

PLANT RECOVERY COMPANY

PRC ENVIRONMENTAL

Sale of W251 B2 Combustion Turbine and Generator Set



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PRC Environmental

Proposal For Sale **W251 B2 Combustion Turbine & Auxiliary Components**

Introduction:

PRC Environmental has a complete power plant for sale with all structures dismantled on the west coast.

The W251 has run at 100% of design capacity since its installation at the Sanger plant in 1990. The machine was first fired after installation on December 15th, 1990 and went into commercial operation on May 1st, 1991.

The turbine was manufactured in Philadelphia, Pennsylvania, at the Westinghouse plant Lester Branch, and was originally installed in Ecuador at Empresa Electrica Quito SA facility. The machine went into commercial operation in April of 1975. The turbine was operated on liquid fuel while in operation at the Empresa facility. The machine has dual fuel capability but has been operated solely on natural gas hel since installation at the Sanger facility. All of the auxiliary components were purchased along with the turbine from the plant in Ecuador, with the exception of the generator. **Please see the Scope of Supply attached for a list and details of the auxiliary components.**

Since installation at the Sanger facility the machine has been maintained according to the OEM recommendations for maintenance schedule. A yearly combustion inspection was conducted, a hot gas path inspection was done every three years and a major inspection was done every six years. Maintenance records are available for inspection.

The gas turbine has steam injection at a rate of 21,000 lbs/hr at 450PSI and 625°F. for NOx control. The plant has operated as a PURPA cogeneration qualifying facility. The plant has operated as a peaking plant for 15 hours a day excluding weekends and holidays, supplying a nominal 38 MW to the PG&E grid.

Schedule:

February 19 – 23, 2007	Inspection of the W251 combustion turbine during normal operation.
February 23 - March 2, 2007	Combustion inspection of the turbine. A borescope of the first stage vane segments, first stage turbine blades, second stage vane segments through to the leading edge of the second stage turbine blades.
Facility maintenance	Meetings with potential buyers at the Sanger to witness the inspection, and view records.
September 28, 2007	Shutdown of the W251 turbine.
October 1 – 12, 2007	Removal of the W25 1 turbine, generator and auxiliary components, loading and transport.

A photo album is attached for your review.

Scope of Supply:

W25 1 B2/B8 Combustion Turbine.

Manufacturer: Westinghouse . Lester, Pennsylvania.
Serial #: 17A2231
Date of Manufacture: 1974
Last Major Inspection: March 2003

The unit was overhauled and rebuilt at the Westinghouse plant in Hamilton Ontario prior to installation in 1990. The overhaul included eight new primary and secondary combustion baskets, a new natural gas fuel skid, fuel nozzles and manifold, as well as a new steam injection manifold.

The rotor had a 2A inspection where the disks were unbolted and un-stacked to permit a full NDT inspection.

A new heat exchanger was installed to recover heat rejected from rotor cooling air exhaust heat to preheat the natural gas fuel to approximately 200°F. this resulted in a heat rate efficiency gain of about 1 %%. This also minimized condensation during the injection of steam into the gas manifold.

The inlet plenum was modified and variable inlet guide vanes were installed to permit control of the exhaust temperature, and maintain steam superheating in the HRSG.

The row 1 turbine blades and vane segments were recently upgraded to the B8 design. The transition pieces side seals have also been upgraded to the B8 design in 2003.

Westinghouse/Acec Generator:

Manufacturer: Westinghouse/Acec. Belgium
Order #: IME11070
Type: TWA 840160
Phase: 3
Volts: 13.8kV
Coupling: Wye
Frequency: 60Hz
RPM: 3600
MVA: 32.15
Mega Watts: 27.3
Mega Vars: 16.9
Power factor: 8.5
Stator Amps: 1345
Rotor Amps: 635
Standard: 1345

Max Altitude: 2850
Air Inlet Temperature: 25° C
Rotor Temperature: 125° C
Stator Temperature: 110° C
Date of Manufacture: 1974
Major Overhaul: March – April 2003 during major inspection of the turbine.

Reduction Gearbox:

Manufacturer: Lufkin
Serial #: 17A2231
Date of Manufacture: 1974
Last overhaul: March – April 2003 during major inspection of the turbine.

Exciter: GTG AC Generator

Manufacturer: Westinghouse
Serial #: IS – 84P624
Frame: PMG 16
KVA: 8.4
Volts: 220
Amps: 48.5
Power factor: .95
Phase: 3
Hertz: 420
KW: 185
R P: 3600
Temperature Rise: 60° C
Date of Manufacture: 1974
Last overhaul: March-April 2003 during major inspection of the turbine.

Start Pack:

Manufacturer: Cummins Diesel/ Koenig Engineering
Clutch and Torque converter
Last overhaul: 2004

Inlet Air Cooling (Evaporative Cooler):

Lubricating Oil Cooler:

Manufacturer: Westinghouse
Serial #: 733026-A1
Part #: 711026T09
Date of Manufacture: 1974
Last overhaul: March-April 2003 during major inspection of the turbine.

Air-to-Air Cooler:

Manufacturer: McKenzie - RIS Manufacturing Corp
Serial #: 12157A-1

PO #: 51-2-2237801A104
Dwg #: 241T931001-02
Date of Manufacture: 1974
Last overhaul: March-April 2003 during major inspection of the turbine.

Halon Fire Suppression System:

Manufacturer: Fenwal Inc. Ashland, Massachusetts
Serial #: 12657
Date of Manufacturer: _____
Last overhaul: 2004

Spare 524 gas turbine breaker

Spare torque converter.

The Engineering and Operating console will also be available for sale with the complete package.

Photo Album:



Diesel Start Pack as viewed on the north side looking towards the exciter.



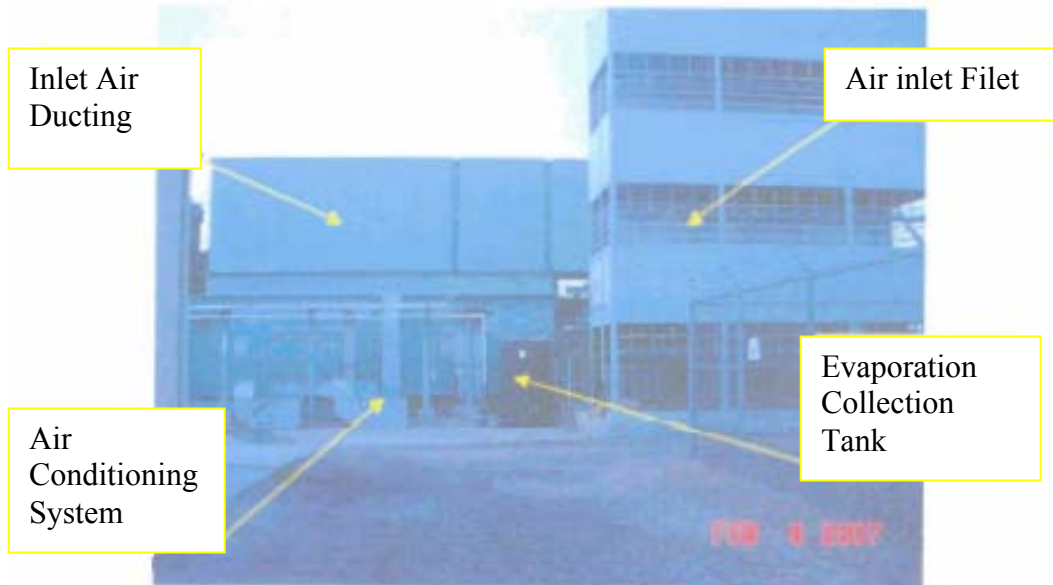
Exciter as viewed on the north side looking towards the generator.



View of the Combustion Turbine package from the southwest. Shows the start pack, generator inlet air filters, turbine inlet air filter (evaporative cooling tower)



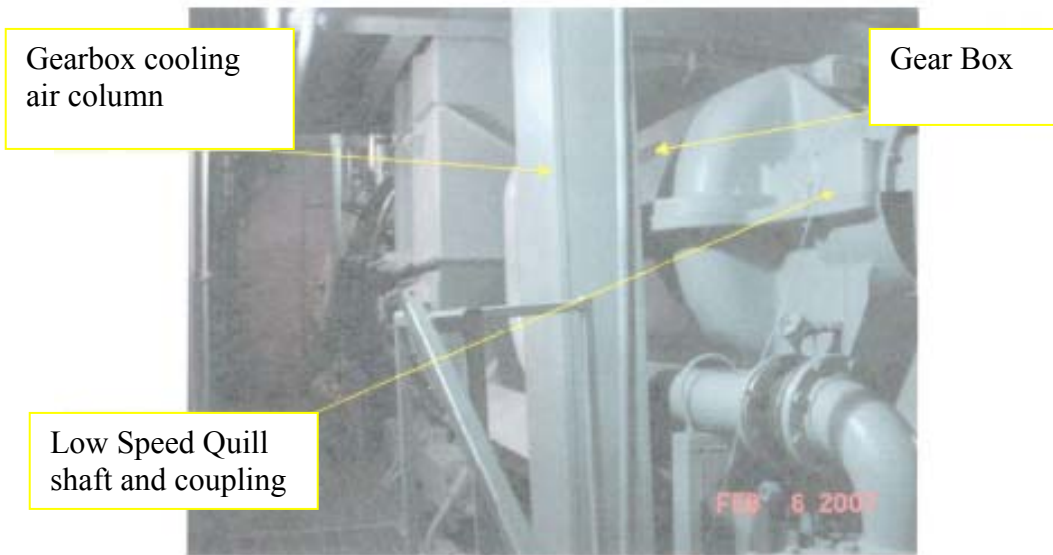
View of the Combustion Turbine from the south side showing air-to-air cooler.



View of the combustion turbine showing the evaporative cooling tower, the inlet air ducting, evaporation collection tank, air conditioning system.



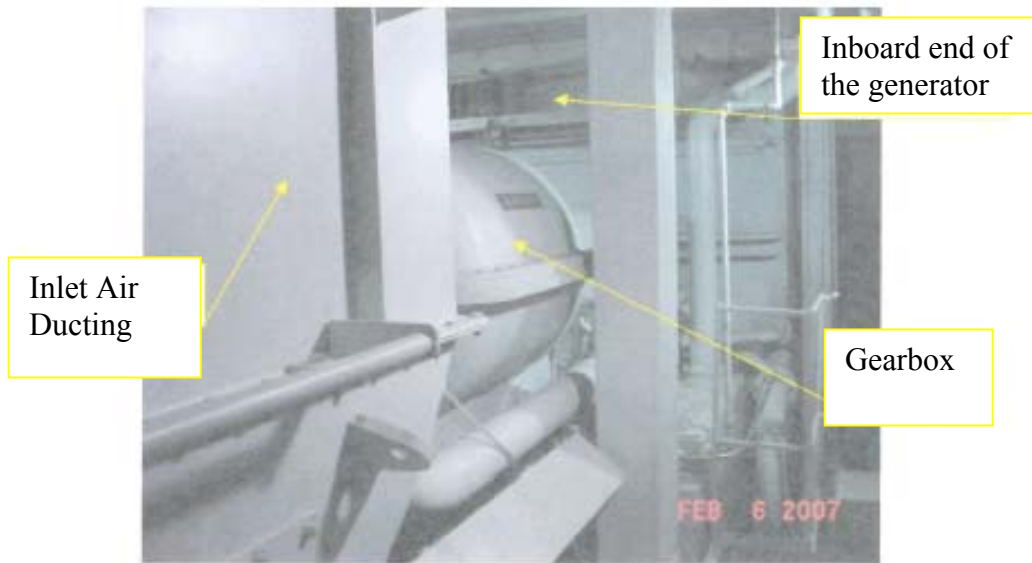
View of the combustion turbine from the north side showing the lubricating oil cooler.



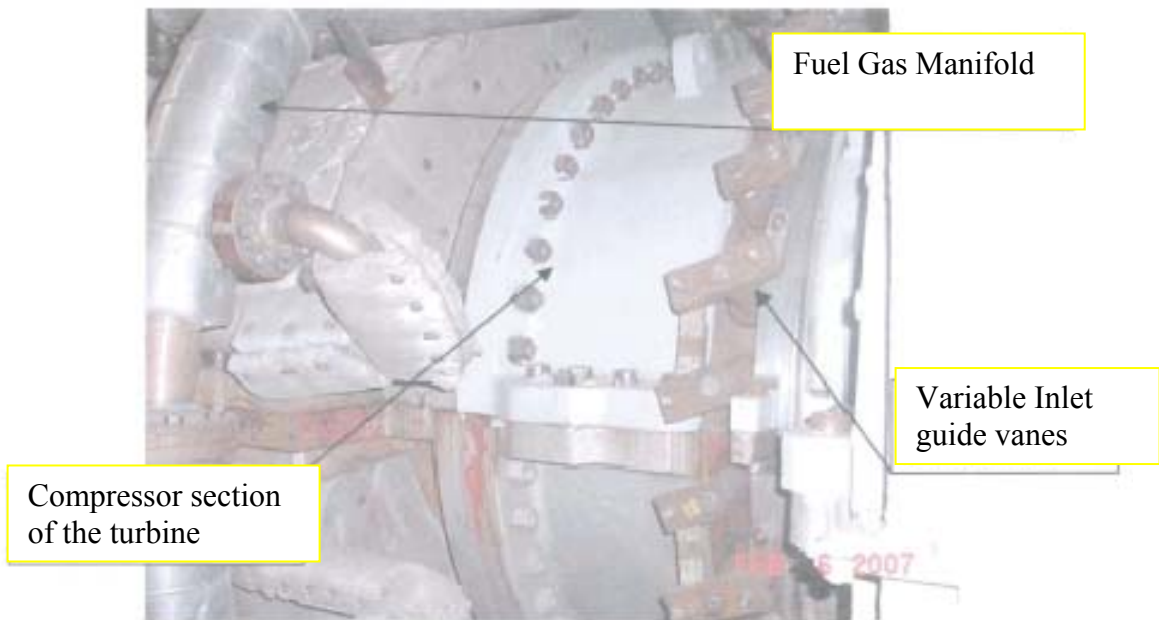
View of the gearbox and cooling air column, looking back toward the combustion turbine on the north side of the machine.



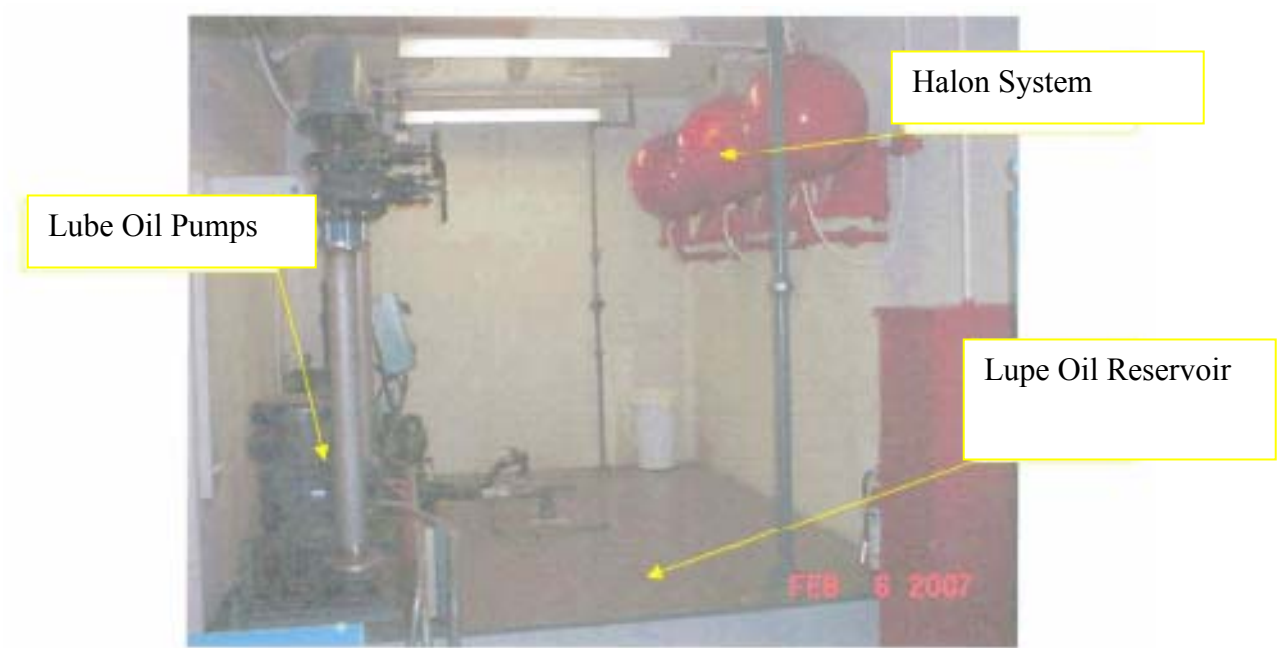
View of the low speed quill shaft shroud, coupling at the gearbox end and the inlet plenum.



View of the inlet plenum and the gearbox looking toward the generator on the north side of the machine.



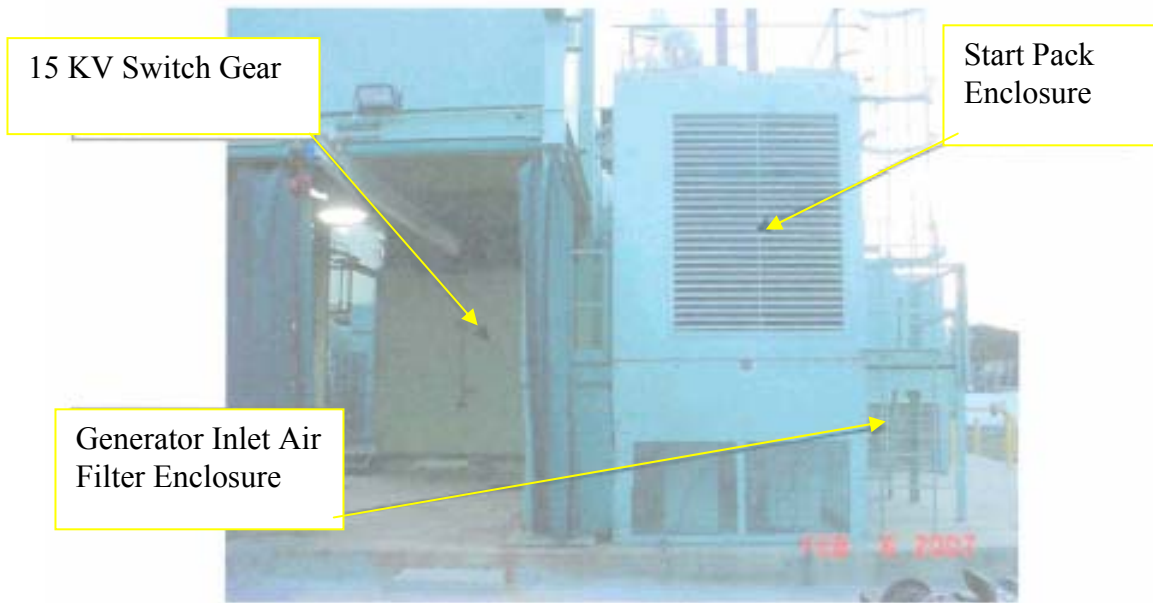
View of the inlet guide vanes and compressor section of the turbine. The fuel gas manifold can also be seen.



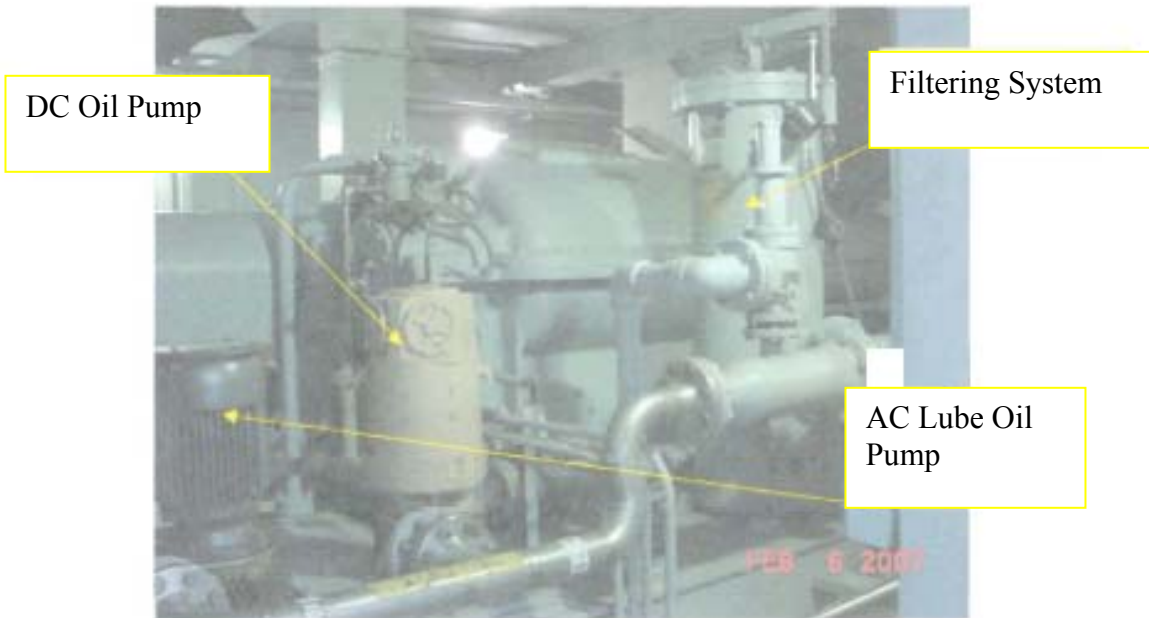
View of the lubricating oil reservoir, pumps and the Halon fire suppression system.



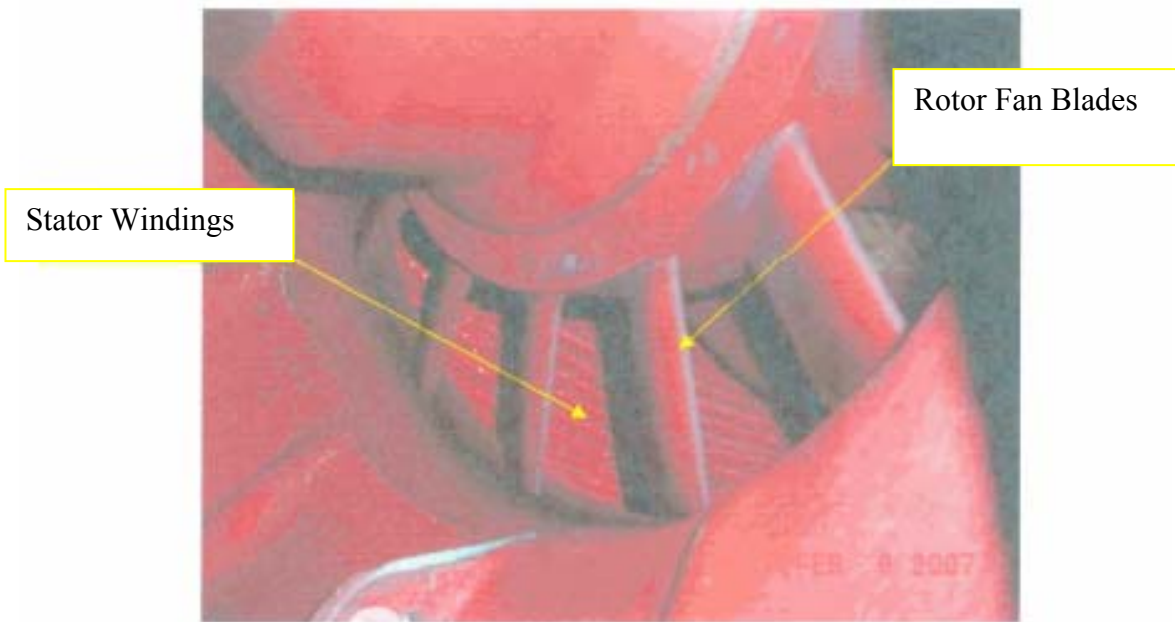
View of the MCC's located on the north side of the turbine and generator set.



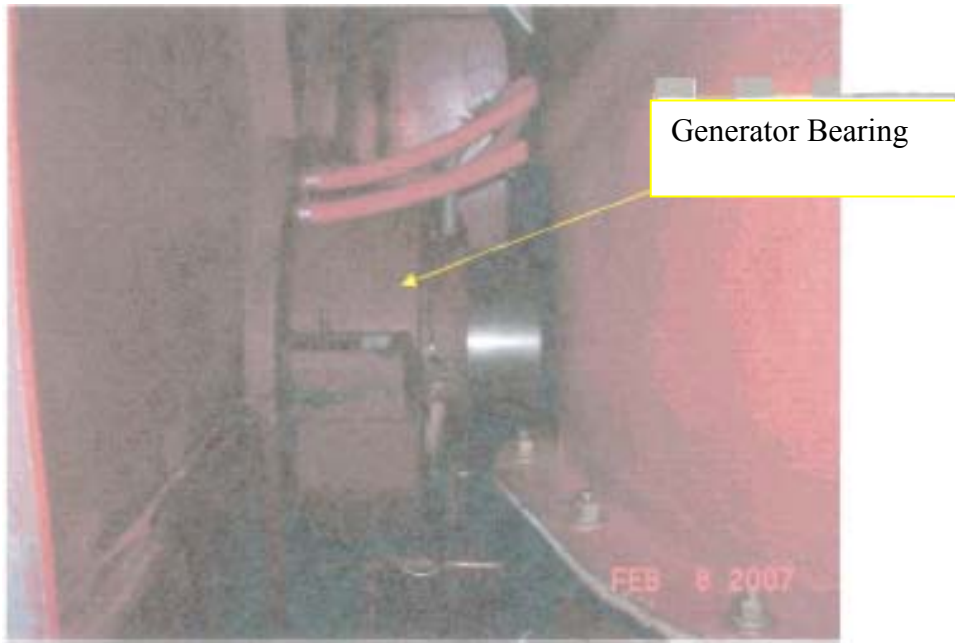
View of the start pack enclosure at the west end of the turbine/generator set, showing generator inlet air filter enclosure and the 15 KV switch gear enclosure.



View of the gearbox from the soude side of the machine showing the filtering system, AC lube oil pump and DC oil pump.



View of the generator rotor and stator at the gearbox end, showing the rotor fan blades and stator windings.



View of the generator bearing at the gearbox end.



View of the generator rotor and stator and the exciter end.



View of the generator bearing at the exciter end.



View of the generator enclosure from within the air inlet filter housing with the panel at the gearbox end removed.



Generator cooling air inlet filters.

Westinghouse W251 B2/B8 Spare Parts List

Item	Description	Quantity	Condition	Westinghouse Part #	October 1, 2006
1	Primary Baskets	8	Being Refurbished	2201458001	
2	Secondary Baskets	4	Refurbished	2130T82G03	
	Secondary Baskets	4	Being Refurbished		
3	Transitions	8	Refurbished	2137T95G01	
	Transitions	1	Needs Upgrade		
4	Bull Horns	6	New		
	Bull Horns	2	Used		
5	Row 1 Vane Segments	16	New	2063T16001	
	Row 1 Vane Segments	9	Refurbished		
6	Row 1 Turbine Blades	72	Refurbished		
7	Row 1 Honeycomb Seals	20	New		
8	Overspeed Trip Valve	1	Used		
9	Manway Cover	1	Used		
10	Blade Ring Cooling air Tube	1	New	21T055001	
11	Spring Seals	2	Refurbished	235T801001	
	Spring Seals	5	Being Refurbished		
12	Floating Seals for Transitions	12	Refurbished		
13	Cross Flame Tubes	2	New	219T634001	
	Cross Flame Tubes	5	Used		
	Cross Flame Tubes	4 sets	Being Refurbished		
	Cross Flame Tubes	7	Big Sides Used		
14	Fuel Nozzle Flange	2	Used		
15	Swirl Baskets	5	New	2053T34001	
16	Expansion Joint	1	New		
17	Cooling Tube Flanges	6	New		
18	Row 2 HoneyComb Seals	4	New		
19	Row 2 Vane Segments	1	New	1253E20G01	
20	Row 3 Vane Segments	3	New	202T459001	

Item	Description	Quantity	Condition	Westinghouse Part #	October 1, 2006
21	Row 3 Turbine Blades	1	New	2511T45001	
22	Fuel Nozzles	8	Being Refurbished	219T710G03	
23	Igniter Transformer	1	New		
24	Thrust Shoes	6	New		
25	Transition Mounting Blocks	9	New		
26	Row 1 Turbine Blade Locking Hardware	1 set	New		
27	Row 2 Turbine Blade Locking Hardware	1 set	New		
28	Row 3 Turbine Blade Locking Hardware	1 set	New		
29	Reduction Gear Primary Seal OP Shaft	1	New		
30	Turning Gear and Clutch Assembly	1	Used		
31	CRG Tooling	Assorted			
32	Oil Seal Sets	9	New		
33	Row 2,3 Vane Segments Locking Hardware	12	New		
34	Thermocouples DC-2 #2198T29G01	2	New		
35	Thermocouples DC-3 #2196T29G02	2	New		
36	Thermocouples DC-1 #2198T29G01	2	New		
37	Thermocouples Rotocooler 53 #240T100002	2	New		
38	Thermocouple cooler Discharge #3845D29104	2	New		
39	Thermocouple blade path #3845D29127	1	New		
40	Igniters	5	New		
41	Igniter Cables	2	New		
42	Turbine Rotor Stand	1	Used		
43	Turbine/Generator Lifting Beam	1	Used		
44	Flux Probe testing Instrument	1	Used		
45	Skid Pan and Shoe	1	Used		
46	Turbine Casing Lifting Guide	1	Used		
47	Combustion Basket Alignment Fixture	1	Used		
48	XMC Westinghouse Synchronizer	1	Used	Westinghouse	
49	25 Device - Sync-Check Relay BE1-25	1	Used	Bazler	
50	P2C Transmitter	1	Used	Westinghouse	

Megger Test – (Westinghouse W-251)

The purpose of performing a Meggar Test on a generator that was taken out of service approximately 14 months ago. The tests consisted of a Meggar test of the entire winding and 1000 Volts and then a Polarization test at 5000 Volts. The generator is located in Sanger, Ca., stored outside but covered.

Unit Nameplate Data:

ACEC Mfg., S/N 1ME11070, 3600 RPM, 60 Hertz, 13.8 kV, 27.3 MW, 16.9 MVAR, 0.8 PF, Amps Arm 1345, Amps Field 625, Field Voltage 165, 25° C Amb, Rotor and Stator Rated Temperature 110° C, Type TAW840/60
Ambient temperature at time of test was 22° C.

Test Results:

Initial 1000 Volt Meggar test showed insulation resistance of entire winding to be greater than 4000 Meg Ohms after 3 minutes.

- Phase U @ 5 kV had initial IR of 2000 MΩ, 1 min 4000 MΩ, 10 min 20,000 MΩ, PI = 5
- Phase V @ 5 kV had initial IR of 1250 MΩ, 1 min 4550 MΩ, 10 min 25,000 MΩ, PI=5.5
- Phase W @ 5 kV had initial IR of 2000 MΩ, 1 min 4350 MΩ, 10 min 25,000 MΩ, PI = 5.75

Tests indicate stator insulation is dry

GTG INSPECTIONS CONDUCTED - SANGER GTG

The Sanger GTG was open by the PIC Field service organization; the following areas were open and inspected:

- Visually inspected the GT by using boroscope and normal vision.
- Visually inspected the Generator by using boroscope and normal vision.
- Visually inspected load gear box
- Visually inspect lube oil pump and sumps
- Visually inspected generator rotating fields
- Visually inspected generator journal bearings

Full details of inspection report available upon request.