776.0	771.0	769.0
Face 180º	776.0	778.0	776.0	774.0
Face 270º	741.0	743.0	740.0	738.0
Average	769.0	771.0	767.3	765.8
Relative	0.0	2.0	-1.7	-3.2

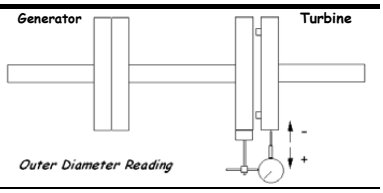
Check	Face	Rim
Top + Bottom=	-1.7	-15.0
Right + Left =	-1.2	-15.0
Difference=	0.5	0.0



Christmas tree mounted on: Generator
Reading coupling of: Turbine

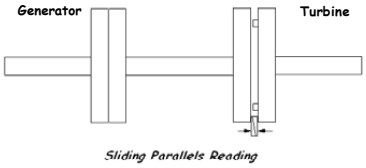
Reading Configuration for Rim (select one) (1)
- ☐ Dial Indicator reading OD
- ☒ Dial Indicator reading OD (2)
- ☐ Dial Indicator reading ID
- ☐ Extended OD reading
- ☐ Extended ID reading

Sign convention: **Standard**



Reading Configuration for Face (select one) (2)
- ☐ Dial Indicator with positive float reading
- ☐ Dial Indicator with positive float reading (2)
- ☐ Dial Indicator with positive float reading (3)
- ☐ Dial Indicator with negative float reading
- ☒ Sliding Parallels at four points

Sign convention: **Inverted**



NOTES:
1. Rim readings reflect indicator riding at coupling OD or on male rabbet; if indicator rides on female rabbet, the sign convention is Inverted.
2. Face readings reflect indicator riding at coupling face. For sliding parallels, sign convention is Inverted.
3. Fill in cells in yellow with values.

Comments
View is towards generator from turbine

Generator Alignment Final report(a)

INSPECTION REPORT
Gas Turbine Maintenance
MS 7001FA

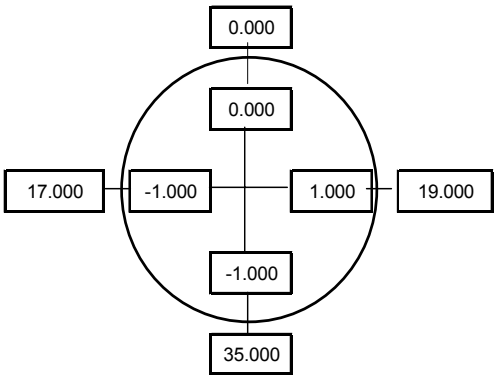
Alignment
Turning Gear

Date 3/14/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type Final

Alignment Readings (Insert readings in (mils)

Position	Top	Left	Bottom	Right
Rim	0	17.000	35.000	19.000
Face 0º	0.000	-1.000	-1.000	1.000
Face 90º	0.000	-1.000	-1.000	1.000
Face 180º	0.000	-1.000	-1.000	1.000
Face 270º	0.000	-1.000	-1.000	1.000
Average	0.000	-1.000	-1.000	1.000
Relative	0.000	-1.000	-1.000	1.000

Check	**Face**	**Rim**
Top + Bottom=	-1.000	35.000
Right + Left =	0.000	36.000
Difference=	-1.000	-1.000



Sweep Diameter (Inches): **12"**

Indicator Mounted on: TG reading Generator

NOTE:
1. Checks to be made in direction of turbine flow.
2. "Rim" readings should reflect indicator riding at coupling OD or on male rabbet; if indicator rides on female rabbet, the sign conventions must be changed.

Comments	
Final alignment on turning gear coupling. Axial dimension set at 7.896"	

GT1005 Turning Gear Alignment FINALFinal

GE Energy Services

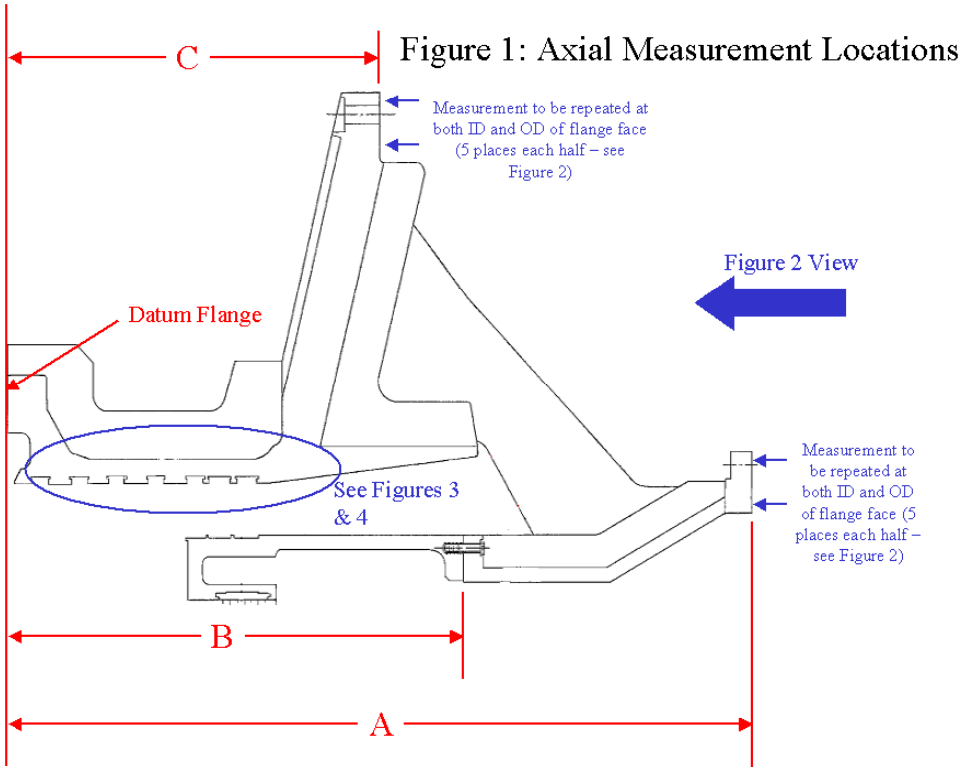
ALIGNMENT & CLEARANCE OVERVIEW

An opening and closing turbine rotor clearance check was performed and results were compared to design values. All measurements indicate that the clearances are acceptable and most are within the recommended tolerances on GE drawing 201E3476. The opening and closing thrust measurements were recorded at 0.017" and 0.015" respectively. A detailed report of the opening and closing clearances can be found on the GE turbine rotor clearances inspection form. The unit rotor was thrust against the "XA" face as noted in the clearance drawing and the nozzles were wedged downstream before measurements were recorded.

An opening and closing compressor rotor clearance check was performed and results were compared to design values. All measurements indicate that the clearances are acceptable and most are within the recommended tolerances on GE drawing 201E3476. A detailed report of the opening and closing clearances can be found on the GE compressor rotor clearances inspection form.

The alignment between the turbine and generator was checked at reassembly. The generator was moved in order to correct the alignment issues. Finally, the turning gear was aligned to the generator. The final alignment data can be review in this report.

TECO POLK



AS FOUND - Readings

	Left Side	Right Side
A	77.197	77.189
B	46.731	46.717
C	39.755	39.745

DWG -Specs

	Left Side	Right Side
A	77.160	77.160
B	46.687	46.687
C	39.700	39.700

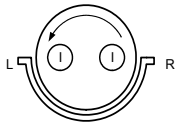
CDC Creep MeasurementCDC Creep

INSPECTION REPORT
Gas Turbine Maintenance

MS 7001, 7001F, 9001

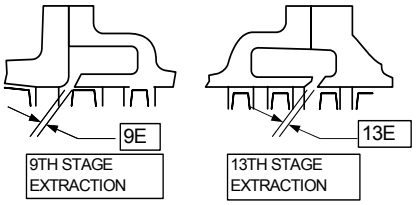
Compressor
Rotor Clearances

Date 2/5/2009 | Turbine S/N 296436 | Prepared By Barody, Jason
FSR # 357T1061 | Sketches Enclosed? NO | Photos Enclosed? no
Data Type Opening / Closing

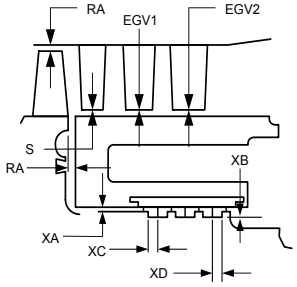


POSITION 1 WITH #1 BOLT HOLE OF COMP ROTOR AT LEFT

NOTE:
1. All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.
2. Refer to clearance diagram for specified dimensions.
3. Take readings with rotor positioned as follows:
   a. Position 1L with #1 bolt hole of comp. rotor at left horizontal joint.
   b. Position 1R with #1 bolt hole of comp. rotor at right horizontal joint.



ROTOR-STATOR BLADE & AIR SEALING CLEARANCES



GT71E022

	OPENING		CLOSING	
STG	1L	1R	1L	1R
R0	0.054	0.064	0.059	0.076
S0	0.029	0.030	0.029	0.031
R1	0.071	0.054	0.054	0.061
S1	0.053	0.042	0.050	0.057
R2	0.054	0.059	0.053	0.065
S2	0.066	0.054	0.058	0.054
R3	0.067	0.064	0.080	0.082
S3	0.069	0.066	0.065	0.071
R4	0.068	0.064	0.059	0.066
S4	0.061	0.064	0.057	0.066
R5	0.073	0.064	0.063	0.064
S5	0.070	0.062	0.055	0.067
R6	0.070	0.066	0.060	0.065
S6	0.073	0.073	0.056	0.067
R7	0.072	0.069	0.061	0.066
S7	0.074	0.071	0.055	0.061
R8	0.073	0.068	0.056	0.066
S8	0.075	0.072	0.053	0.058
R9	0.077	0.077	0.067	0.072
S9	0.087	0.074	0.066	0.072

	OPENING		CLOSING	
STG	1L	1R	1L	1R
R10	0.076	0.078	0.064	0.073
S10	0.086	0.072	0.067	0.070
R11	0.076	0.081	0.064	0.073
S11	0.073	0.074	0.049	0.070
R12	0.095	0.081	0.060	0.067
S12	0.086	0.074	0.061	0.079
R13	0.072	0.078	0.062	0.079
S13	0.062	0.076	0.059	0.078
R14	0.078	0.087	0.078	0.088
S14	0.075	0.074	0.075	0.095
R15	0.088	0.086	0.075	0.087
S15	0.071	0.070	0.078	0.075
R16	0.085	0.074	0.076	0.079
S16	0.088	0.081	0.082	0.085
R17	0.089	0.081	0.076	0.086
S17WF	0.030	0.033	0.034	0.034
S17WA	0.034	0.040	0.030	0.042
S17YA	0.050	0.055	0.084	0.060

	OPENING		CLOSING	
	1L	1R	1L	1R
E1WF	0.033	0.035	0.051	0.035
E1WA	0.033	0.036	0.028	0.035
E1YF	0.040	0.044	0.036	0.034
E1YA	0.040	0.044	0.082	0.074
E2WF	0.034	0.034	0.039	0.028
E2WA	0.035	0.030	0.036	0.035
E2YF	0.055	0.060	0.058	0.066
E2YA	0.055	0.055	0.053	0.044
RA	0.268	0.274	0.302	0.301
XA	0.075	0.080	0.045	0.040
9E	0.610	0.610	0.614	0.616
13E	0.685	0.685	0.688	0.678

R2 Base - S2 Tip
R3 Base - S3 Tip

	OPENING		CLOSING	
	1L	1R	1L	1R
R2-S2	0.256	0.307	0.438	0.355
R3-S3	0.354	0.360	0.370	0.403
X	0.127	0.112	0.101	0.094

Comments:

NOTE: New Turbine Rotor installed at HSC and rotor was moved upstream .036" to correct A-set

INSPECTION REPORT
Gas Turbine Maintenance

Alignment

MS7001F

R0 Tip Clearances-Opening

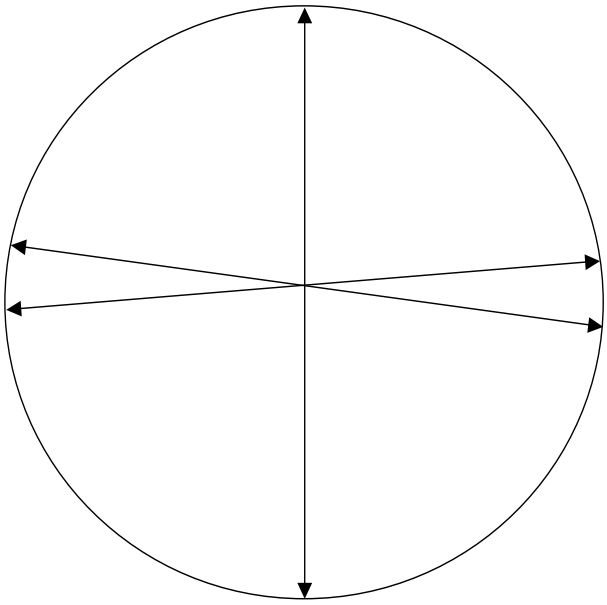
Date	02/02/09	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	N	Photos Enclosed?	N

R0 Tip Clearances are to be measured and recorded below. All views with turbine flow.

Opening Positioning Checks (Disassembly)	**O**	X
Closing Positioning Checks (Reassembly)	**C**	

Rub ring "X" x LHS, x RHS

Leading 0.117
Middle 0.120
Trailing 0.134



Leading 0.095
Middle 0.096
Trailing 0.106

Leading 0.094
Middle 0.100
Trailing 0.107

Leading 0.091
Middle 0.096
Trailing 0.107

Leading 0.092
Middle 0.094
Trailing 0.110

Leading 0.100
Middle 0.104
Trailing 0.116

Comments:

Readings taken on RO blade # 1 follwing it around with lift oil on.

R0- 6 POINT OPENING AND CLOSING CLEARANCESOpening

INSPECTION REPORT
Gas Turbine Maintenance

MS7001F

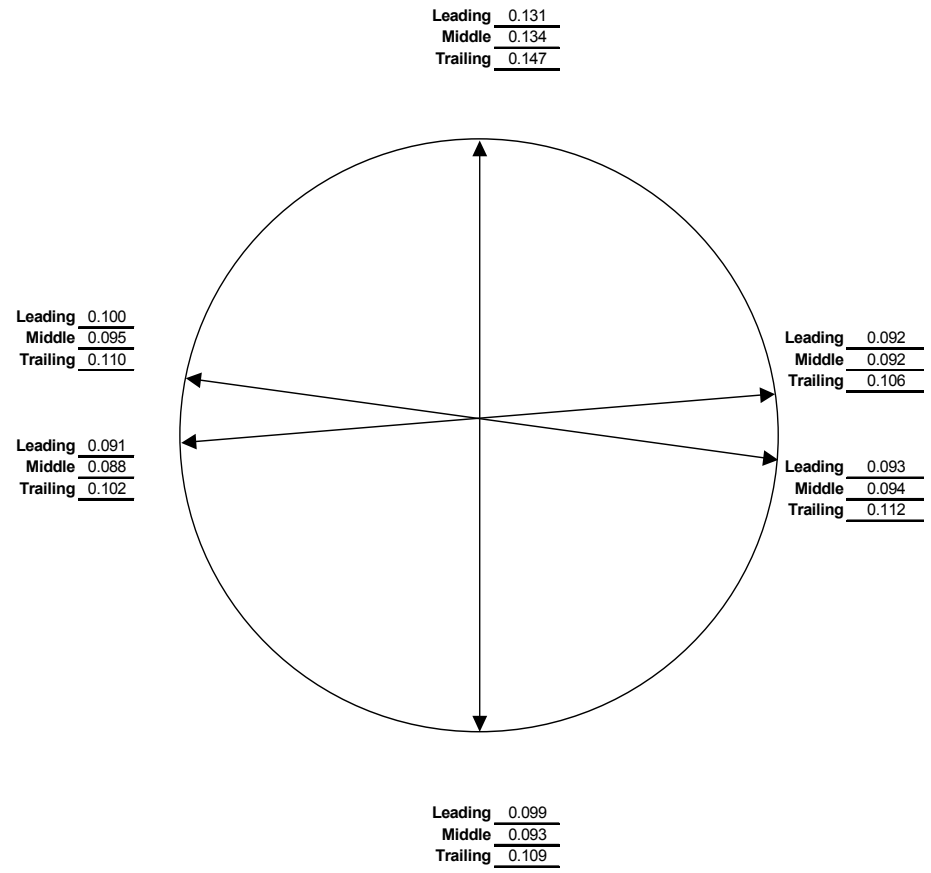
Alignment

R0 Tip Clearances - Closing

Date		Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	N	Photos Enclosed?	N

R0 Tip Clearances are to be measured and recorded below. All views with turbine flow.

Opening Positioning Checks (Disassembly)	**O**	
Closing Positioning Checks (Reassembly)	**C**	X



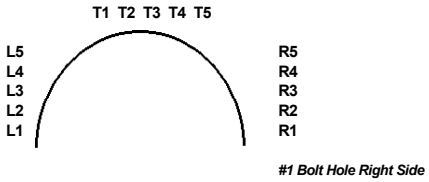
Comments:	
Readings taken following a single blade with lift oil on.	

R0- 6 POINT OPENING AND CLOSING CLEARANCESClosing

INSPECTION REPORT
Gas Turbine Maintenance
MS7001FA

Rotor Clearances
R13 Compressor - Opening

Date 02/05/09 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Unit # 1 | Customer TECO Polk



#1 Bolt Hole Right Side

Left Side			Top			Right Side		
Position	Leading Edge	Trailing Edge	Position	Leading Edge	Trailing Edge	Position	Leading Edge	Trailing Edge
L1	0.103	0.100	T1	0.140	0.128	R1	0.095	0.088
L2	0.107	0.105	T2	0.139	0.126	R2	0.099	0.092
L3	0.112	0.017	T3	0.134	0.124	R3	0.101	0.094
L4	0.117	0.111	T4	0.134	0.124	R4	0.102	0.099
L5	0.119	0.116	T5	0.132	0.123	R5	0.102	0.099

Comments:

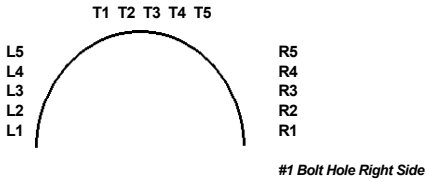
Upper Half CDC Installed & Tight
5 Blades on Left Side Starting at Upper Horizontal Joint
5 Blades on Right Side Starting at Upper Horizontal Joint
5 Blades on Top - Top Center Blade & 2 Blades on Each Side

R13 Tip Clr Open and ClosingR13 Rtr Open

INSPECTION REPORT
Gas Turbine Maintenance
MS7001FA

Rotor Clearances
R13 Compressor - Closing

Date 03/10/09 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Unit # 1 | Customer TECO Polk



#1 Bolt Hole Right Side

Left Side			Top			Right Side		
Position	Leading Edge	Trailing Edge	Position	Leading Edge	Trailing Edge	Position	Leading Edge	Trailing Edge
L1	0.109	0.107	T1	0.156	0.151	R1	0.108	0.102
L2	0.113	0.110	T2	0.157	0.150	R2	0.109	0.104
L3	0.119	0.114	T3	0.157	0.150	R3	0.111	0.109
L4	0.126	0.118	T4	0.157	0.148	R4	0.119	0.114
L5	0.127	0.120	T5	0.157	0.148	R5	0.122	0.114

Comments:

Upper Half CDC Installed & Tight
5 Blades on Left Side Starting at Upper Horizontal Joint
5 Blades on Right Side Starting at Upper Horizontal Joint
5 Blades on Top - Top Center Blade & 2 Blades on Each Side

R13 Tip Clr Open and ClosingR13 Rtr Closing

INSPECTION REPORT
Gas Turbine Maintenance

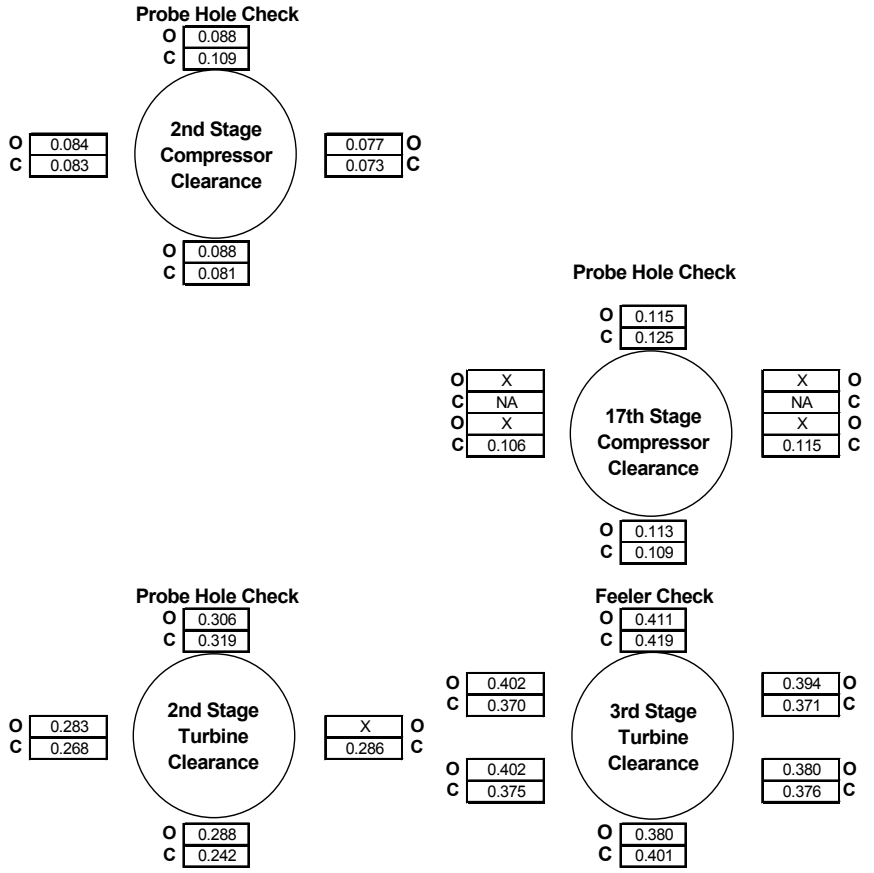
MS7001F

Alignment
Rotor Position

Date	2/03/09	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	N	Photos Enclosed?	N

Rotor Tip Clearances are to be measured and recorded below. All views with turbine flow.

Opening Positioning Checks (Disassembly)	O	02/02/09
Closing Positioning Checks (Reassembly)	C	3/14/09



Comments:	

X - Broken plug

GT Rotor Position Final(a)

INSPECTION REPORT
Gas Turbine Maintenance

MS7001F, MS9001F

Turbine
Turbine Rotor Clearances

Date 2/5/2009 | Turbine S/N 296436 | Prepared by Barody, Jason
FSR # 357T1061 | Sketches Enclosed? N | Photos Enclosed? N
Data Type OPENING / CLOSING

All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.

Record all readings in Mils

1ST STAGE S/N

	OPENING		CLOSING			OPENING		CLOSING	
	Left	Right	Left	Right		Left	Right	Left	Right
1N1	0.020	0.025	0.053	0.057					
C	2.258	2.328	2.260	2.300	1A2	0.339	0.337	0.380	0.385
1F2	0.276	0.222	0.252	0.206	1A3	0.455	0.547	0.500	0.499
1F3	0.427	0.393	0.402	0.400	1A4	0.518	0.632	0.537	0.521
1F4	0.268	0.215	0.240	0.211	1PA	0.475	0.611	0.469	0.475
1F5	0.525	0.499	0.498	0.495					
E	0.010	0.023	0.016	0.013					
A SET	1.988	1.985	2.001	2.000					
					1PH	0.342	0.352	0.390	0.435
					1PL	0.341	0.346	0.333	0.412
					1R	0.334	0.308	0.270	0.270

2ND STAGE S/N | **3RD STAGE S/N**

	OPENING		CLOSING			OPENING		CLOSING	
	Left	Right	Left	Right		Left	Right	Left	Right
2F2	0.340	0.393	0.310	0.386	3F2	0.457	0.447	0.415	0.413
2F3	0.586	0.472	0.593	0.630	3F3	0.684	0.623	0.693	0.668
2F4	0.632	0.504	0.657	0.686	3F4	0.895	0.864	0.925	0.890
2A2	0.420	0.357	0.367	0.425					
2A3	0.430	0.472	0.428	0.432					
2A4	0.757	0.800	0.757	0.750	3S	0.351	0.355	0.373	0.387
2PA	0.410	0.434	0.401	0.401	3SA	0.546	0.509	0.496	0.480
					3F	0.573	0.524	0.535	0.530
					3A1	0.337	0.295	NA	NA
2PH	0.340	0.336	0.329	0.408	3A2	0.845	0.845	0.822	0.815
2PL	0.381	0.356	0.364	0.400	3A3	0.259	0.245	NA	NA
2S	0.265	0.251	0.249	0.250					
2SA	0.673	0.632	0.655	0.683					
2F	0.612	0.571	0.724	0.706					

Comments:

Opening thrust---- 0.017"
Closing thrust----.015"

GT9390 Turbine Clearances 1(a)

INSPECTION REPORT
Gas Turbine Maintenance

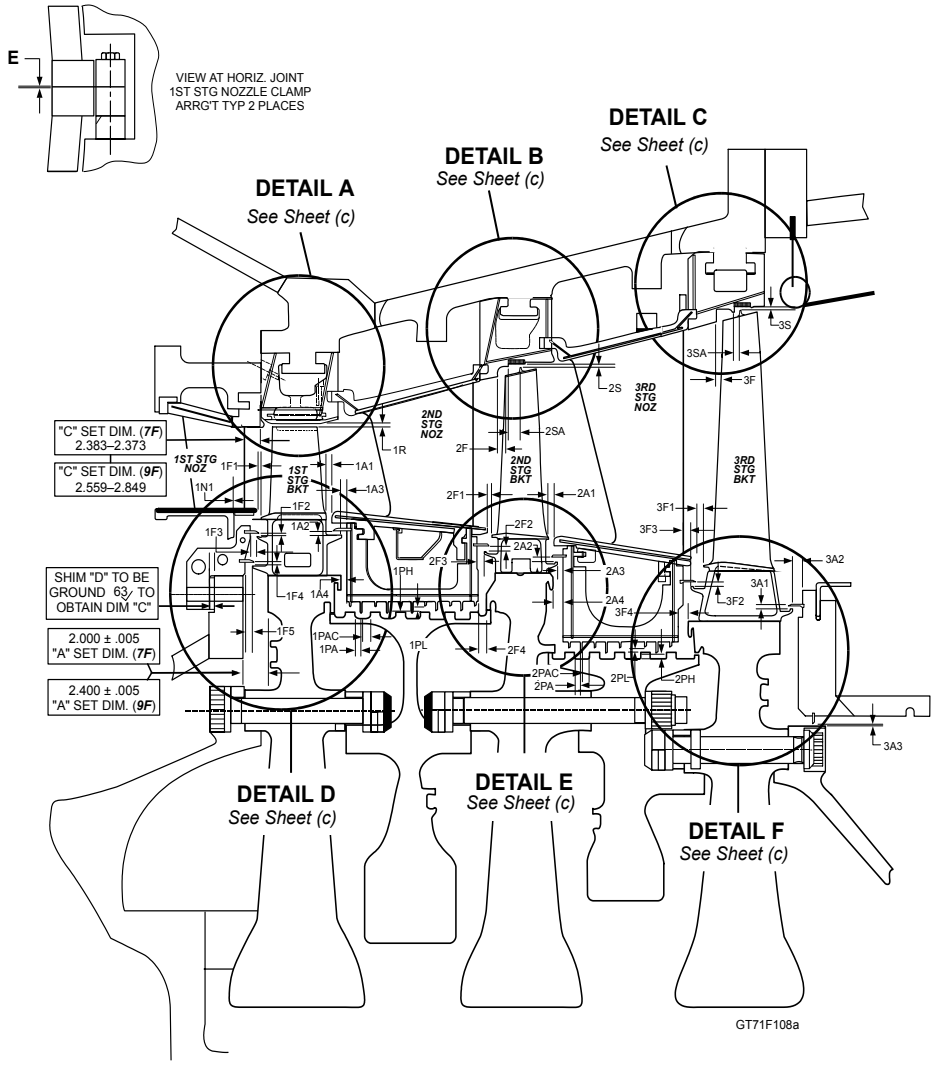
MS7001F, MS9001F

Turbine

Turbine Rotor Clearances

Date _____ Turbine S/N _____ Prepared by _____
FSR # _____ Sketches Enclosed? _____ Photos Enclosed? _____
Data Type _____

All axial clearances are measured with rotor against the loaded thrust face. Refer to EM5260 to confirm rotor position.



GT9390 Turbine Clearances 1(b)

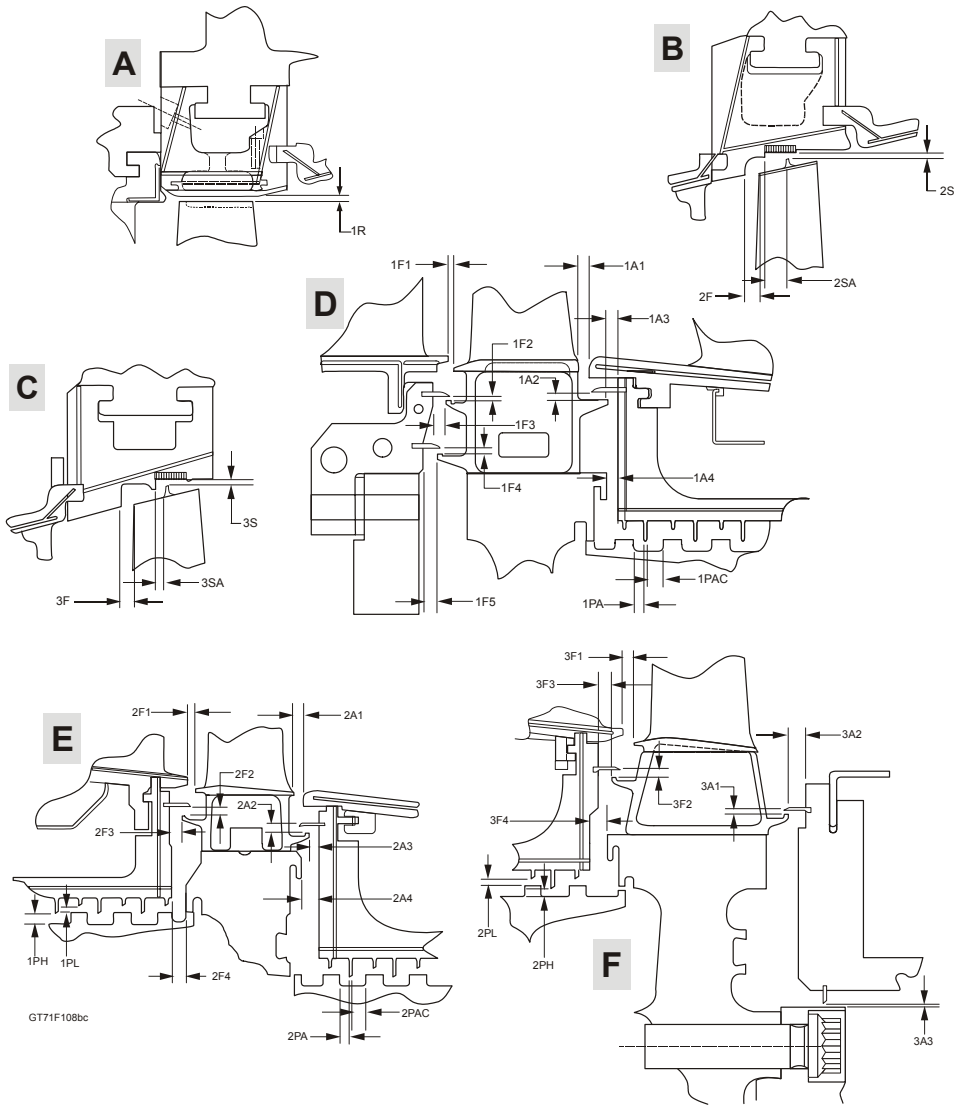
INSPECTION REPORT
Gas Turbine Maintenance

MS7001F, MS9001F

Turbine

Turbine Rotor Clearances

Date _____ Turbine S/N _____ Prepared by _____
FSR # _____ Sketches Enclosed? _____ Photos Enclosed? _____
Data Type _____



GT9390 Turbine Clearances 1(c)

STARTUP COMMENTS

The unit was put on turning gear on 03/20/09 prior to start up on 03/21/09. On 03/21/09 the unit was ready to start the green rotor run in procedure. During the run it was noted that the 90TS valve for the exhaust frame cooling system wasn't opening. The valve was removed from the machine, cleaned and returned to service. The valve was stroked to verify functionality. Then the unit was restarted and completed the green rotor run in procedure on 03/22/2009 at 8:42 PM.

Next, the unit was available for operations. The machine reached base load on liquid fuel without any mechanical or control issues. Finally, the unit was ready to transfer to Syngas. There were some nitrogen pressure switches that needed adjustment prior to the transfer. All in all, the transfer was a success. There were no other GE control or mechanical issues.

APPENDIX

External Attachments

File Name	Description
HGP Serial Numbers.xls	HGP Serial Numbers
Combustion Serial Numbers.xls	Combustion Serial Numbers
Parts Used Final.xls	Parts Used - Final

INSPECTION REPORT
Gas Turbine Maintenance

MS 7001FA

Hot Gas Path

S/N - Nozzles & Shrouds

Date	02/12/09	Turbine S/N	296436	Prepared by	Barody, Jason
FSR #	357T1061	Sketches Enclosed?	N	Photos Enclosed?	No

Part Description	Part Number / Dwg Number (Out)	Serial Number (Out)	Part Number / Dwg Number (In)	Serial Number (In)
1st Stage Nozzle	103E5728 G6	7F003	103E5728 G9	7F015
1st Stage Shrouds	344A6052 G2	M4327	344A6052 G2	M2323
2nd Stage Nozzle	105E8919 G12	M1206	105E8919 G12	GFD013
2nd Stage Shrouds	344A6054 G2	M1032	207C3818 G2	M2813
3rd Stage Nozzle	979E0219 G15	FC015	979E021 G14	GFD190
3rd Stage Shrouds	329A3285 G2	M3895	329A3285 G2	M3050

HGP Serial NumbersHGP Parts

INSPECTION REPORT
Gas Turbine Maintenance
All Frame Sizes

Combustion
Flow Sleeves

Date: 02/10/09 Turbine S/N: 296436 Prepared by: Barody, Jason
FSR #: 357T1061

Instructions: Request the as running part information from the Support Central Site link below.
http://supportcentral.ge.com/scmail/sup_logacase_home.asp?prod_id=25686&case_category_id=18047

Combustion Chamber Number (Out)	Dwg Number / Part Number (Out)	Serial Number (Out)
1	176D3811G005	G6612
2	176D3811G006	G6614
3	176D3811G006	G6613
4	176D3811G008	G6623
5	176D3811G008	G6624
6	176D3811G008	G6619
7	176D3811G008	G6620
8	176D3811G008	G6616
9	176D3811G008	G6617
10	176D3811G008	G6618
11	176D3811G007	G6615
12	176D3811G008	G6621
13	176D3811G008	G6622
14	176D3811G005	G6611

Combustion Chamber Number (In)	Dwg Number / Part Number (In)	Serial Number (In)
1	176D3811G005	G6612
2	176D3811G006	G6614
3	176D3811G006	G6613
4	176D3811G005	G8459
5	176D3811G005	G8458
6	176D3811G005	G8460
7	176D3811G005	G8457
8	176D3811G005	G8447
9	176D3811G005	G8455
10	176D3811G005	G8456
11	176D3811G007	G6615
12	176D3811G008	G6621
13	176D3811G007	G8446
14	176D3811G005	G6611

NOTE: Removed Flow Sleeves #4-10 and # 13 were incorrect and were replaced as part of this outage with the proper group #.

Combustion Serial NumbersFlow Sleeves

INSPECTION REPORT
Gas Turbine Maintenance
All Frame Sizes

Combustion
Fuel Nozzles

Date: 02/10/09 Turbine S/N: 296436 Prepared by: Barody, Jason
FSR #: 357T1061

Instructions: Request the as running part information from the Support Central Site link below.
http://supportcentral.ge.com/scmail/sup_logacase_home.asp?prod_id=25686&case_category_id=18047

Combustion Chamber Number (Out)	Dwg Number / Part Number (Out)	Serial Number (Out)
1	109E9381G001	00001
2	109E9381G001	00003
3	109E9381G001	00005
4	109E9381G001	00006
5	109E9381G001	00002
6	109E9381G001	00009
7	109E9381G001	00010
8	109E9381G001	00011
9	109E9381G001	00012
10	109E9381G001	A36529
11	109E9381G001	00004
12	109E9381G001	A46228
13	109E9381G001	A36527
14	109E9381G001	A36524

Combustion Chamber Number (In)	Dwg Number / Part Number (In)	Serial Number (In)
1	109E9381G002	00014
2	109E9381G002	00002
3	109E9381G002	A36530
4	109E9381G002	00018
5	109E9381G002	00016
6	109E9381G002	00007
7	109E9381G002	00017
8	109E9381G002	00015
9	109E9381G002	A36533
10	109E9381G002	A36523
11	109E9381G002	A36525
12	109E9381G002	A36526
13	109E9381G002	00013
14	109E9381G002	A46229

Combustion Serial NumbersFuel Nozzles

INSPECTION REPORT
Gas Turbine Maintenance
All Frame Sizes

Combustion
Transition Pieces

Date: 02/10/09 Turbine S/N: 296436 Prepared by: Barody, Jason
FSR #: 357T1061

Instructions: Request the as running part information from the Support Central Site link below.
http://supportcentral.ge.com/scmail/sup_logacase_home.asp?prod_id=25686&case_category_id=18047

Combustion Chamber Number (Out)	Dwg Number / Part Number (Out)	Serial Number (Out)
1	979E0269G013	71F0656
2	979E0269G013	71F0642
3	979E0269G013	71F0655
4	979E0269G013	71F0646
5	979E0269G013	71F0645
6	979E0269G013	71F0649
7	979E0269G013	71F0650
8	979E0269G013	71F0647
9	979E0269G013	71F0643
10	979E0269G013	71F0653
11	979E0269G013	71F0648
12	979E0269G013	71F0651
13	979E0269G013	71F0654
14	979E0269G013	71F0644

Combustion Chamber Number (In)	Dwg Number / Part Number (In)	Serial Number (In)
1	979E0269G029	06-04-827
2	979E0269G029	06-04-494
3	979E0269G029	06-04-493
4	979E0269G029	06-04-830
5	979E0269G029	06-04-826
6	979E0269G029	06-04-824
7	979E0269G029	06-04-825
8	979E0269G029	06-04-492
9	979E0269G029	06-04-491
10	979E0269G029	06-04-823
11	979E0269G029	06-04-831
12	979E0269G029	06-04-828
13	979E0269G029	06-04-829
14	979E0269G029	06-04-832

Combustion Serial NumbersTP

INSPECTION REPORT
Gas Turbine Maintenance
All Frame Sizes

Combustion
Liners

Date: 02/10/09 Turbine S/N: 296436 Prepared by: Barody, Jason
FSR #: 357T1061

Instructions: Request the as running part information from the Support Central Site link below.
http://supportcentral.ge.com/scmail/sup_logacase_home.asp?prod_id=25686&case_category_id=18047

Combustion Chamber Number (Out)	Dwg Number / Part Number (Out)	Serial Number (Out)
1	979E0242G007	166169
2	979E0242G007	166168
3	979E0242G007	166159
4	979E0242G007	166171
5	979E0242G007	166170
6	979E0242G007	166167
7	979E0242G007	166161
8	979E0242G007	166162
9	979E0242G007	166158
10	979E0242G007	166166
11	979E0242G007	166160
12	979E0242G007	166163
13	979E0242G007	166164
14	979E0242G007	166165

Combustion Chamber Number (In)	Dwg Number / Part Number (In)	Serial Number (In)
1	979E0242G007	184342
2	979E0242G007	184348
3	979E0242G007	184352
4	979E0242G007	184353
5	979E0242G007	184355
6	979E0242G007	184354
7	979E0242G007	184350
8	979E0242G007	184349
9	979E0242G007	184351
10	979E0242G007	184356
11	979E0242G007	184343
12	979E0242G007	184345
13	979E0242G007	184344
14	979E0242G007	184347

Combustion Serial NumbersLiners

Parts

TECO POLK MAJOR INSPECTION

Dual Fuel

296436: Unit CT-1 Date: 02.02.09 Prepared by: Charity Hein

ML	Part Description	GE P/N	QTY	Comments
218	TC Guide Tubes	239B9434P002	2	
218	TC Guide Tube Clips	357A1627P004	2	
218	TC Guide Tube Clips	357A1627P014	2	
637	Wheelspace T/C TT - WS1AO - 1,2			
701	Outer Cross Fire packing	287A1614P002	56	
701	AFT. Can Gasket	318A9711P002	14	
701	Outer Cross Fire Bolt	N14TP29018		
701	? " x ? " Soc. Hd. - Flowsleeve Bolt	N28P25010	56	
701	Inner Cross Fire Tube - female	199C4782P001	14	
701	Inner Cross Fire Tube - male	199C4782P002	14	
701	Inner Cross Fire Tube Retainer	199C4748P001	28	
701	Outer X-Fire Tubes	239B9455P001	12	
702	TP's	979E0269G029	1 set	
703	Liners	979E0242G007	1 set	
705	S1SB Seal	214C7561G002	30	
705	S1S Retaining Pin	239B5919P001	31	
705	S2S/S3S Retaining Pin	239B5919P011	85	
705	S1SB Seal	239B5965P001	30	
705	S1SB Seal	239B5966P001	2	
705	S3SB Seal	239B5969P001	34	
705	S2SB Seal	239B5969P002	46	
705	Seals - S2SB	239B5969P006	46	
705	S3SB Seal	239B5970P001	2	
705	S2SB Seal	239B5970P002	2	
705	Seals - S2SB	239B5970P006	2	
705	S2SB Seal	239B5971G001	46	
705	S3SB Seal	239B5971G002	46	
705	Turbine Shell Manway Gasket	302A4594P321	2	
705	S1SB Seal	318A9812P002	60	
705	S2SB Seal	318A9813P001	2	
705	S2SB Seal	318A9813P002	2	
705	Shroud Pin	318A9823P001	4	S1SB at Horiz. Joints
705	2" x 13¼" BB	355B7917P004	1	
706	Exhaust Flex Seals	114E1736G001		
706	Exhaust Flow Shield Kit	114E1819G001	1	
706	Exhaust Flow Cone Mod	115E6742G001	1	
706	Machine Plug	115E6759P002	4	
706	Gasket - Exhaust Flow Cone	199D3163P001	1	
706	Antirotation clips-- outer	227C5079P001	60	

Parts Used FinalPg1

Parts

TECO POLK MAJOR INSPECTION

Dual Fuel

296436: Unit CT-1 Date: 02.02.09 Prepared by: Charity Hein

ML	Part Description	GE P/N	QTY	Comments
706	Exhaust lock plates - inner horz	239B9443P001	4	
706	Sleeve - Exhaust Casing	255B9802P001	1	
706	Exhaust Frame Inconel Gaskets	351A9259P001	2	
706	Exhaust Frame Inconel Gaskets	351A9259P002	2	
706	Braided Wire Rope	352A6917P009	2	
706	Int. Pressurized Wave Seal	362A1504P001	1	
706	Pressurized Wave Seal	362A1504P001	1	
706	Cap Screw & Fin Bolt	N14BP33036	2	Inner Exhaust at Horiz. Split
706	Exhaust bolts - inners horz	N14BP33036	2	
706	? " x 1¼" Heavy Hex. Hd. Bolt	N60QP33020	14	
706	Exhaust Bolts	N733AP33064	10	
706	? " x 1¾" 12-pt. - Exhaust/Diffuser	N733DP33028	12	
717	Bullhorns	154D7578G001	14	12K
717	Bullhorn Bolt	186C1916P022	28	
717	TP Bolt	219B6733P003	28	
717	Bear Claw - Left	224B9719P001	14	
717	Bear Claw - Right	224B9719P002	14	
717	Side Seal Block	239B9471G004	14	
717	Side Seal Retainer	233C2503P002	14	
717	Bullhorn Lockplate	318A9872P001	14	
801	Nichrome Strip	26594	40"	
801	Lift Oil lines - T1	324A5973P001	2	
805	? " x 3½" 12-pt. Bolt	N733AP33056	6	
905	O-Ring: T-1 Lift Oil System	185A1343P215	12	
909	Flex Hose	315A2803P063	1	2nd Stg. C&S R/S
909	Flex Hose	315A2803P064	1	3rd Stage C&S L/S
909	4" - 150# Gasket	N5606P04001G11	17	
909	4" - 300#	N5606P04003G11	40	
909	6" - 150# Gasket	N5606P06001G11	8	
909	8" - 150# Gasket	N5606P08001G11	20	
909	10"- 150# Gasket	N5606P10001G11	10	
915	1" - 150# Gasket	372A1159P003	3	
915	1½" - 150# Gasket	372A1159P005	12	
918	Flex Hose	324A5773P057	1	LF Purge Manifold
961	O-Ring	185A1343P232	14	Liquid Fuel
961	Flex Hose - LF	324A5773P056	14	
961	O-ring: LF Check Valve for Cooling Water	357A1544P001	40	
961	O-ring: LF Block Elbow	357A1544P004	20	
961	½" External Star Lock washer	N403P00050	56	Liquid Fuel
961	Tube Adapter w/ O-ring: Adapter to T-fitting	SS-810-1-8ST	3	Swagelok P/N
962	Flex Hose	351A9057P001	1	Syngas Can #11
962	? " Lock Nut	N265BP00033	160	
962	¾" Lock Nut	N265BP00035	936	
962	¾" Lock Nut	N266AP00035	512	
962	2½" - 3/4/600# Gasket	N5606P02506G11	28	
962	2½" - 3/4/600# Gasket	N5606P02506G11	48	

Parts Used FinalPg2

Parts

TECO POLK MAJOR INSPECTION

Dual Fuel

296436: Unit CT-1 Date: 02.02.09 Prepared by: Charity Hein

ML	Part Description	GE P/N	QTY	Comments
962	12" - 300# Gasket	N5606P12003G11	3	
965	Flex Hose - AA/Ext. Manifold L/S	328A3653P018	1	
965	8" - 300# Gasket	N5606P08003G11	12	
968	Flex Hose - WI	324A5773P056	14	
968	LF and Water Cool Check Valve	221A3913P001	14	Liquid Fuel Check Valve
969	Flex Hose	351A3235P002	1	L/H AA Manifold
969	Flex Hose - L/H AA Manifold	351A3235P002	1	
972	12" - 150# Gasket	N5606P12001G11	7	
998	Flex Hose	351A3676P008	1	N_2 Can #4
998	? " x 7¾" Hex. Hd. Bolt	N14P37124	6	
998	1" x 9½" Hex. Hd.	N14P39152	6	
998	14" - 300# Gasket	N5606P14003G11	5	
998	16" - 300# Gasket	N5606P16003G11	3	
1301	Key (S_0: 6.10 ± .02)	298A0111P040	2	
1301	Key (S_1: 5.00 ± .02)	298A0111P041	2	
1301	Key (S_2 - S_3: 4.00 ± .02)	298A0111P042	4	
1301	Key (S_4: 3.64 ± .02)	298A0111P043	2	
1301	Key Stock	298A0111P046	2	
1305	Pin Plat. Seal - S3B	232B8614P001	92	
1305	Pin Shk. Seal - S3B	232B8615P001		
1305	Pin Plat. Seal - S2B	232B8616P001	92	
1305	Pin Shk. Seal - S2B	232B8617P002	92	
1305	Retention Wire - STG. 1 & 2	232B8618P002	2	
1305	Pin Plat. Seal - S1B	237B2174P001	1	
1305	Retention Wire - STG. 3	314A5127P002	1	
1305	Pin Dowel - S1B	314A5196P001	39	
1305	Pin Shk. Seal - S1B	322B4119P001	184	Need to use P002
1401	S1N	103E5730G014	1 set	
1401	Center Line Key ½" Bolt	293A0911P009	2	
1401	Center Line Key and 45° Key ¾" Bolt	293A0913P009	8	
1401	Center Line Key Lockplate	294A0151P004	5	
1401	45° Key Lockplate	294A0151P006	4	
1401	S1N Hold Down Lockplate	294A0151P007	4	
1401	Center Line Key Lockplate (3-Hole)	314A5977P001	2	
1401	1" x 7½" Hex. Hd. (Hold Down/Elev. Block)	N14TP39120	4	
1401	1¼" x 4" 12-pt. Bolt - S1N Horiz. Jt.	N733CP44064	6	S1N Horiz. Jt.
1402	Instrumentation Tubing	188C9441P003	2	
1403	1" x 3½" 12-pt. Bolt	N733AP39056	2	
1403	1" x 3? " 12-pt. Bolt	N733AP39062	28	
1409	Tube Cap	156A1090P004	1	
1409	Instrumentation Tubing	232B8673P001	4	
1409	Instrumentation Tubing	232B8673P002	2	
1409	S3N	979E021G014	1 set	
1502	Oil Seal:T-2 Slinger Ring	159A0601P001	1	
1502	T2 Bearing Cover lockplates	239B5942P001	2	

Parts Used FinalPg 3

Parts

TECO POLK MAJOR INSPECTION

Dual Fuel

296436: Unit CT-1 Date: 02.02.09 Prepared by: Charity Hein

ML	Part Description	GE P/N	QTY	Comments
1502	Lift Oil Lines - T2	324A5973P002	2	
1502	Gasket	336A9298P001	1	T-2 Bearing
1604	1¾" x 13½" Stud	353B3539P023	8	
1612	Expansion Joint	214C7536P001	1	
1612	Expansion Joint	214C7536P002	2	
1614	¼" x 3" Red Rubber: 10' per roll	Non-GE	20'	
1612	? " x 3" Close Cell Foam: 50' per roll	Non-GE	100'	
1612	¼" x 3" Close Cell Foam: 50' per roll	Non-GE	100'	
218A/B	Vibration Sensor	329A3529P029	2	
235A	Packing Gland	235A9598P017	1	
235A	T/C: Thrust Bearing	351A3488P042	4	
235A/B	T/C: T-1, T-2 Brg.	314A5945P004	4	
235B	Vibration Probe and Cable	162381-209-040-15-05	1	T-2
701/1121	Gasket - Spark Plug & Flame Detector	318A9713P027	6	
GEN	Fluorosilicone - Sealing Compound	164A7383P0009	18	
GEN	End Shield Access Gasket	341A6573P0001	4	
N/A	Versilube	0659A911P0019	1	
701	Outer X-Fire Washer	239B9456P001	2	
918	Purge Check Valve	362A1331P002	28	Purge Check Valve
MISC	Gasket	372A1159P009	30	
MISC	Gasket	372A1159P010	10	
MISC	Gasket	372A1159P013	14	
MISC	Drive Pin	372A4654P001	166	
MISC	Bolt	N14P33056	4	
MISC	Bolt	N14P35056	10	
MISC	Bolt	N14P35068	8	
MISC	Bolt	N14P35072	4	
MISC	4" - 300#	N5606P04003G11	30	
MISC	Gasket	N5606P06003G11	15	
MISC	Bolt	N733AP33064	8	
701	Flow Sleeves		8	
512	Fuel Nozzles	109E9381G001	1 set	
703	Cap & Liner	979E0242G007	1 set	
702	Transition Pieces	979E0269G029	1 set	
1305	1st Stage Buckets	103E5536G021	1 set	
1305	2nd Stage Buckets	353B3024G010	1 set	
1305	3rd Stage Buckets	969E0134P011/12	1 set	
1401	1st Stage Nozzle	103E5730G020	1 set	
1402	2nd Stage Nozzles	105E8919G012	1 set	
1409	3rd Stage Nozzles	979E9219G015	1 set	
705	1st Stage Shroud Blocks	213C1443G010	1 set	
705	2nd Stage Shroud Blocks	207C3818G002	1 set	
705	3rd Stage Shroud Block	329A3285G002	1 set	

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