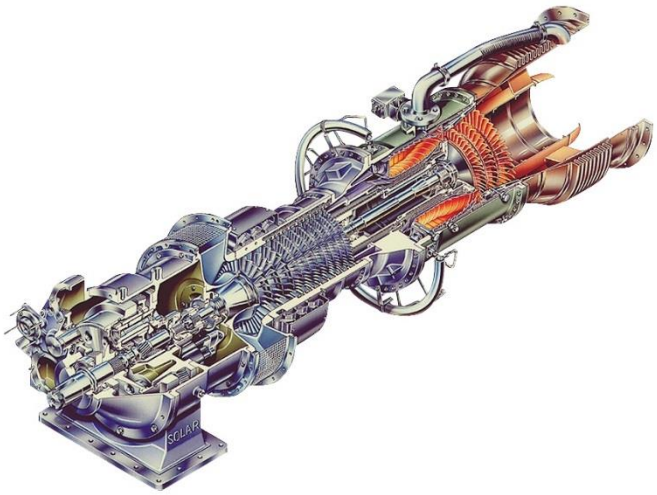
Solar Turbines
A Caterpillar Company

usp&e

BORESCOPE INSPECTION REPORT



GAS TURBINE ENGINE
CENTAUR 50
COLD END DRIVE

Engine Rating
6201SA GSC

Engine Serviceable
Yes

Inspection Performed By
GREGG ROSSOFF

Inspection Date
Tuesday, January 21, 2020

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BORESCOPE INSPECTION INFORMATION

		Inspection Date	**1/21/2020**
		Inspection Performed By	**GREGG ROSSOFF**
		Reason For Inspection	**Unplanned Inspection**
		Borescope Equipment Used (Brand/Model)	**OLYMPUS I-plex**
Work Order #		Borescope Inspection Procedure (WFM Task #)	**128**

PACKAGE INFORMATION

PD #		Package S/N	
Unit Customer Tag	**2**	Package Hours	**0**
		Package Starts	**0**

ENGINE INFORMATION

Engine GP[1] P/N		Gas Fuel Hours	**0**
Engine GP S/N		Liquid Fuel Hours	**0**
Engine Rating	**6201SA GSC**	Total Hours	**0**
Combustion Type	**SoLoNOx**	Total Starts	**0**
Fuel Type	**Dual**	Next Planned Overhaul Running Hours	**TBD**
Inspection Last Date	**Tuesday, July 14, 2015**	Gas Fuel Hours since last inspection	**0**
		Liquid Fuel Hours since last inspection	**0**
		Starts since last inspection	**0**

NOTES

Borescope completed before Offline Compressor Wash.

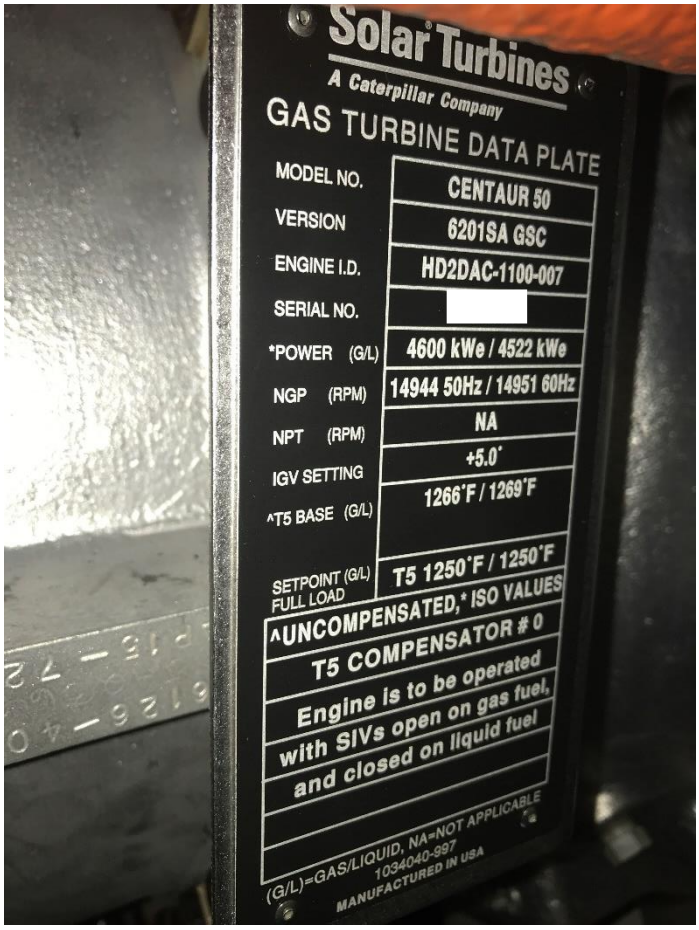
BORESCOPE INSPECTION CHECK LIST

Step	Description[2]	Performed			Initials & Date
		Yes	No	N/A	
1	Complete Task Risk Assessment.				GR January 21, 2020
2	Complete Job Safety Analysis.				GR January 21, 2020
3	Ensure the shutdown Gas Turbine engine is cool.				GR January 21, 2020
4	Prepare the package for a Borescope Inspection.				GR January 21, 2020
5	Perform Borescope Inspection (Record images, measurements and comments on the Borescope Inspection Report).				GR January 21, 2020
6	Return Gas Turbine engine to service.				GR January 21, 2020
7	Complete the Borescope Inspection Report (Borescope report sections populated correctly, FSR signature, Customer signature).				GR January 21, 2020
8	Print/Scan the document as a PDF. Archive the document under the WFM associated Major Assembly / Field Attachments section.				GR January 21, 2020

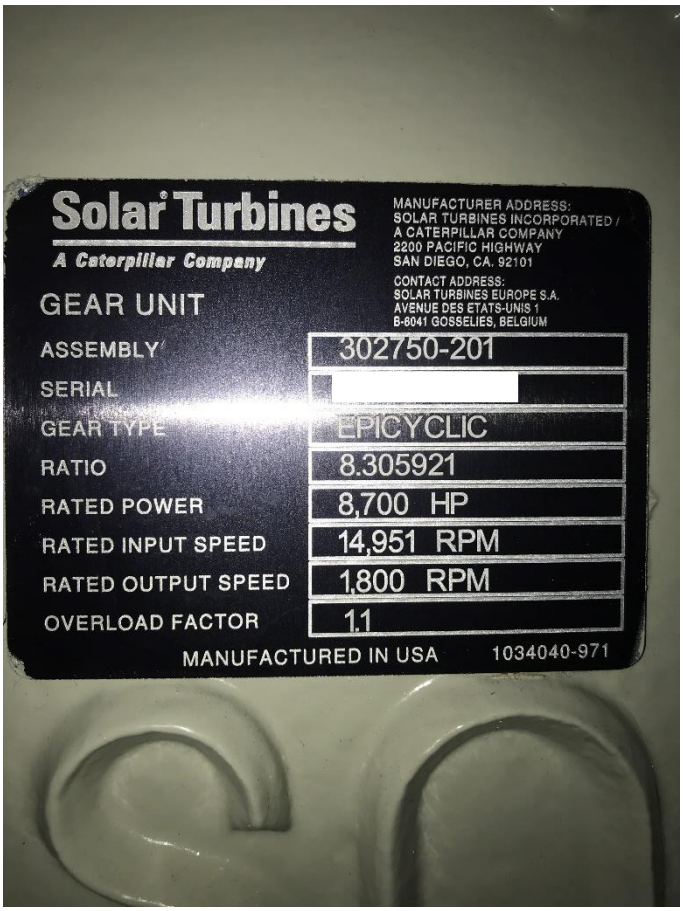
[2] For detailed step instructions, please refer to the Solar Turbines WFM (Work Force Management) internal procedure mentioned in the Equipment Information section.

EQUIPMENT DATA PLATE

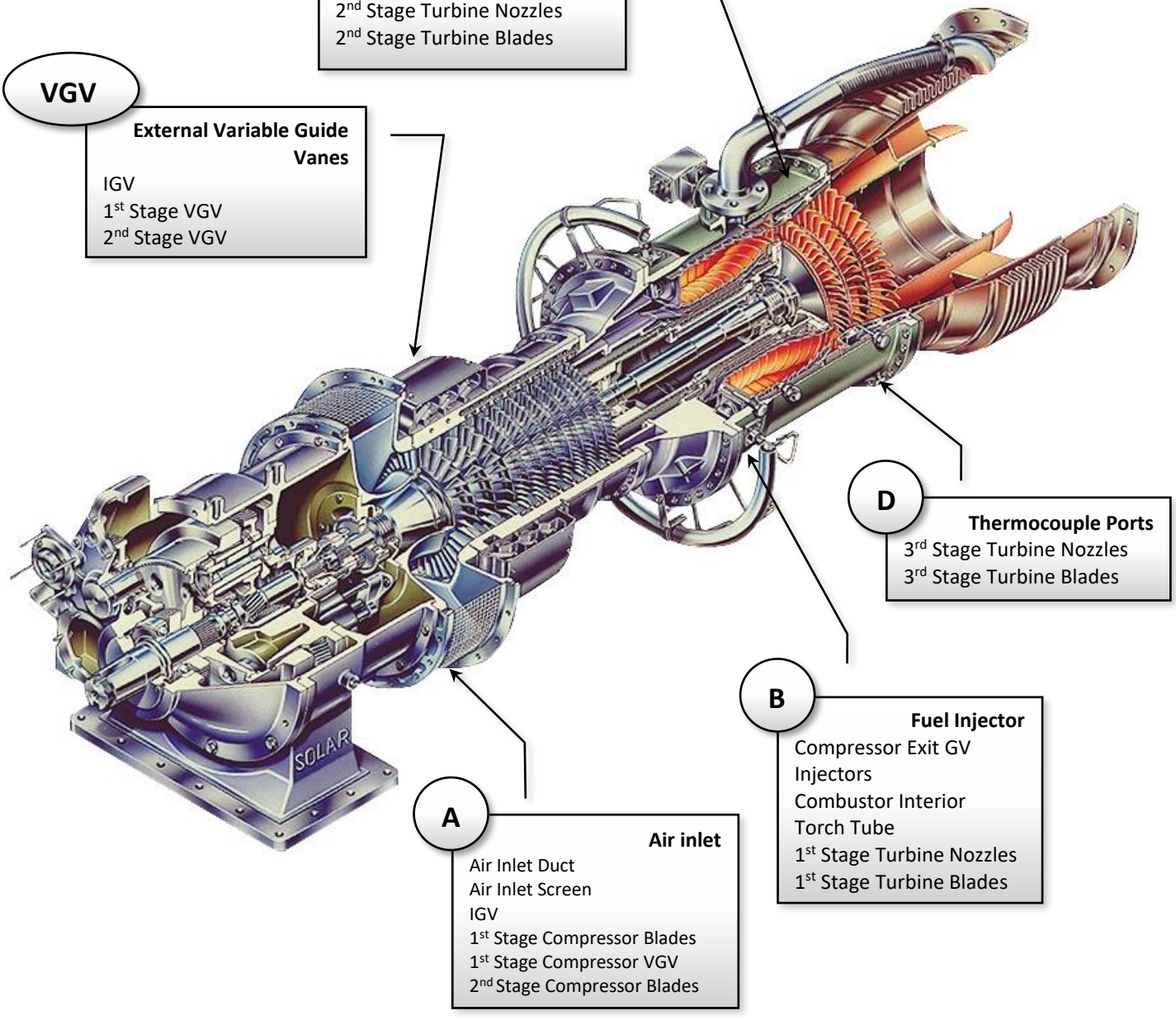
Gas Turbine



Reduction GearBox

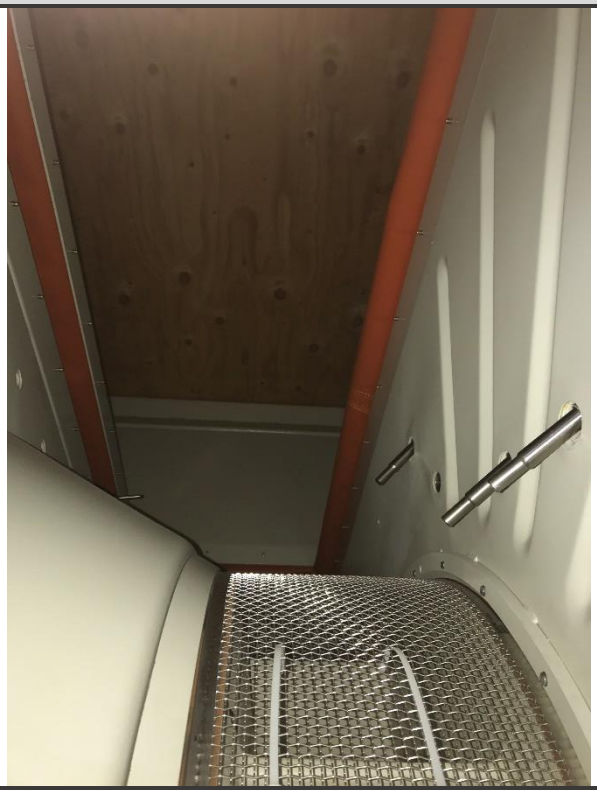


BORESCOPE INSPECTION LOCATIONS



BORESCOPE INSPECTION SUMMARY

BORESCOPE INSPECTION PICTURES

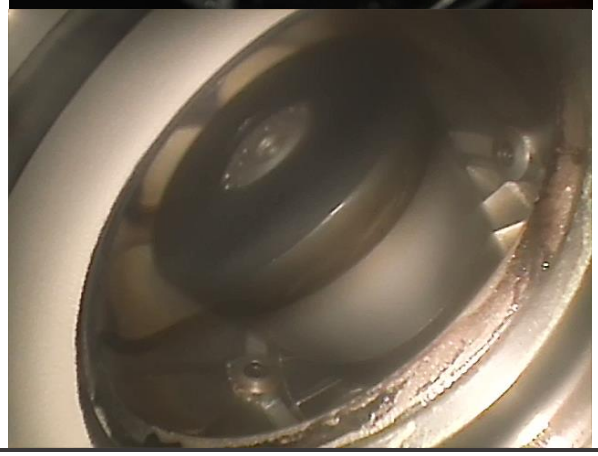
Access location Description	Picture	Inspection for	Severity / Comments
A Air Inlet Duct		a)Potential FOD b)Corrosive Pitting c)Cracks d)Excessive fouling	Normal Condition

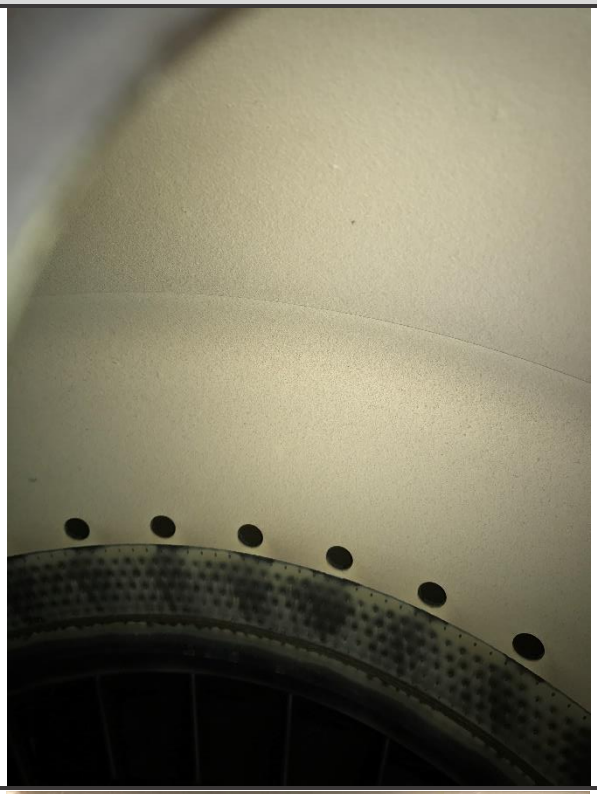
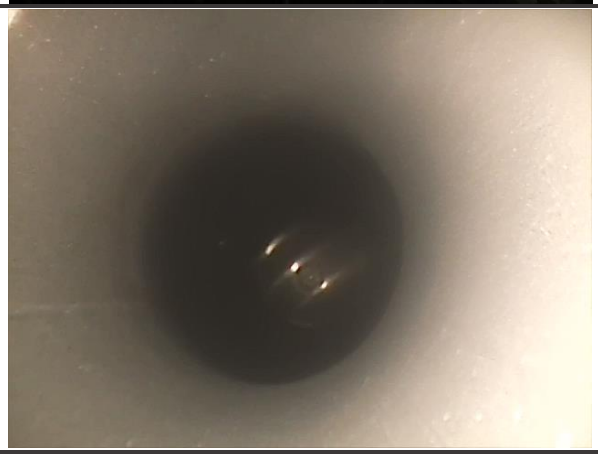
Access location Description	Picture	Inspection for	Severity / Comments
A Air Inlet Screen		a)Potential FOD b)Cracks, damaged mesh	Normal Condition

Access location Description	Picture	Inspection for	Severity / Comments
A IGV		a)Nicks and dents. Qty and size b)Excess of fouling c)Corrosive pitting. Affected area	Minor Corrosion
A 1st Stg Compressor Blades		a)Nicks and dents. Qty and size b)Excess of fouling c)Corrosive pitting. Affected area d)Tip rub. Gap width, metal curl	Minor Corrosion

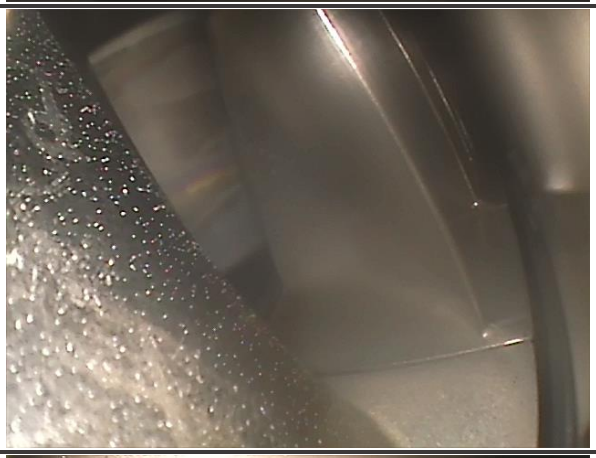
Access location Description	Picture	Inspection for	Severity / Comments
A 2nd Stg Compressor VGV		a)Nicks and dents. Qty and size b)Excess of fouling c)Corrosive pitting. Affected area	Normal Condition
A 2nd Stg Compressor Blades		a)Nicks and dents. Qty and size b)Excess of fouling c)Corrosive pitting. Affected area	Normal Condition

Access location Description	Picture	Inspection for	Severity / Comments
B Compressor Exit GV		a)Nicks and dents. Qty and size b)Excess of fouling c)Corrosive pitting. Affected area	Minor Corrosion

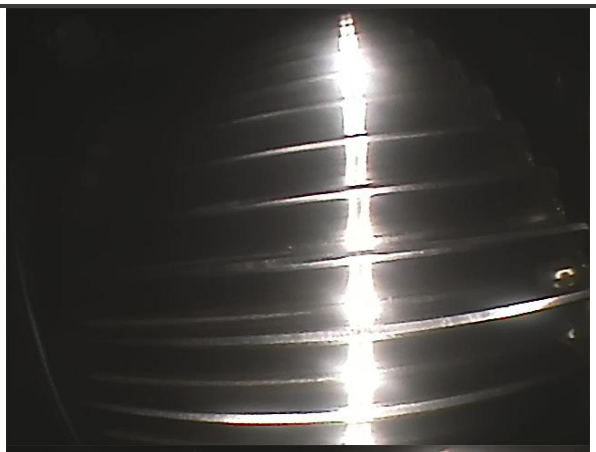
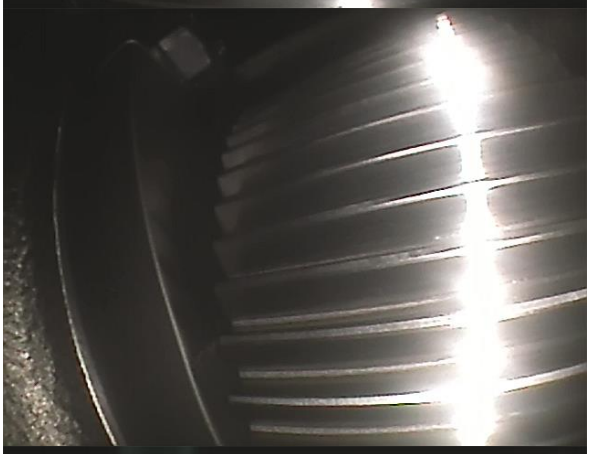
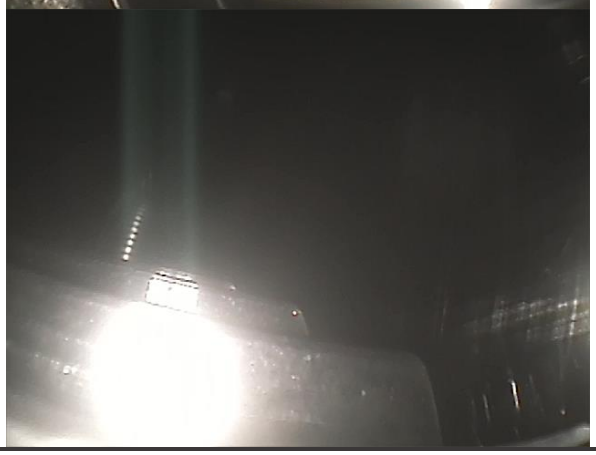
Access location Description	Picture	Inspection for	Severity / Comments
B Injectors	 	a)Pilot Center Erosion b)Fuel hole contaminated or blocked c)Cracks, Qty & Size d)Liquid: broken spoke	Normal Condition

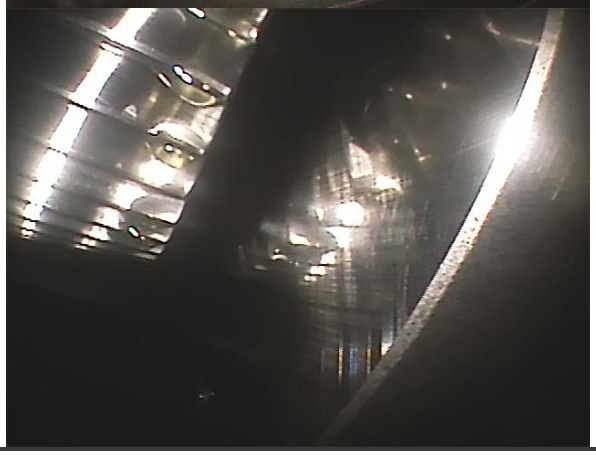
Access location Description	Picture	Inspection for	Severity / Comments
B Combustor Interior		a)Cracks, Qty, length, orientation b)Thermal Erosion c)Hot Spots d)Buckling or warpage	Normal Condition
B Torch Tube		a)Thermal erosion	Normal Condition

Access location Description	Picture	Inspection for	Severity / Comments
B 1st Stg Turbine Nozzles		a)Cracks, Qty, length, orientation b)Thermal Erosion. Depth, Area c)FOD, Area	Normal Condition
B 1st Stg Turbine Blades		a)Cracks, Qty, length, orientation b)Thermal Erosion. Depth, Area c)FOD, Area d)Tip rub, Gap width	Normal Condition

Access location Description	Picture	Inspection for	Severity / Comments
C 2nd Stg Turbine Nozzles		a)Cracks, Qty, length, orientation b)Thermal erosion, Depth, Area c)FOD, Area	Normal Condition
C 2nd Stg Turbine Blades		a)Cracks, Qty, length, orientation b)Thermal Erosion. Depth, Area c)FOD, Area d)Tip rub, Gap width	Minor Corrosion
D 3rd Stg Turbine Nozzles		a)Cracks, Qty, length, orientation b)Thermal erosion, Depth, Area c)FOD, Area	Normal Condition

Access location Description	Picture	Inspection for	Severity / Comments
D 3rd Stg Turbine Blades		a)Cracks, Qty, length, orientation b)Thermal Erosion. Depth, Area c)FOD, Area d)Tip rub, Gap width	Normal Condition
VGV IGV		a)Cracks b)Lever arms bent c)Grommet out of position on unison ring d)Corrosion	Normal Condition

Gearbox	  		Normal Condition



Access location Description	Picture	Inspection for	Severity / Comments
			

CONCLUSION

The Engine appears to be in serviceabile condition at this time. Minor corrosion/oxidation was observed in the forward and aft sections of the compressor as well as the second stage turbine blades, this is due to the turbine being stored for over four years in a harsh environment.

RECOMMENDATION

Please continue to monitor engine condition and preservation status if continued storage is required.

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

Inspector Name: **GREGG ROSSOFF**
Inspector Email Address:
Inspector Phone Number: