ANALYSIS OF EMISSIONS FROM WASTE COAL-FIRED COMBUSTION UNITS IN PENNSYLVANIA

On April 13, 2004, Secretary McGinty testified before the Pennsylvania House Environmental Resources and Energy Committee to promote the enactment of an Advanced Energy Portfolio Standard. This analysis was prepared in support of her testimony concerning the inclusion of Pennsylvania waste coal-burning facilities in the "second tier" of Governor Rendell's proposed renewable energy portfolio standard. The concerns addressed by Secretary McGinty arose from a comparison of toxic emissions from the nine existing Pennsylvania waste coal facilities and emissions from typical coal burning facilities. The basis of this emissions information was data extracted from the annual U.S. Environmental Protection Agency's (EPA's) Toxic Release Information (TRI) database. In order for the Pennsylvania Department of Environmental Protection Agency (Department or PADEP) to properly address the air emissions from Pennsylvania's waste coal-burning facilities, it was first necessary to determine the origin and basis of the TRI air emissions data, and then to review other emissions data available to the Department.

For more than 30 years, the Department has collected company specific information necessary to obtain estimates of the sources contribution to Pennsylvania's ambient air quality. Therefore, we are cognizant of the difficulties in determining precisely the quantity of pollutants being emitted. The Department has, like EPA, been struggling with the lack of good, accurate emission factors that can be used in estimating emissions, especially air toxic emissions. Most of the available emission factors were generated from an average of emissions tests that have been conducted on a broad range of equipment designs and coal types across the nation. The Department was able to determine that EPA's emission factors for waste coal burning were extrapolated from typical coal firing and adjusted for the heating value of the coal. The emission factors were not generated from tests on waste coal burning facilities. It would be expected that when using the same emission factors for a waste coal, which contains about half the heat content of regular coal per pound, that the results would indicate a doubling of the rate of emissions for the waste coal compared to the same amount of total heat input as regular coal combustors. This situation becomes problematic when critiquing data available in the TRI database. For example, Pennsylvania's newer waste coal facilities have been required to use the more efficient fabric filters, rather than the less efficient electrostatic precipitators (ESP) typically installed on older coal fired units. In addition, the control device temperatures in fabric filters are significantly lower than in electrostatic precipitators, which enhance the collection of some pollutants such as the toxic metal pollutants. Additionally the lower temperatures in the fabric filters also reduces the formation of dioxins and furans. None of these more favorable operating conditions for the waste coal-burning facilities have been factored into the general toxic emission factors for waste coal facilities available from TRI or EPA's Factor Information Retrieval (FIRE) emission factor databases.

A more accurate way for the owners of facilities to estimate their toxic emissions would be through the use of actual stack test data. However, specific toxic testing has been very

limited because of the high cost of toxic emission stack tests. The Department recently required the owners of a Pennsylvania waste bituminous coal fired facility to conduct extensive air toxics emissions stack testing to support their request to burn a 10% mixture of coal tar waste contaminated soil in combination with their normal waste coal. The facility's stack test emission results from the burning of the waste coal without the coal tar were extrapolated to an annual basis.

The waste coal facility clearly shows lower emissions for all of the toxic pollutants. The dioxin levels were approximately 4 times lower, while most metals were about half with the exception of mercury which was 10 times lower per gigawatt-hour generated. The Department believes that these extrapolated results are representative of actual emissions from this type of facility in Pennsylvania, not the TRI generated emissions data that has been reported. These results are shown in the **Attachment 1** along with the comparative data from a representative typical bituminous coal-fired facility. The data was graphed on a basis of electricity generated.

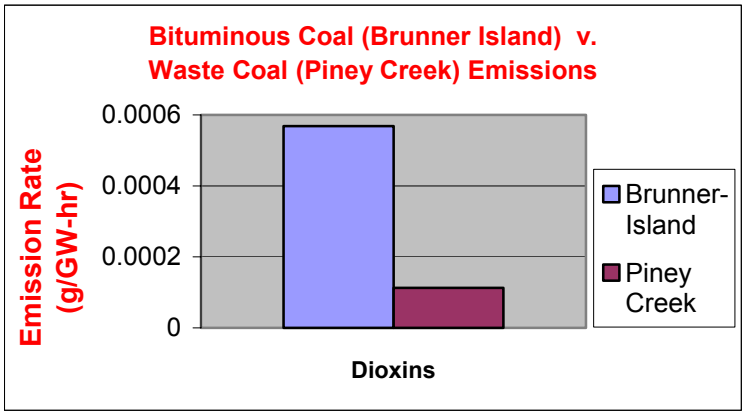
In addition, graphs based on Continuous Emissions Monitoring (CEM) data submitted to the Department on a quarterly basis for NOx and SOx emissions from utility boilers are also provided. This emissions data has been grouped by coal type, boiler type and type of emissions control for the most recent seven-year period that has been quality assured. **(See, Attachments 2 and 3).** The NOx emission levels for units firing anthracite culm (waste anthracite coal), as compared to the other types of coal-fired utility facilities should also be noted. These culm combusting facilities represent the majority of the waste coal facilities in Pennsylvania and the data presented shows that these facilities have been achieving a NOx emissions level of 0.15 lbs/MMBtu. In comparison, a typical pulverized coal facility without add-on selective catalytic reduction (SCR) controls, which is presently the majority of pulverized units, would emit NOx in the 0.3-0.5 lb/MMBtu range. Therefore, most pulverized units emit NOx at 2-3 times the emissions rate of a waste coal facility.

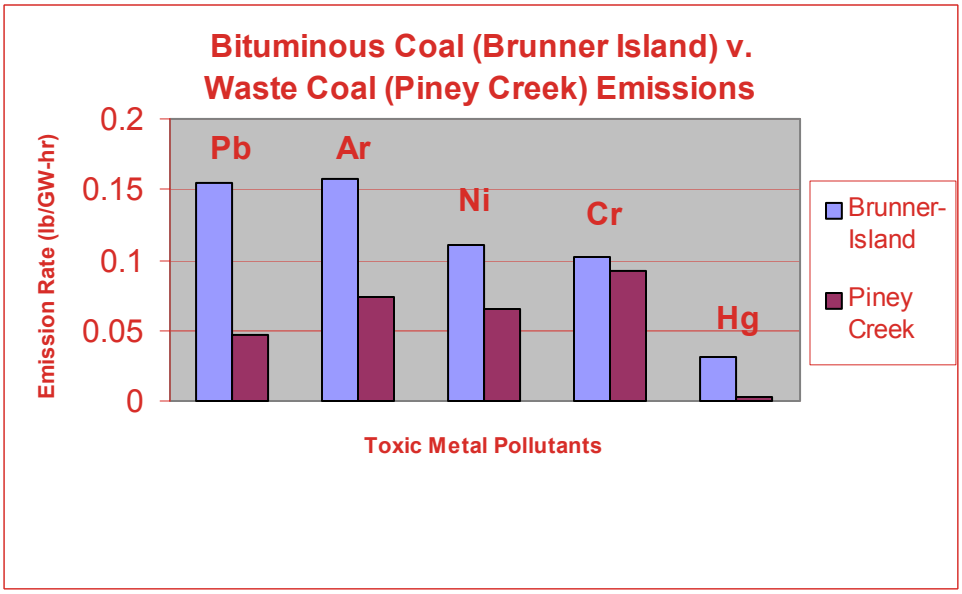
This CEM data also shows that some of the waste coal facilities have been achieving an SO2 emissions rate of 0.20-0.25 lbs/MMBtu range using limestone injection. The pulverized coal-fired boilers typically emit in the 2-3 lbs. of SO2 per MMBtu. The six Pennsylvania pulverized coal-fired units with SO2 scrubbing operate in the 0.1-0.4 lbs. of SO2 per MMBtu range.

Pennsylvania waste coal burning facilities are lower emitters of both NOx and SOx than the typical coal-fired utilities. However, it should also be noted that an SO2 emission rate of 0.1 lbs/MMBtu is achievable for a newly built pulverized coal-fired unit that would be required to install an SO2 scrubber under an SO2 Best Available Control Technology (BACT) determination. Therefore, newly constructed electric generating combustors of either waste coal and coal would emit at very comparable levels because both would be employing very similar BACT for all pollutants. The waste coal burning facilities have the added environmental benefit that they are utilizing a waste product, cleaning up old mining sites and generating an ash that is used as a beneficial back-fill material for reclamation of the old mining sites.

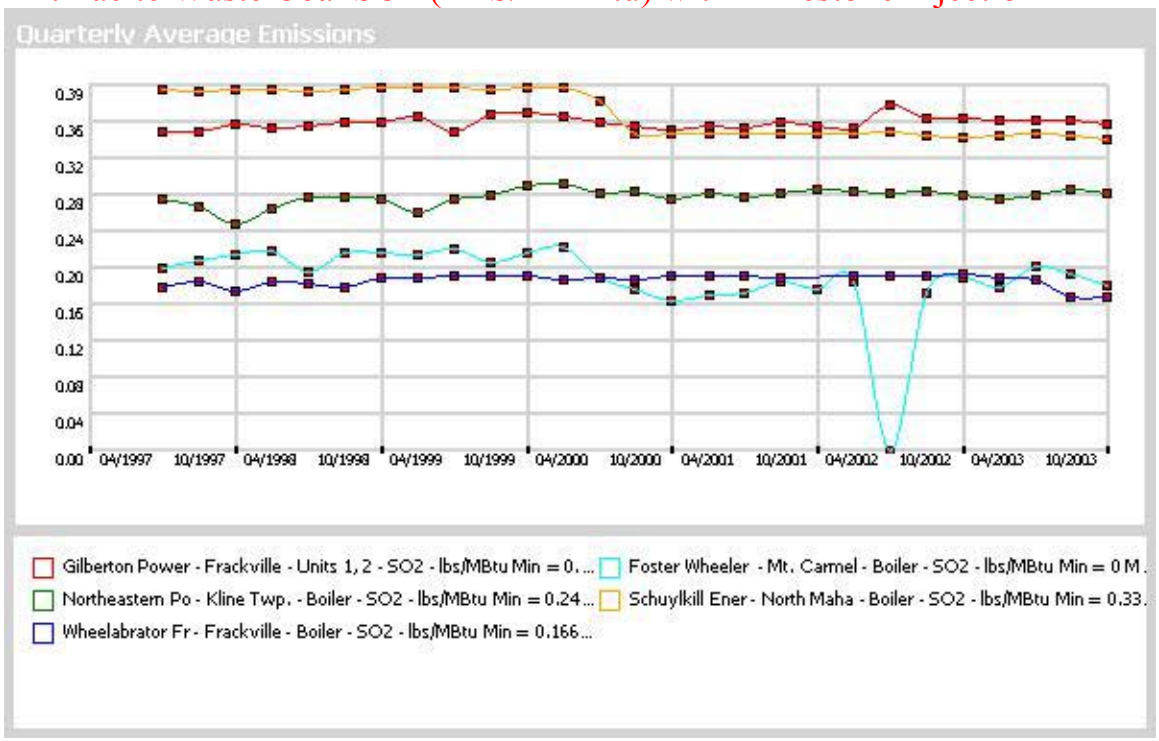
Attachment 1

Toxic Emissions Comparison Between a Waste-Coal Combustor and a Typical Pulverized Coal Combustor

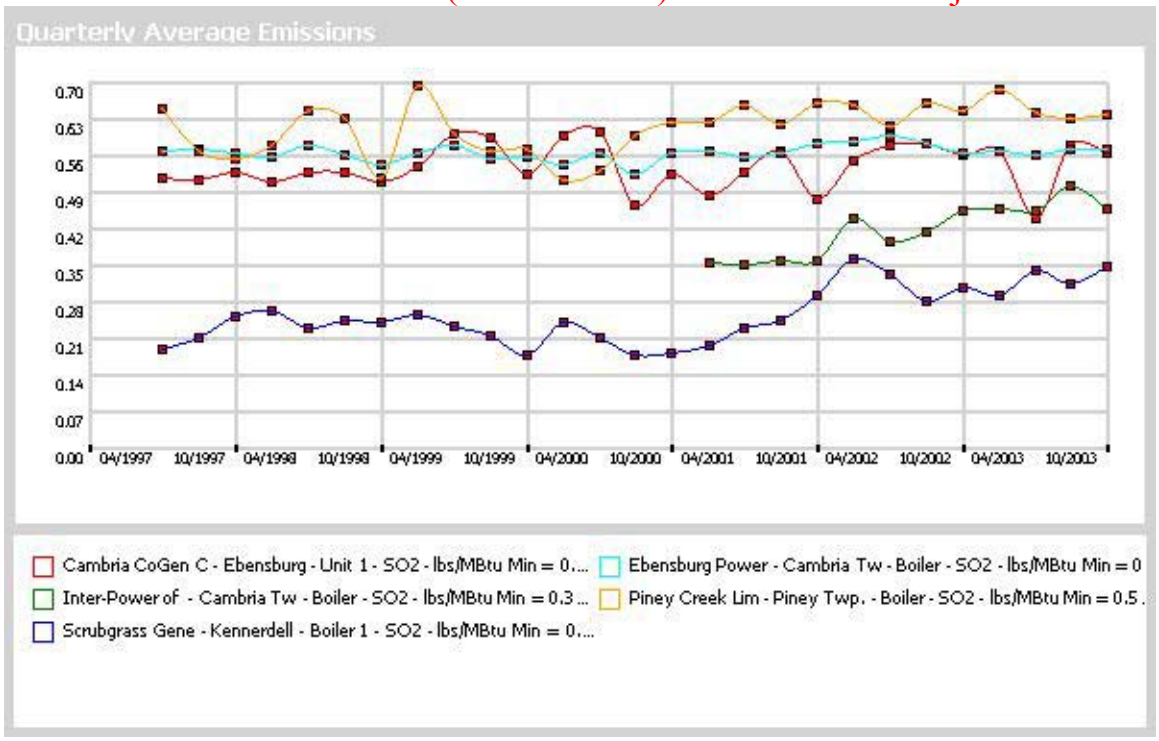




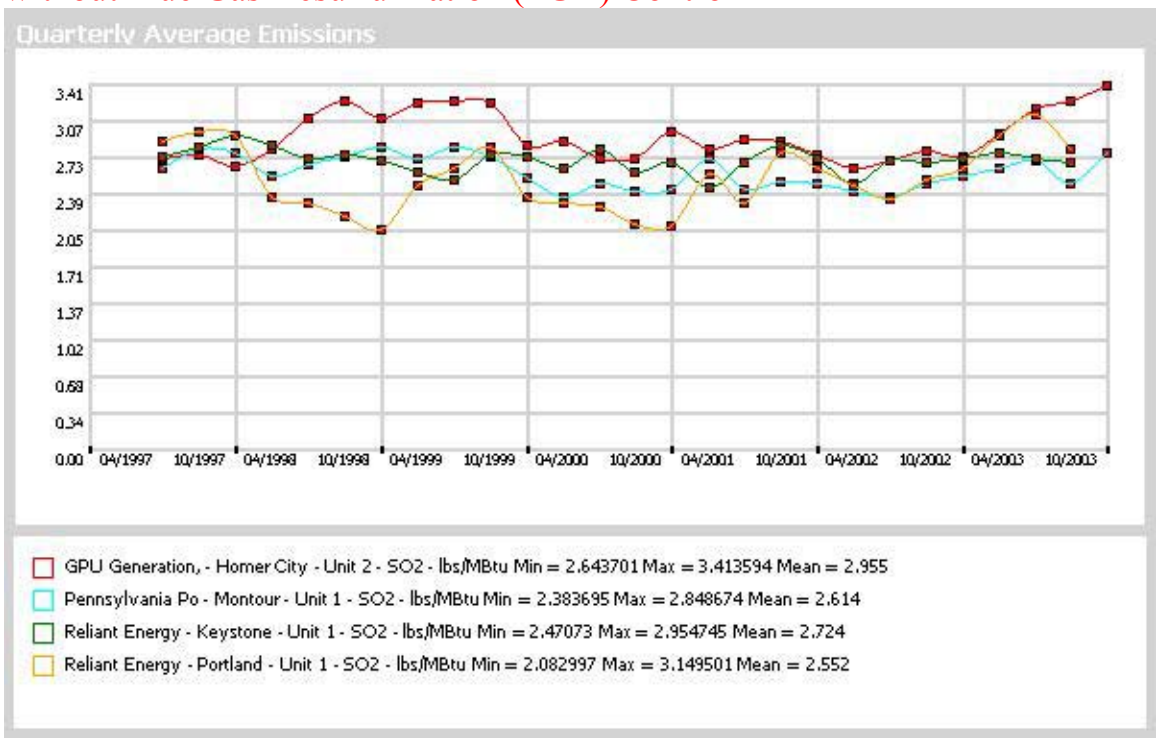
Anthracite Waste Coal SO2 (LBS/MMBtu) with Limestone Injection



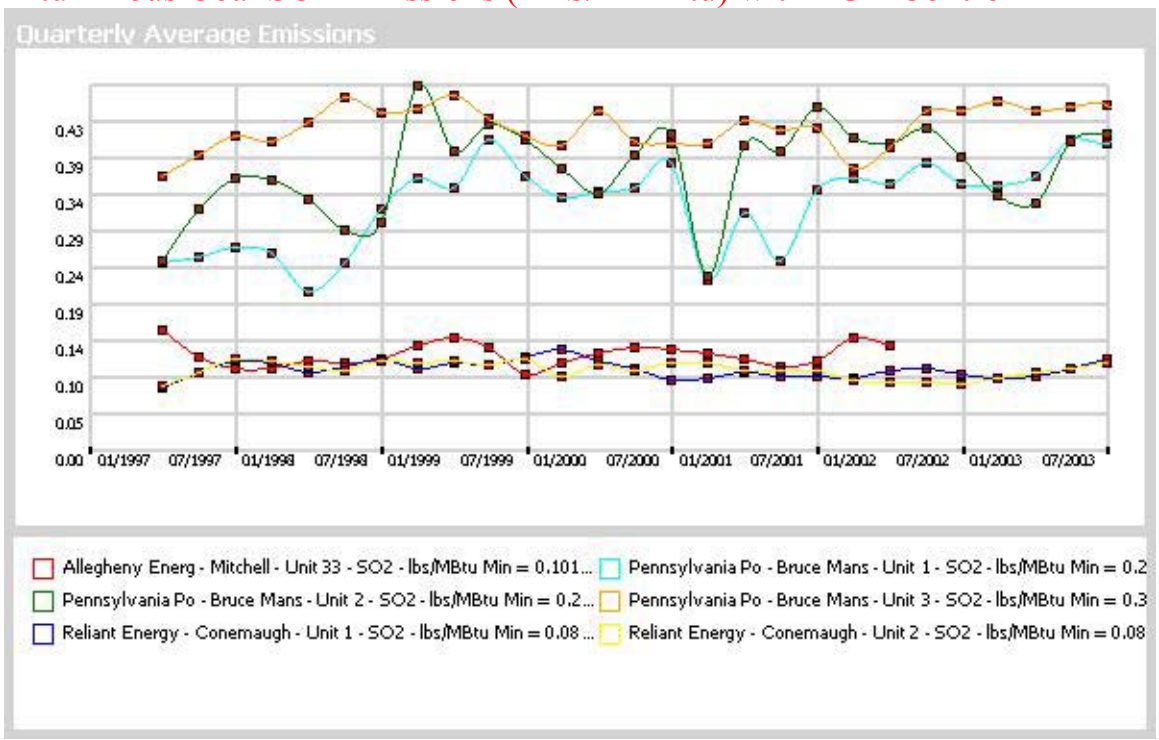
Bituminous Waste Coal SO2 (LBS/MMBtu) with Limestone Injection



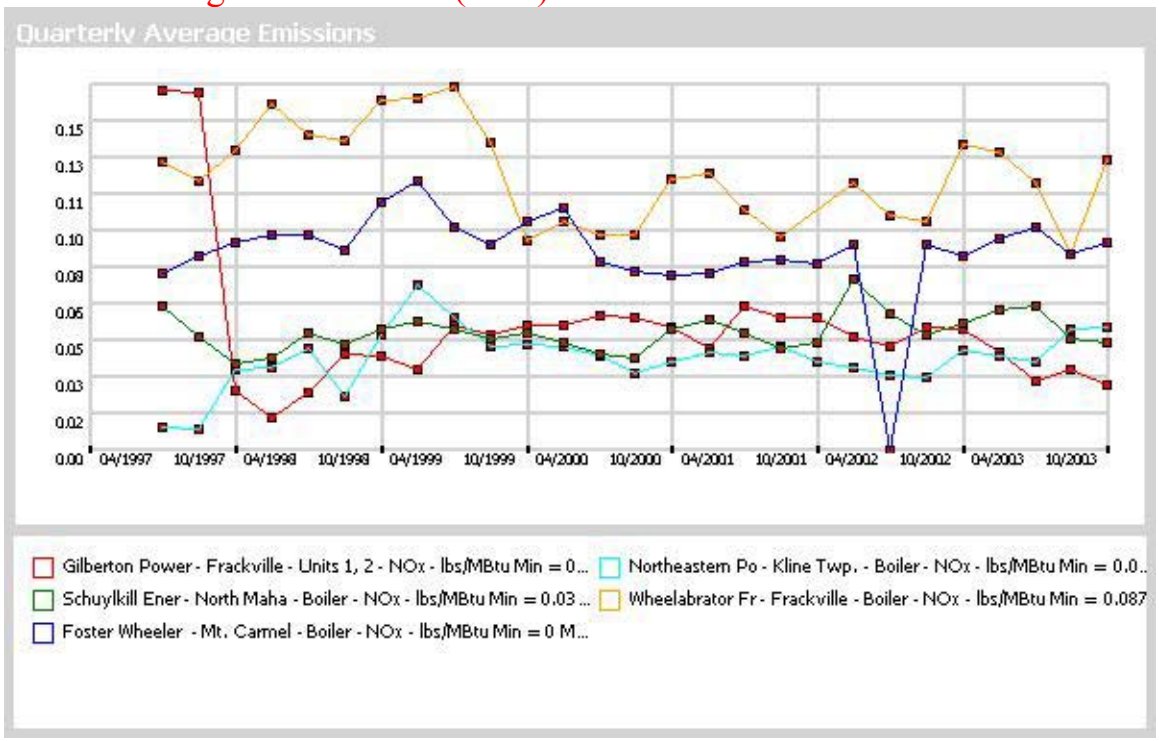
Bituminous Coal SO2 Emissions (LBS/MMBtu) without Flue Gas Desulfurization (FGD) Control



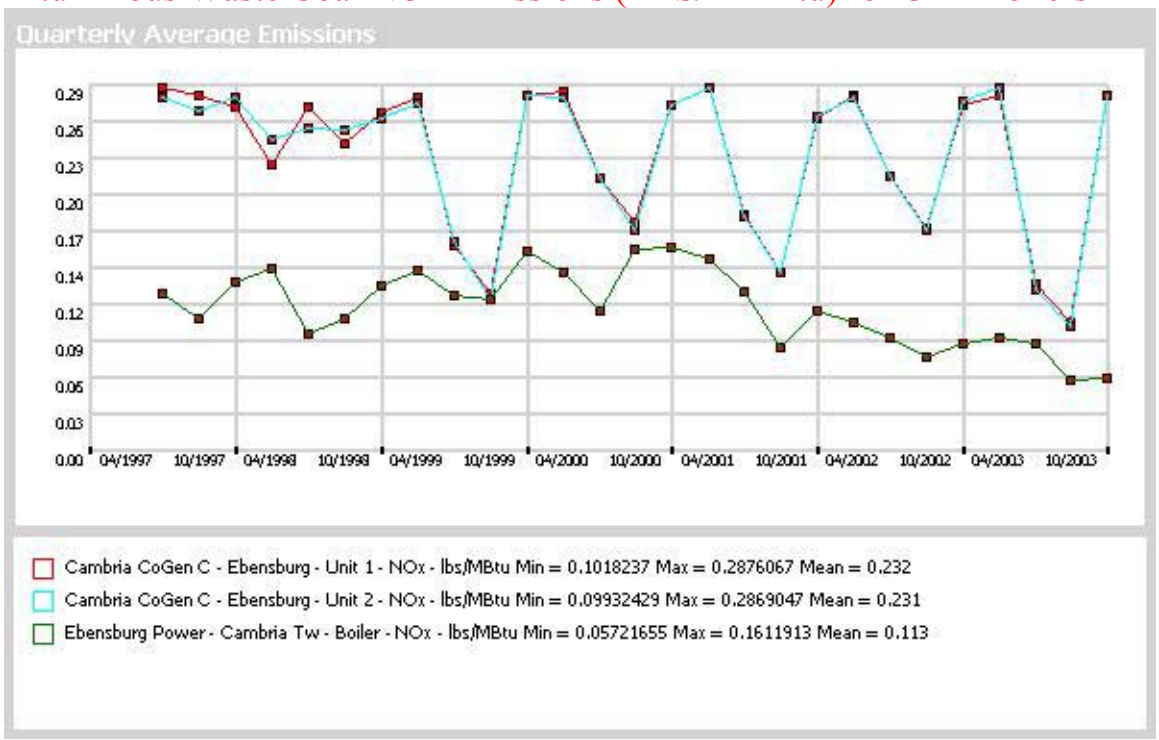
Bituminous Coal SO2 Emissions (LBS/MMBtu) with FGD Control



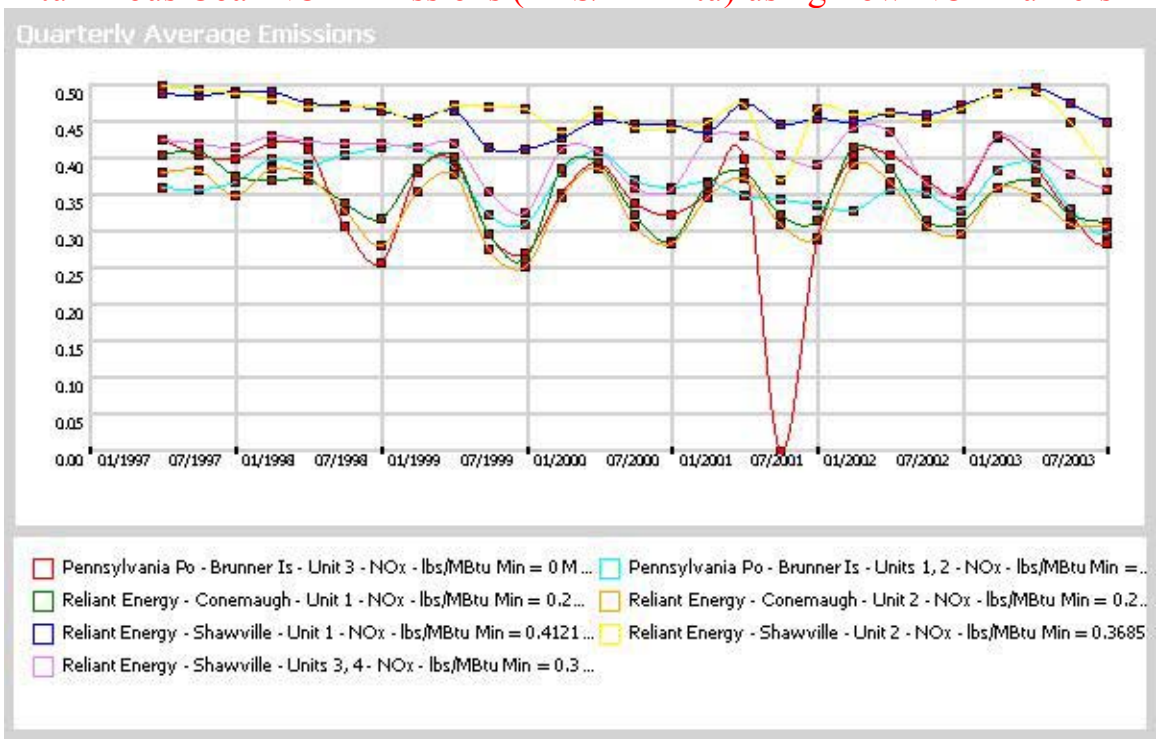
Anthracite Waste Coal NOx Emissions (LBS/MMBtu) for Circulating Fluidized Bed (CFB) Boilers



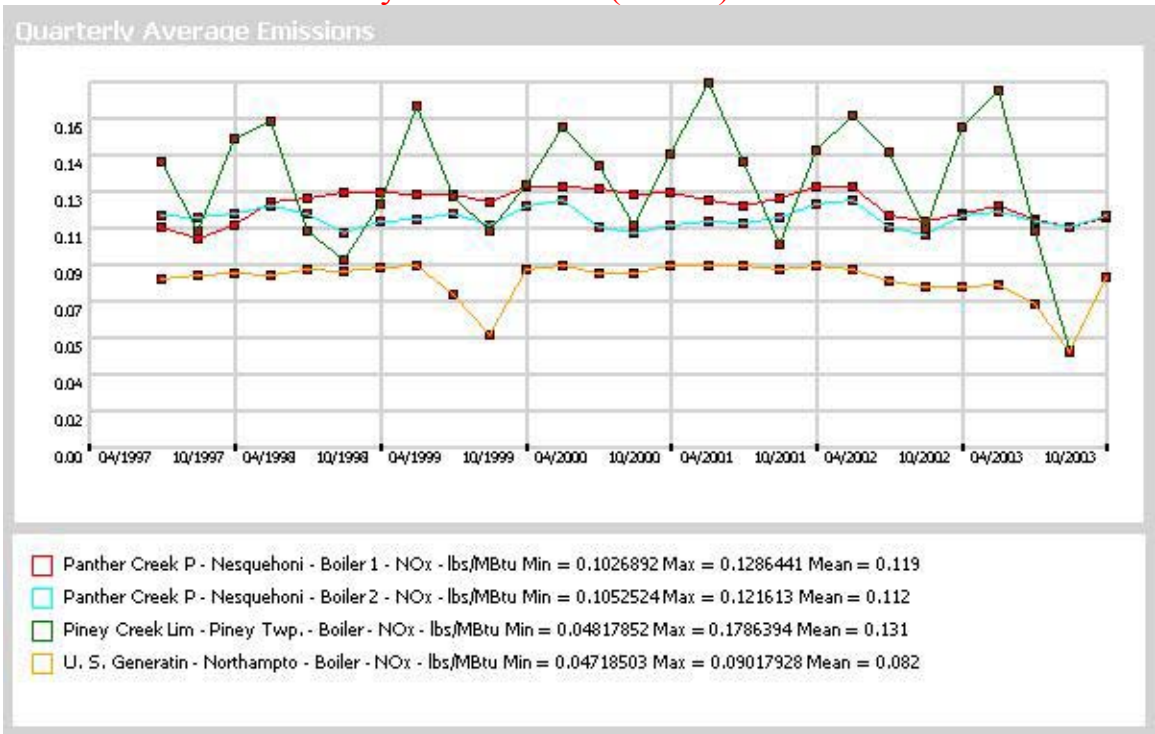
Bituminous Waste Coal NOx Emissions (LBS/MMBtu) for CFB Boilers



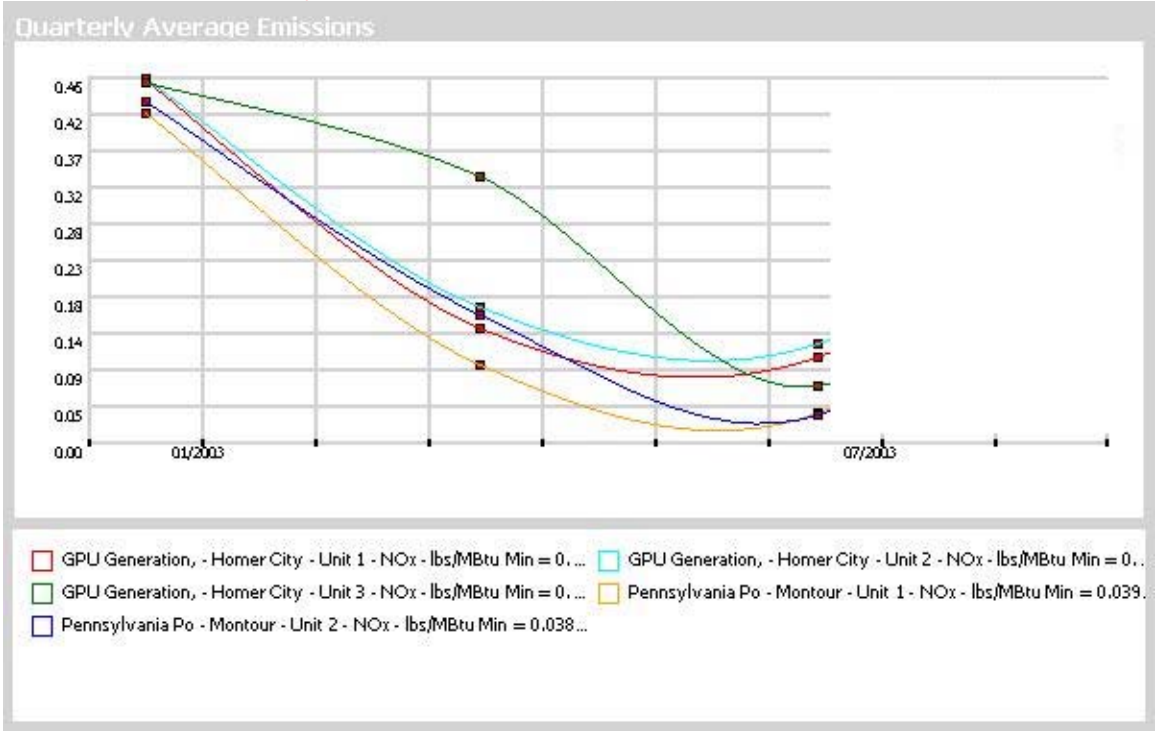
Bituminous Coal NOx Emissions (LBS/MMBtu) using Low NOx Burners



Waste Coal NOx Emissions (LBS/MMBtu) with Selective Non-Catalytic Reduction (SNCR) Controls



Bituminous Coal NOx Emissions (LBS/MMBtu) with Selective Catalytic Reduction (SCR) Controls



Note: No Data After 07/2003