Texas Utility Plant - Cogeneration

CAPACITY: 450 mm BTU

A Texas Utility Plant owns and operates eight (8) GE Frame 7B/FA combustion turbines at its generation plant located in Houston, Texas. All eight of the turbines operate normally in combined cycle mode and are utilized for onsite generation of steam and electricity. All eight turbines combust pipeline natural gas exclusively. All eight units are affected by the Clear Air Interstate Rules (C.A.I.R.) and are regulated under 40 CFR Part 75 regulations accordingly. The turbines are in the process of being retrofitted to utilize a state-of-the-art dry-low-NOx combustor design that achieves minimal NOx emission rates.

***Not actual site. Source: OPUC**

The Units 31 through 34 and 41 through 44 identical General Electric (GE) Frame 7B combined cycle gas turbines were placed in service during the period 1972- 1974. Each gas turbine is a single shaft, three-bearing machine with the generator connected at the exhaust end of the unit. The seventeen-stage axial compressor provides a continuous flow of high-pressure air to the multiple combustion chambers symmetrically grouped around the shaft, where fuel is added and burned. The resultant hot gases expand successively through the three stages of the turbine, developing power to drive the axial compressor and to produce useful shaft output for the generator drive. The gas fuel system utilizes continuous two-valve control of fuel flow to cover the range of start-up, acceleration, and load conditions.

The exhaust gas stream is discharged to the atmosphere and emissions are monitored using a statistical hybrid predictive emissions monitoring system (PEMS) and data acquisition system under 40 CFR Part 75, Appendices C, D, E, and F.

Federal Regulations promulgated in Title IV of the Clean Air Act Amendments of 1990 are applicable to these units. These regulations specify emission limitations for particulate matter, sulfur dioxide, and nitrogen oxides. The regulations require installation, calibration, maintenance, and operation of a data acquisition system for documentation and reporting of operating data and nitrogen oxides emission rates. Additional monitoring, recordkeeping, and reporting of sulfur dioxide, carbon dioxide, and volumetric flow is specified through the Acid Rain Program (CAAA 1990, Title 4 - 40 CFR, Part 75) and the local operating permit (WCAPC).

DAS System: ESC - StackVision
History of Project Development:
03/15/2007
A contract was issued by Plant to CMC Solutions for PEMS related engineering services.
04/16/2007
AMP was submitted to the Texas Commission on Environmental Quality (TCEQ).
06/18/2007 – 06/28/2007

RATAs were conducted on the temporary CEMS on units 31, 32, 33, 34, 41, 42, 43, and 44 by QA Support, LP.

08/30/2007

The first comprehensive PEMS models were built from the July data that has been gathered.

09/19/2007

A minimum of 720 hours of CEMS data was collected on each unit as required by the Subpart E demonstration.

10/08/2007 – 10/11/2007

RATAs were conducted on the CEMS on units 31, 33, 34, 41, 42, and 43 by QA Support, LP.

10/10/2007 – 10/12/2007

StackVision Training was conducted.

10/11/2007 – 10/12/2007

CMC Solutions conducted PEMS training for Administrators and Operators.

11/15/2007

The Subpart E demonstration reports were submitted.

12/30/2008

The original PEMS approval letter was provided by the USEPA to NRG.

7/20/2009 – 7/26/2009

A 90 run certification test was conducted on THW32. The unit passed using the low emitter criteria of ≤0.200 lb/mmBtu. The average mean difference was ≤0.002 which is less than the standard of ±0.015 lb/mmBtu for annual RATA testing.