

182 MW COAL FIRED POWER PLANT



Rev: 00 Date 10-19-2017



PERFORMANCE DATA

Plant rating	Gross (KW) Net (KW)	182,400 165,000
New plant heat rate actual average	BTU/KWH	9,988
Plant efficiency	%	34.16
Boiler Efficiency	%	88.74
Availability factor	%	87.7
Steam rate	lbs/kwh	6.65
Steam	Flow (lbs/hr) Pressure (psig) Temperature (Deg F)	1,250,000 2,500 1000/1000
Coal average heat content	Btu/lb, % ash, HGI	12,644, 12, 43
Consumption	lbs/hr, lbs/kw Tons/day	129,189.25, 0.773796 1410
Ash	Fly ash Tons/hr Bottom ash Lbs/hr (dry/wet)	40 3,800/5,300
Auxiliary power consumption (kw/hr)		14,539
Make up water	GPM	1,700
Lime use for FGD	lbs/hr	3487
Substation voltage	KV	230
Emission	NOx CO VOC Particulate matter	0.33 0.20 0.03 0.02

HISTORY

Plant startup: 3/14/1994
Plant Shutdown: 3/1/2017 Operated base load until 2013, peaking plant 2014 to 2017
Turbine last Overhaul: 2009
All equipment is in working order, many upgrades over the years

TECHNICAL DETAILS

PLANT DESIGN BASIS:

Wind speed: 90 MPH
Ambient Temperature: 98.8 °F high 4.8 °F low
Seismic Zone: 0.05G

BOILER

Riley (B & W) stoker pulverized coal, reheat type top hung boiler, rated 1,250,000 lbs/hr, 2520 psig, 1005/1005 °F, Contract number: 91006, Feed water 480 deg F, efficiency 88.74%
Burners CCV-5

STEAM TURBINE GENERATOR SET



General Electric tandem unit with combined high pressure and intermediate pressure sections and single exhaust low pressure section. Rated at 182,320 kw, serial number 270T238, inlet pressure 2400 psig temperature 538 deg C, exhaust 2.5" hga, 3600 rpm, 20 stages Generator 203,250 kva, serial number 290T238, 13800 v, hydrogen cooled, 0.9 pf, flow 1212300 lbs/hr, generator and mechanical loss 2399 kw. Stem rate: 6.65 lbs/kwh

CONDENSER

Foster wheeler two pass single shell condenser, designed to thermal duty 807 MBtu/hr pressure 2.5" HgA, circulating water flow 92,770 gpm, admiralty tubes, air removal section has stainless tubes, 100,040 Sq. feet

EMISSION CONTROL

ABB Flakt inc dry scrubber 93% so2 removal and particulate emissions reduction to 0.02 lb/MMBtu.

Bag house 475,000 cfm, gas temperature entering 158 deg f
Stack 325 feet concrete.

SCOPE OF SUPPLY

Riley stoker (B & W) 1,250,000 lbs/hr, Contract number 91006 boiler with air preheater, economizer, super heater, reheater furnace, coal burners, oil start-up burners, ducts, structural steel.

Coal rail unloading station from Rail cars 1000 TPH, coal 2- weighing approximately 50 lbs/cu. Ft, maximum moisture content 10%. , 2 x Hewitt-Robbins Model HDV car shakers, 2 x Robbin Myers model SH3-6.6-26M17S car shaker hoists, car shaker trolleys, belt scale, Dings Model 44 magnetic separator, Tema sampling system, frozen coal shakers, vacuum cleaning system, dust suppression system, 42" coal conveyor to coal stacking.

Coal reclaim and feeding system 300 TPH, with 3 x reclaim hoppers, 3 x GK UC5-5 reclaim variable rate vibratory feeders, Dings model 33 magnetic separator, Andco 7210t Flop gate, 2 x Pennsylvania model TTK26X40 300 TPH crushers, Tectron 5000 metal detector, vacuum cleaning system, crusher hoist, 1 x reclaim conveyor, 1 x reclaim transfer conveyor, 1 x boiler feed conveyor, 4 x 280 Tons coal silos. Dust suppression system

Coal feeding system 4 x Arita 556D 49,500 lbs/hr coal pulverizers,
16 x Riley CCV-5 coal burners

Bottom ash system designed for 3,800 lbs/hr (dry), 5,300 lbs/hr wet, with water quench, submerged scraper conveyor

2 x TLT Babcock 1444B/1725/0 FD fans with, 1200 hp , 885 pm motor

2xTLT Babcock 2118AZ ID fans, 279,000 ACFM, with 2000 hp Westinghouse motor

Flue gas desulfurization system Abb Flakt FGD reactor and atomizer, Baghouse, lime and reagent preparation.



Flyash handling system, 2 x Fly ash silos total capacity 1800 tons, blowers, filters, piping, ash conditioners rotary van feeders, 40 tons/hr bag house

Soot blowers 14x Diamond power 1K4M retractable rotating, 6x Diamond power G9B fixed position, 2 x Diamond power condensate drain controllers

General Electric steam turbine generator with HP/IP, LP turbine, 2x main steam trip valves, 2x reheat steam valves, extraction NRVs, GE ATB-2 203,250 kva generator, brush type exciter, Lube oil system, control oil system, EX2100 exciter, Mark VIe controls

4 x Foster wheeler low pressure feed water heaters, heater controls, drain pumps, piping

2 x Foster wheeler high pressure feed water heaters, heater controls, drain pumps, piping

Sterling Deaerator 1.256 HTHS deaerator, capacity 1,218,200 lbs/hr, 250 psig design

3 x Ingersoll Rand model CHTA, type 65CHTA10 boiler feed water pumps, 10 stages, 1,575 gpm, 7,170' head with 3500 hp, Westinghouse, 3600 rpm, 4160 v motors

2 x Ingersoll Rand vertical 14KKH-3, 1200 gpm, Auxiliary cooling water pumps. 100 Hp, US 460 v vertical motors

Hamon Cooling water tower model CF5448C6, induced draft counter flow, 94,000 gpm, 103.7 deg f to 86 deg f water temp., wet bulb temp. 48 deg f, 6 cells, Siemens 200 hp 460 v, fan motors pvc fill.

2 x Johnson Pump JT64TMC, vertical turbine circulating water pumps, 47,320 gpm, 57' head, TECO 900 hp, 4000 v, 395 rpm motors

2 x Dean pumps PH250 6x8x13 1/2 generator cooling water booster pumps, 1,580 gpm, 42' head US 25 hp, 480 v, 1200 rpm motor

Foster wheeler condenser, 110,400 sq. ft, two passes, admiralty tubes. 91,216 gpm cooling water, cooling water in 86 deg f out 103.7 deg f.

2 x Ingersoll rand air compressor 689SCFM, air receiver, air dryer

Co2 system, hydrogen system, nitrogen system

2 x Atlas Copco rotary screw GA37-125W service air compressor, 205 SCFM, GE 60 hp, 460 v, 1750 rpm motor.

2 x Ingersoll Rand 18KKH-2 vertical turbine service water pumps, 3,050 gpm, 260' head, US 300 hp, 460 v, 1800 rpm vertical motors

2 x Grundfos CR2-80U service water bearing flush booster pumps
2 gpm, 350' head, 2 hp motor



2 x Johnston 16CMC vertical turbine fire protection pump, 2000 gpm, 350' head with one 300 hp motor, one with diesel engine. 1 x Aurora 105 jockey pump, 20 gpm 265' head, all fire protection system

UPS system with 480 v ac to 125 vdc battery charger, 892.8 amp-hour batteries.

Waste water treatment system , 2 x Ingersoll Rand 3x1-1 ½-6 ESP2 vertical pump, 100 gpm, US 3hp, 460 v motor, 2 x Lawrence 2x3x13 FGD sump pumps, 150 gpm 45' head 5 hp, 460 v motor, FGD sump agitator, 1 x Lawrence 2x3x13 coal unloading sump pump 50 gpm 120' head 20 hp, 460 v motor, 1 x Lawrence 2 x3x13 coal reclaim sump pump 50 gpm 25' head, 5 hp, 460 v motor, 2 x Lawrence 2x3x13 detention pond sump pumps 100 gpm, 50' head 5hp, 460 v motor, 1 x Dean PH2110 1x1-1/2x6 clarifier sludge pump 50 gpm, 30' head 1hp, 460 v motor, 2 x Dean PH2110 1-1/2x3x8 coal pile run off recovery pump, 200 gpm, 140' head, 15hp, 460 v motor, clarifier

Fuel oil system maximum 6.1 gpm, with oil tank, 35000 gallons, 18' dia x 20' height, 2 x Roper 26F50 rotary helical gear pump, 40 gpm 346' head, Baldor 7.5 hp, 460 v motors

5 kv electrical Siemens switchgear, 4000 amps bus with 2x 3000 amps breakers, 350 mva, 16 x FVNR, 400 amps motor starters. 16 x Multilin 365 feeder protection relays

4 x GE 1500/1725/1930 kva, oa/fa substation oil filled transformers, 4160 d to 480 y/277, 5.75% impedance, one 5 kv switch

1 x GE 500 kva oa, substation oil filled transformers, 4160 d to 480 y/277, 5% impedance with switch 5 kv

480 v distribution centers and 480 v MCCs

Cummins ONAN 750 DFJA, 740 kw, 277/480 v, 1800 rpm emergency back-up generator with 1000 amps, 600 v ATS

13.8 kv isophase bus from generator to main transformer and distribution transformers, 10,000 amps continuous current rating main bus and 1200 amps current rating for distribution transformers, 1 x 13.8 kv sf6 generator breaker, with disconnect switch, Pneumatic trip. Pts and CTS at generator bus

ABB generator step-up transformer 110/148/185 mva, oa/fa/fa, 230 kv Wye/ 13.2 kv delta. Oil filled substation type. 10% impedance

ABB station distribution transformer, 15/20/25 mva, oa/fa/fa, 13200 v delta /4160 wye, 8.5% impedance

Bailey Infi 90 PLC control system boiler and balance of plant with 10,000 tag points and 7 local control cabinets



GE Mark V1e turbine generator control panel, DCS system, solid state relay generator protection and control panel, manual synchronization panel with analogue meters.

75/15-ton overhead bridge crane turbine bay, hoist at boiler house

Main boiler turbine building 111' long x 90' wide X 172' 9" Tall

Workshop building with machine tools and equipment inside

Coal dozer and other material handling equipment

Special tools and spare parts, manuals, drawings, history records.

All cables, wires, pipes, pipe racks, cable racks, valves, instruments belong to ROVA 1 scope of supply equipment.

Boiler house Elevator

Emission control panel room with instruments, sensors at stack.