Gateway Generating Station – Overview and ACC Operating Issues Discussion

PG&E Pacific Gas and Electric Company

About Gateway

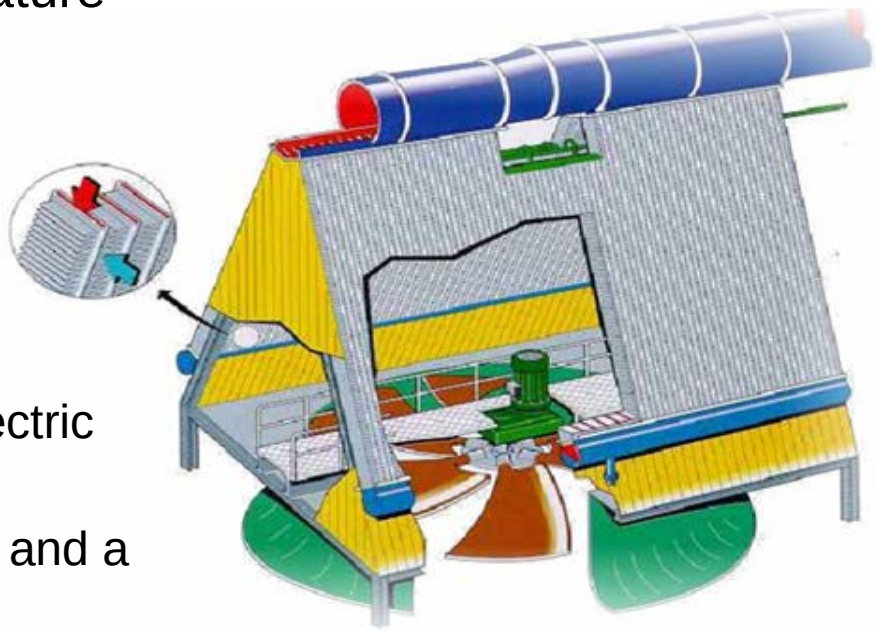
- History
  - On January 31, 2000 Mirant Delta, LLC (Mirant) filed an Application for Certification (AFC) with the California Energy Commission (CEC) seeking approval to construct and operate the Contra Costa Power Plant Unit 8 (CC8), a 530 megawatt (MW) nominal combined cycle electric generation facility.
  - Mirant began construction activities in late 2001 but found it necessary to suspend construction in February 2002 due to several factors.
  - In June 2005, Mirant and PG&E executed an Asset Transfer Agreement (ATA) to transfer and assign the CC8 assets to PG&E.
  - On November 28, 2006, Mirant and PG&E closed under the ATA and PG&E became the sole owner of the CC8 assets.
  - PG&E groundbreaking occurred on January 24th, 2007.
  - Gateway commenced commercial operation (COD) January 4th, 2009.

Plant Info

- Constructed by Black and Veatch (EPC)
  - Nominal Capacity – 530MW
  - Maximum load – 590-600MW
- Combustion Turbines
  - GE 7FA.03
- Steam Turbine
  - D11
- HRSG
  - Vogt / NEM
  - Supplemental Duct Firing
- ACC
  - SPX
- Inlet Cooling
  - Chiller System (TAS)

ACC Information

- Design max ambient temperature
  - 104°F
- Design back pressure
  - 5 inHgA
- Other details
  - 36 Fans (6 streets of 6)
  - 4160V, 250HP Marathon Electric Motors
  - Two holding vacuum pumps and a conventional steam hogger.



Fans / Gearboxes

- In the fall of 2010, gearbox lube oil sampling analysis were reporting metal particulate and vibration readings were trending up. This was occurring on 10 of the 36 fans. In December the fans were drained of oil showing obvious chunks of metal debris on several fans. The inspection cover was removed on all 10 gearboxes and 5 of the 10 had severe damage to the secondary pinion gear.
- Possible issues for discussion
  - Vibration
  - Gear tooth hardness
  - High starting torque
  - Fan “stall” due to wind gusts and high winds
- Still under investigation by the manufacturer and PG&E.


• Secondary Pinion Gear Damage

Wind / Vibration

- Original wind design
  - Avg. wind speed per SPX Specification > 3 m/s.
  - Gateway site specific design wind speed can be 5.21 m/s (11.654 mi/hr)
    - Strong winds typical of the area.
    - Prevailing winds are from the west.
    - Afternoon wind speeds of 15 to 20 mph are common throughout the straits region, accelerated by the venturi effect setup by the surrounding hills. Annual average wind speeds are and 9.5 to 10 mph.
- Screen placement
  - Screens were installed to break up the wind, but were placed only based on other installations and not as a result of a specific study.
- Vibration
  - Creates loose hardware / fasteners. This is a hazard to personnel and equipment.
  - Loose items may (or have) fallen into fan blades (causing impact damage). Some blades have been replaced due to this.
  - Could be a major contributor to gearbox failures.

Recommendations

- Recommendations to current users
  - Regular Predictive Maintenance Monitoring (vibration and oil analysis)
  - Create PM to check for loose bolts, brackets, fasteners, etc.
- New users
  - Wind study / Proper placing of wind screens.
  - Proper scoping of fans for expected wind conditions
  - QC during construction and commissioning period
  - Proper iron filter during commissioning
  - Expect to clean out drip pot
  - Change out gearbox oil at recommended interval (especially new oil that should only be used for the first 100-400 operating hours)

Recommendations From You?

- What have you experienced?
- What have you done to improve your systems?