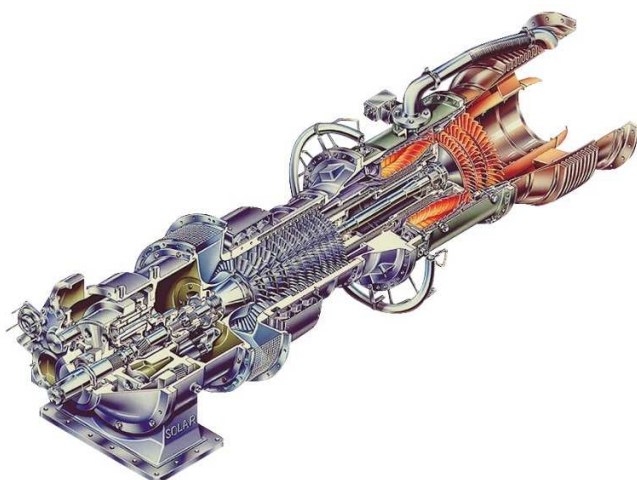


# BORESCOPE INSPECTION REPORT



GAS TURBINE ENGINE  
TAURUS 60  
COLD END DRIVE

Engine Serial Number  
**0984T**

Engine Rating  
**7301**

Engine Serviceable  
[Choose an item]

Inspection Performed By  
**Darryl Hudson**

Inspection Date  
**Thursday, May 30, 2019**

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1

- Create the Standard Inspection folder structure (use the "Create Inspection Folders" button).
- Save all borescope inspection pictures in his associated folder or use the folder structure with the borescope to directly save the picture in the appropriate folder during the borescope inspection.

**Create Inspection Folders**

2

- Once borescope inspection has been performed import all pictures in the document (use the "Import Inspect Pics", select the parent folder of the Standard Inspection folder structure and click OK).
- Once import has been performed, in the 'Borescope Inspection Pictures' section select severity, description and add comments for each borescope pictures.

**Import Inspection Pictures**

3

- Generate the Borescope Report Inspection summary section (Use the "Insp. Summary Creation" button). Be precise and accurate as much as possible when including comments.

**Insp. Summary Creation**

4

- Populate all other document sections as accurately as possible (Information, Check List, Conclusion, Recommendation, Signature).
- Follow the borescope report review process (detailed in TL 21.7/100). If in doubt about any equipment or component condition submit for review.

5

- Print the document using the "Print Document as PDF". This will conserve all hyperlink features of the document in the PDF version.
- NOTE: If Recommendation or Customer signature section fields are empty they will not be printed in the PDF document.
- IMPORTANT: Archive the PDF document under the associated Major Assembly / Field attachment section under WFM.**

**Print Report as PDF**

Note 1

Support needed ? Feedback ? Contact [T3\\_FIELD\\_SUPPORT@solarturbines.com](mailto:T3_FIELD_SUPPORT@solarturbines.com)

Note 2

The inspector is free to add any additional pictures relevant to the inspection.

## B O R E S C O P E   I N S P E C T I O N   I N F O R M A T I O N

Country	USA	Inspection Date	5/30/2019
Customer Name	Wabash Power	Inspection Performed By	Darryl Hudson
Site Name	Wabash Power	Reason For Inspection	Customer Request
District	Chicago	Borecope Equipment Used (Brand/Model)	Olympus DBS17
Work Order #	W1061424624	Borecope Inspection Procedure (WFM Task #)	128

## P A C K A G E   I N F O R M A T I O N

PD #	59111	Package S/N	TG00N29
Unit Customer Tag	None	Package Hours	20222
		Package Starts	472

## E N G I N E   I N F O R M A T I O N

Engine GP <sup>1</sup> P/N	TD0DA-1500-007	Gas Fuel Hours	[Gas Run Hrs]
Engine GP S/N	0984T	Liquid Fuel Hours	[Liq Run Hrs]
Engine Rating	7301	Total Hours	[Total Run Hrs]
Combustion Type	Conventional	Total Starts	[Total Starts]
Fuel Type	Gas	Next Planned Overhaul Running Hours	[Engine Next Plan OHL]
Inspection Last Date	Thursday, May 19, 2011	Gas Fuel Hours since last inspection	[Gas Last Insp Run Hrs]
		Liquid Fuel Hours since last inspection	[Liq Last Insp Run Hrs]
		Starts since last inspection	[Starts Last Insp]

## N O T E S

Borecope completed [Choose an item] Offline Compressor Wash.

[Insert additional notes here]

<sup>1</sup> GP stands for "Gas Producer".

## BORESCOPE INSPECTION CHECK LIST

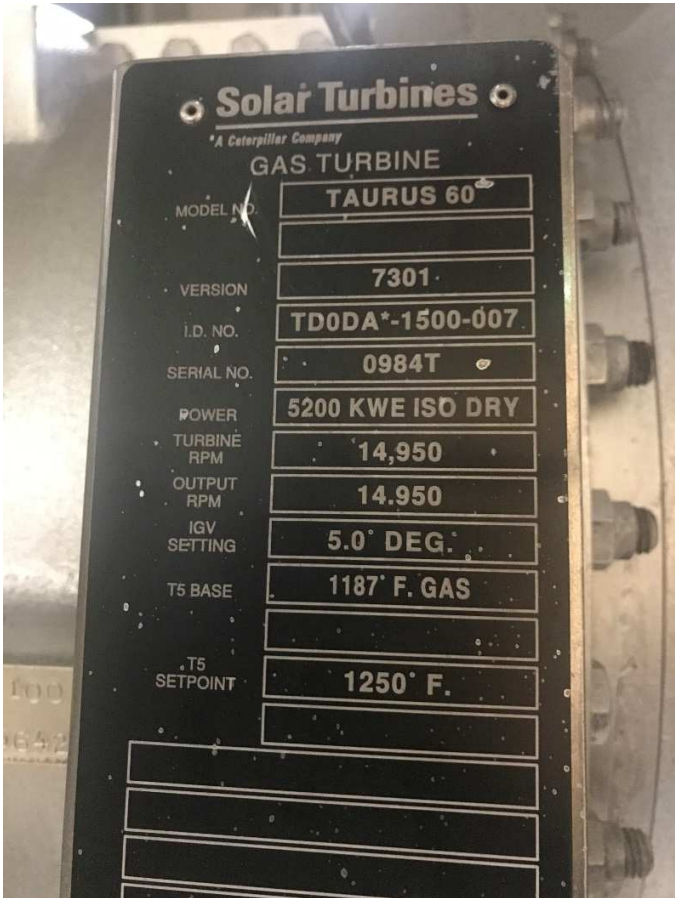
Step	Description <sup>2</sup>	Performed			Initials & Date
		Yes	No	N/A	
1	Complete Task Risk Assessment.				DDH May 30, 2019
2	Complete Job Safety Analysis.				DDH May 30, 2019
3	Ensure the shutdown Gas Turbine engine is cool.				DDH May 30, 2019
4	Prepare the package for a Borescope Inspection.				DDH May 30, 2019
5	Perform Borescope Inspection (Record images, measurements and comments on the Borescope Inspection Report).				DDH May 30, 2019
6	Return Gas Turbine engine to service.				DDH May 30, 2019
7	Complete the Borescope Inspection Report (Borescope report sections populated correctly, FSR signature, Customer signature).				DDH May 30, 2019
8	Print/Scan the document as a PDF. Archive the document under the WFM associated Major Assembly / Field Attachments section.				DDH May 30, 2019

<sup>2</sup> For detailed step instructions, please refer to the Solar Turbines WFM (Work Force Management) internal procedure mentioned in the Equipment Information section.

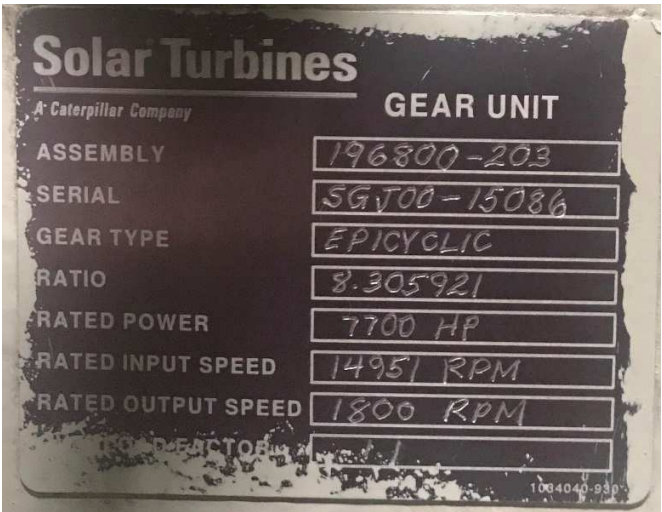


EQUIPMENT DATA PLATE

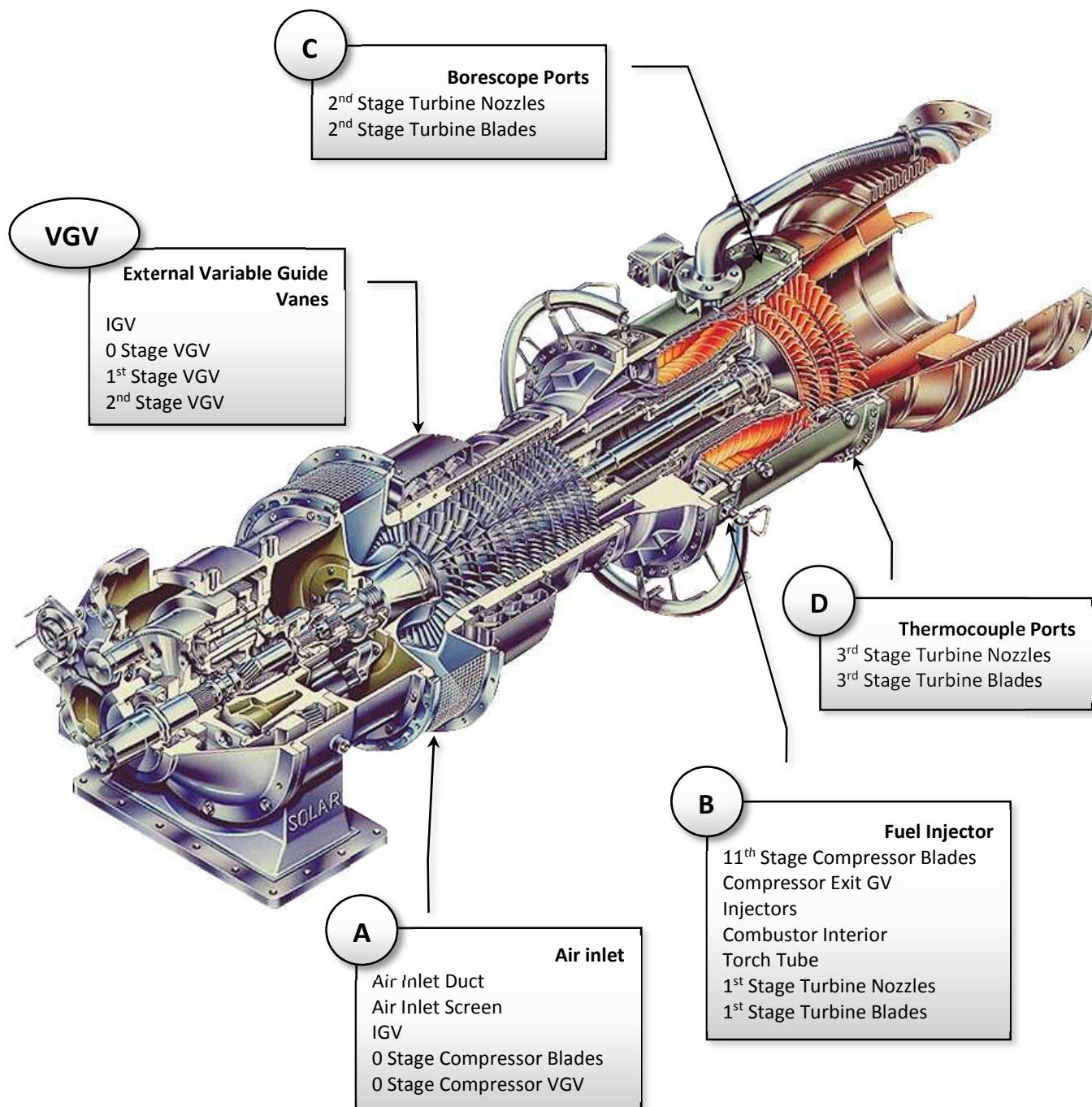
Gas Turbine



Reduction GearBox



## BORESCOPE INSPECTION LOCATIONS



## BORESCOPE INSPECTION SUMMARY

Access Port	Location	Inspection for	Normal Condition	Minor	Moderate	Severe	Comments
<u>A</u>	Air Inlet Duct	a)Potential FOD b)Corrosive Pitting c)Cracks d)Excessive fouling					[Insert Comments Here]
<u>A</u>	Air Inlet Screen	a)Potential FOD b)Cracks, damaged mesh					[Insert Comments Here]
<u>A</u>	IGV	a)Nicks and dents. Quantity and size b)Excessive fouling c)Corrosive pitting. Affected area					[Insert Comments Here]
<u>A</u>	0 Stg Compressor Blades	a)Nicks and dents. Quantity and size b)Excessive fouling c)Corrosive pitting. d)Tip rub, gap width, curling					[Insert Comments Here]
<u>A</u>	0 Stg Compressor GV	a)Nicks and dents. Quantity and size b)Excessive fouling c)Corrosive pitting. Affected area					[Insert Comments Here]
<u>B</u>	11th Stg Compressor Blades	a)Nicks and dents. Quantity and size b)Excessive fouling c)Corrosive pitting. d)Tip rub, gap width, curling					[Insert Comments Here]

Access Port	Location	Inspection for	Normal Condition	Minor	Moderate	Severe	Comments
<u>B</u>	Compressor Exit GV	a)Nicks and dents. Quantity and size b)Excessive fouling c)Corrosive pitting. Affected area					[Insert Comments Here]
<u>B</u>	Injectors	a)Pilot center erosion b)Fuel hole contaminated, blocked c)Cracks d)Liquid: broken fuel spoke					[Insert Comments Here]
<u>B</u>	Combustor Interior	a)Crack, Qty and size b)Thermal erosion c)Hot spots d)Buckling or warpage					[Insert Comments Here]
<u>B</u>	Torch Tube	a)Thermal erosion					[Insert Comments Here]
<u>B</u>	1st Stg Turbine Nozzles	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area					[Insert Comments Here]
<u>B</u>	1st Stg Turbine Blades	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area d)Tip rub width					[Insert Comments Here]
<u>C</u>	2nd Stg Turbine Nozzles	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth, Affected area					[Insert Comments Here]

Access Port	Location	Inspection for	Normal Condition	Minor	Moderate	Severe	Comments
<u>C</u>	2nd Stg Turbine Blades	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area d)Tip rub width					[Insert Comments Here]
<u>D</u>	3rd Stg Turbine Nozzles	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth, Affected area					[Insert Comments Here]
<u>D</u>	3rd Stg Turbine Blades	a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area d)Tip rub width					[Insert Comments Here]
<u>VG</u> <u>V</u>	IGV	a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion					[Insert Comments Here]
<u>VG</u> <u>V</u>	0 Stg VGV	a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion					[Insert Comments Here]
<u>VG</u> <u>V</u>	1st Stg VGV	a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion					[Insert Comments Here]

Access Port	Location	Inspection for	Normal Condition	Minor	Moderate	Severe	Comments
<a href="#">VGV</a>	2nd Stg VGV	a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion					[Insert Comments Here]
<a href="#">X</a>	Other1	TBD					[Insert Comments Here]
<a href="#">X</a>	Other2	TBD					[Insert Comments Here]
<a href="#">X</a>	Other3	TBD					[Insert Comments Here]


See Below for all Comments for each area


BORESCOPE INSPECTION PICTURES




Access location Description	Picture	Inspection for	Severity / Comments
A  Air Inlet Duct		a)Potential FOD b)Corrosive Pitting c)Cracks d)Excessive fouling	Normal Condition  Not applicable  [Insert Comments Here]



Access location Description	Picture	Inspection for	Severity / Comments
A  Air Inlet Screen		a)Potential FOD b)Cracks, damaged mesh	Normal Condition  Not applicable  [Insert Comments Here]

<div>A</div> <div>IGV</div>		<div>a)Nicks and dents. Quantity and size</div> <div>b)Excessive fouling</div> <div>c)Corrosive pitting. Affected area</div>	<div>Normal Condition</div> <div>Not applicable</div> <div>[Insert Comments Here]</div>
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Access location Description	Picture	Inspection for	Severity / Comments
			

A

0 Stg  
Compressor  
Blades



- a)Nicks and dents.  
Quantity and size
- b)Excessive fouling
- c)Corrosive pitting.
- d)Tip rub, gap width,  
curling

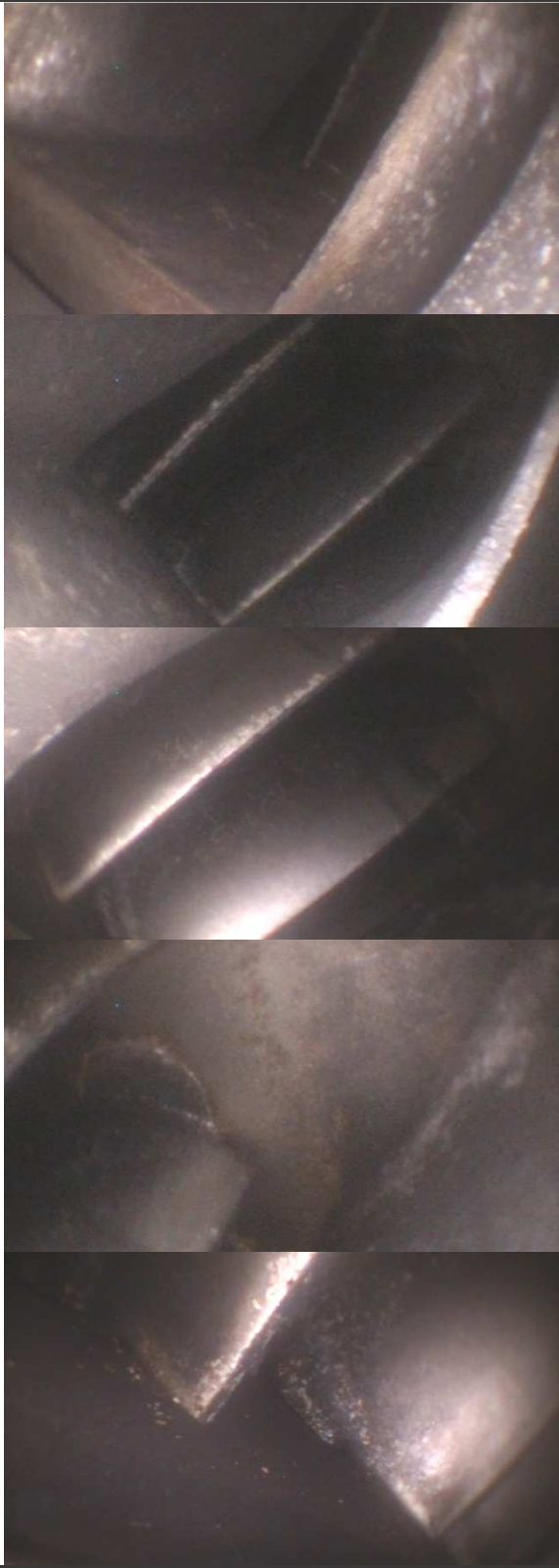
Normal Condition

Not applicable

[Insert Comments  
Here]

Access location Description	Picture	Inspection for	Severity / Comments
			


A  
  
0 Stg  
Compressor GV



a)Nicks and dents.  
Quantity and size  
b)Excessive fouling  
c)Corrosive pitting.  
Affected area

Normal Condition  
  
Not applicable  
  
[Insert Comments  
Here]



Access location Description	Picture	Inspection for	Severity / Comments
			

B

11th Stg  
Compressor  
Blades



- a)Nicks and dents.  
Quantity and size
- b)Excessive fouling
- c)Corrosive pitting.
- d)Tip rub, gap width,  
curling

Moderate





Carbon build up






[Insert Comments  
Here]



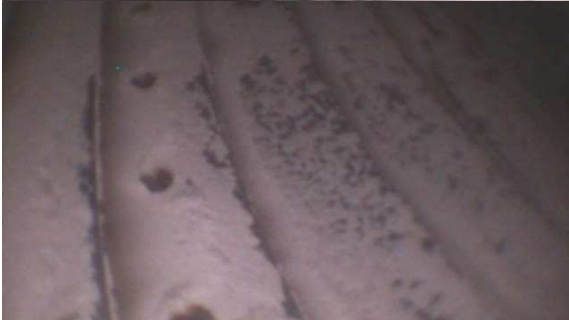
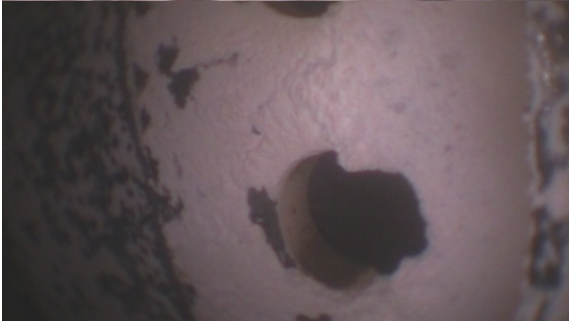









Access location Description	Picture	Inspection for	Severity / Comments
			

Access location Description	Picture	Inspection for	Severity / Comments
B  Compressor Exit GV			
			
			
			
		a)Nicks and dents. Quantity and size  b)Excessive fouling  c)Corrosive pitting. Affected area	Minor  Erosion, minor  [Insert Comments Here]

Access location Description	Picture	Inspection for	Severity / Comments
B  Injectors			
			
			
			
			
		a)Pilot center erosion b)Fuel hole contaminated, blocked c)Cracks d)Liquid: broken fuel spoke	Moderate  Carbon build up  Injectors should be cleaned

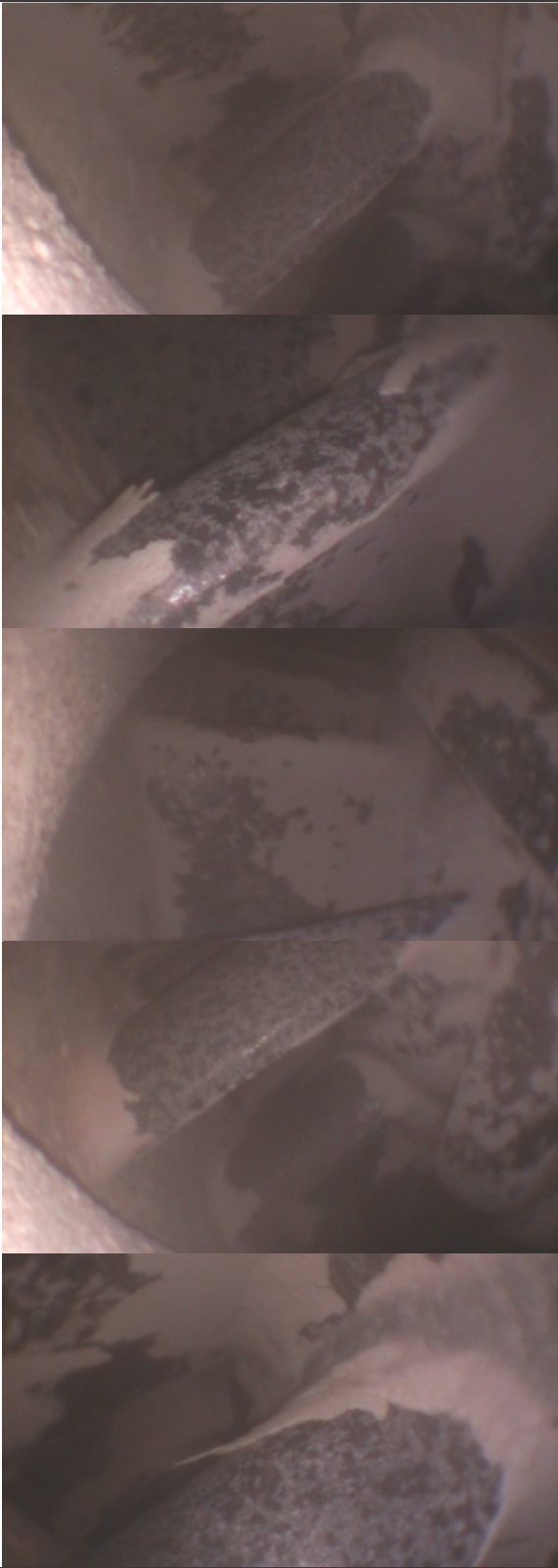
Access location Description	Picture	Inspection for	Severity / Comments
B  Combustor Interior			
			
			
			
			
		a)Crack, Qty and size b)Thermal erosion c)Hot spots d)Buckling or warpage	Moderate  Carbon build up  This seems to be a common occurrence with Land Field Units

Access location Description	Picture	Inspection for	Severity / Comments
B  Torch Tube		a)Thermal erosion	Normal Condition  Not applicable  [Insert Comments Here]
			
			
			



B

1st Stg Turbine  
Nozzles



- a)Cracks, Qty, length,  
orientation
- b)Thermal erosion,  
Depth and area
- c)FOD, Affected area

Moderate

Carbon build up

This seems to be a  
common occurrence  
with Land Field Units

Access location Description	Picture	Inspection for	Severity / Comments
			



B

1st Stg Turbine  
Blades

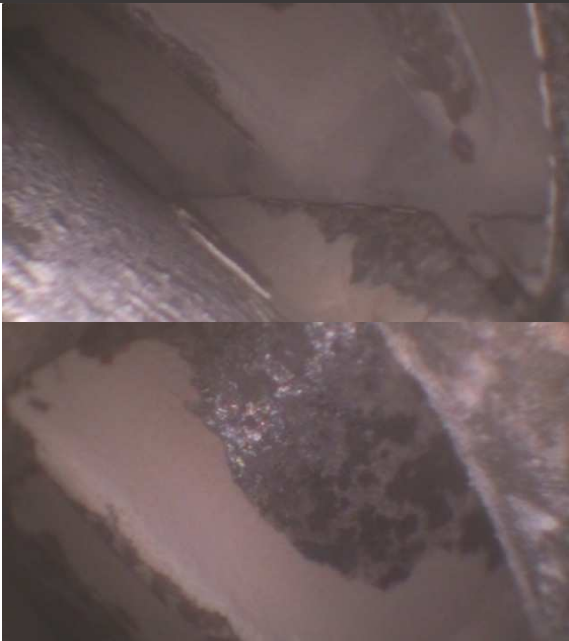







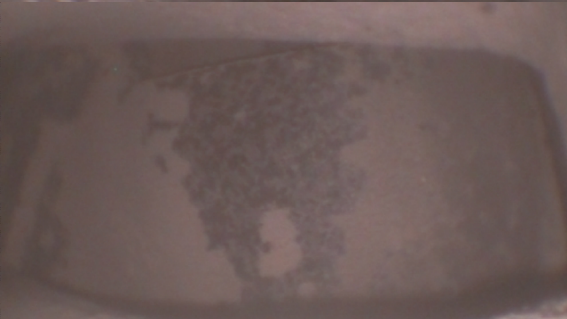
- a)Cracks, Qty, length, orientation
- b)Thermal erosion, Depth and area
- c)FOD, Affected area
- d)Tip rub width


Severe


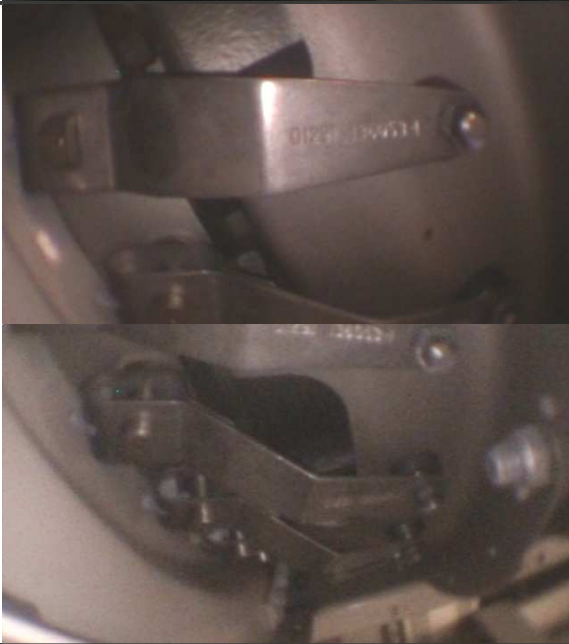
Carbon build up

This seems to be a common occurrence with Land Field Units


Access location Description	Picture	Inspection for	Severity / Comments
			
C  2nd Stg Turbine Nozzles		a)Cracks, Qty, length, orientation  b)Thermal erosion, Depth, Affected area	Choose an item.  Choose an item.  [Insert Comments Here]

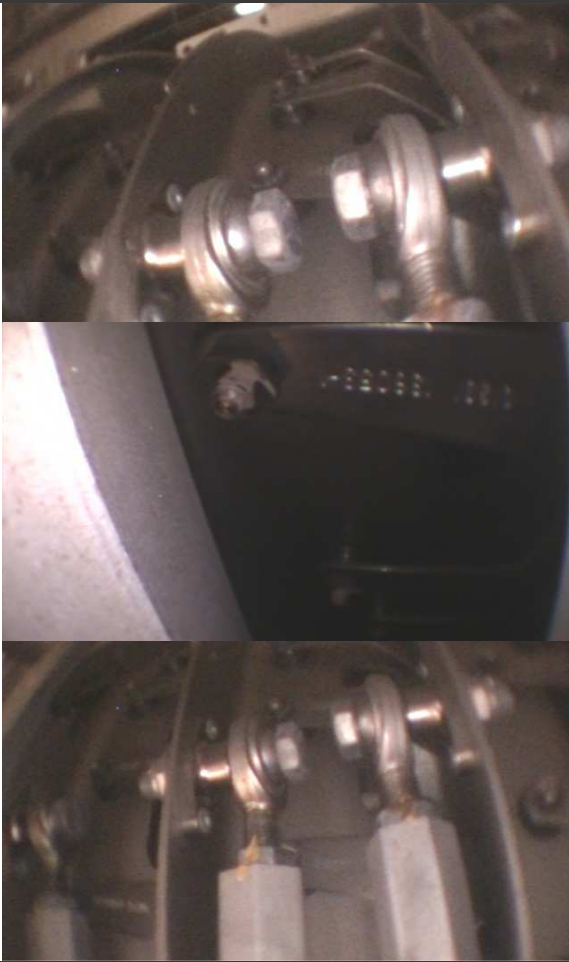
Access location Description	Picture	Inspection for	Severity / Comments
C  2nd Stg Turbine Blades		a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area d)Tip rub width	Minor  Carbon build up  This seems to be a common occurrence with Land Field Units
			
			
D  3rd Stg Turbine Nozzles		a)Cracks, Qty, length, orientation  b)Thermal erosion, Depth, Affected area	Minor  Carbon build up  This seems to be a common occurrence with Land Field Units
			

Access location Description	Picture	Inspection for	Severity / Comments
D  3rd Stg Turbine Blades		a)Cracks, Qty, length, orientation b)Thermal erosion, Depth and area c)FOD, Affected area d)Tip rub width	Minor  Carbon build up  This seems to be a common occurrence with Land Field Units

Access location Description	Picture	Inspection for	Severity / Comments
VG IGV		a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion	Normal Condition  Not applicable  [Insert Comments Here]
VG 0 Stg VG		a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion	Normal Condition  Not applicable  [Insert Comments Here]



Access location Description	Picture	Inspection for	Severity / Comments
VG VG 1st Stg VG		a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion	Normal Condition  Not applicable  [Insert Comments Here]

Access location Description	Picture	Inspection for	Severity / Comments
VGW  2nd Stg VGW		a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion	Normal Condition  Not applicable  [Insert Comments Here]

X

#1  
Thermocouple




A) Broken

Severe

Other defects

The Tip is broken off  
and needs a  
replacement of the  
Thermocouple



Access location Description	Picture	Inspection for	Severity / Comments
			

X


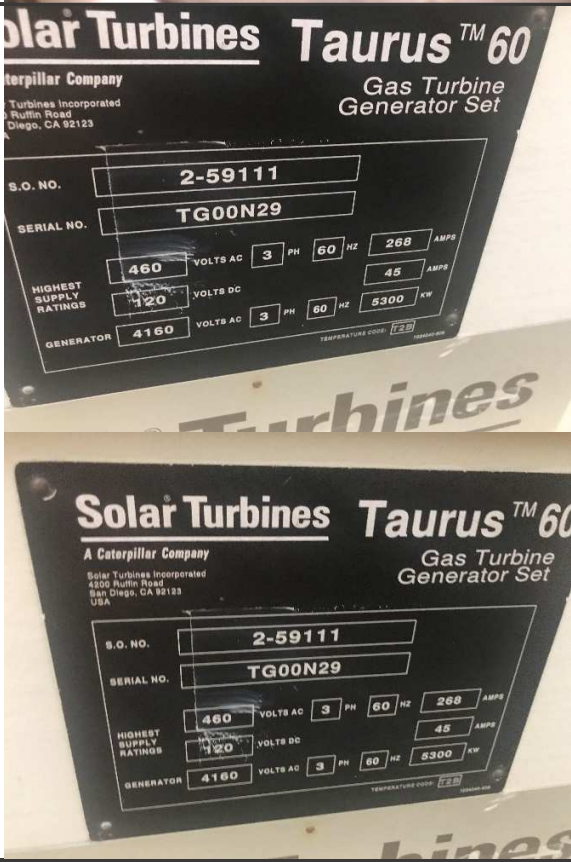
Guide Vane  
Actuator rod



TBD

Minor  
Corrosion

The actuator need  
corrosion treatment  
The Actuator is also in  
full stroke and needs  
to be checked

Access location Description	Picture	Inspection for	Severity / Comments
			
X  Package Data Tag		Package Data Tag	Normal Condition  Not applicable  [Insert Comments Here]

**C O N C L U S I O N**

The Unit looks very good and clean there are a few areas on the engine that needs some corrosion prevention to the outside that is a very minor issue and will not effect the engines performance in any way

---

**R E C O M M E N D A T I O N**

As Stated above corrosion preservation The Unit looks very good and clean there are a few areas on the engine that needs some corrosion prevention to the outside that is a very minor issue and will not effect the engines performance in any way.

**BORESCOPE INSPECTION OF GAS TURBINE ENGINE  
GENERAL OBJECTIVES**

*The gas turbine borescope inspection is an internal inspection performed by a trained specialist who assesses the condition of the gas turbine components. This inspection is performed using an instrument specifically designed to examine the gas path, via the access ports positioned along the engine, from the air inlet to the exhaust.*

*These inspections are one of the primary diagnostic methods for maintaining turbo-machinery. Both rigid and flexible fiberscopes are used in conjunction with especially formed guide tubes to inspect the internal stationary and rotating components. Primary goals are to detect early signs of wear or impending failure. The major benefits of the inspection include equipment condition awareness and effective scheduling of any necessary maintenance interventions. In addition, greater reliability / longevity can be achieved through internal inspections, as well as reducing the potential of severe equipment damage.*

*The operating gas turbine engine components, by design, are exposed to high thermal and mechanical constraints. Internal inspections are thus necessary to determine if wear or thermal erosion has occurred. In addition, these inspections will quantify if any foreign object damage (FOD) or corrosion has occurred, as well as assessing internal components for thermal deterioration, cracking or distortion.*

*While every effort is made to examine all accessible parts of the engine, some areas are not accessible through a borescope inspection. Therefore, a borescope inspection should not be considered to be the ultimate method to assess an engine's health.*

*This borescope inspection has been performed following a Hierarchical Task Analysis procedure exposed in TL 21.7/100.*

**SOLAR TURBINES INSPECTOR SIGNATURE / DATE**

[Insert Inspector Signature Here]

Inspector Name: **Darryl Hudson**  
Inspector Email Address: hudson\_darryl\_d@solarturbines.com  
Inspector Phone Number: 734-740-2270

Thursday, May 30, 2019

**CUSTOMER SIGNATURE / DATE**

[Insert Customer Signature Here]

Customer Name: Rick Caitung  
Customer Email Address: rick@wabaspower.com  
Customer Phone Number: 847-499-5064

Thursday, May 30, 2019