

## **Appendix A-2**

### **Combustion Turbine Emission Rate Calculations**





### Natural Gas Sulfur Content

(Based on measurements taken between November 1, 2006 and September 30, 2008)

<b>Averaging Period</b>	<b>1hr</b>	<b>3hr</b>	<b>24hr</b>	<b>Annual</b>
Sulfur Content of NG - volume basis (ppmv)	35.6	35.6	32.8	18.0
Sulfur Content of NG - mass per volume (gr/100cf)	2.07	2.07	1.909	1.049
Higher Heating Value of NG (Btu/cf)			1024	
lb SO2/MMBtu	0.0058	0.0058	0.0053	0.0029
density of NG (lb/ft3)			0.044	
Sulfur Content of NG - mass basis (gr/lb)	0.470	0.470	0.434	0.238

## Natural Gas Sulfur Content Data Sources

In order to determine SO<sub>2</sub> emissions from sources combusting natural gas (the CTs, duct burners, and auxiliary boiler), it was necessary to determine the maximum short-term average (hourly and daily) and long-term average sulfur contents of the pipeline natural gas. The natural gas pipeline delivers natural gas produced in British Columbia, Canada. Sulfur content data were collected from both the Canadian (Spectra Energy Transport) and the U.S. (Williams) pipeline companies responsible for delivering the fuel from the natural gas fields in northern British Columbia to Grays Harbor County in Washington.

Daily and annual average sulfur contents were calculated using data obtained from an analyzer operated by Williams in Sumas, Washington, as well as data provided by Spectra Energy Transport, obtained from their analyzer in Huntingdon, British Columbia. Daily average data from the Sumas analyzer covered the period from November 1, 2006 to October 31, 2007, and data from the Huntingdon analyzer covered the period from October 1, 2007 to September 30, 2008. The average daily sulfur concentration was 1.049 grains per 100 standard cubic feet of natural gas (gr/100 scf), which was used to calculate annual average SO<sub>2</sub> emission rates. The maximum daily average, 1.909 gr/100 scf was used to calculate maximum daily SO<sub>2</sub> emission rates.

Hourly data were obtained from the Sumas analyzer for the period from October 1, 2007 to September 30, 2008. Spectra provided 8-minute average data from the Huntingdon analyzer for periods where the Sumas data exhibited atypical short-term fluctuations in sulfur content. Where appropriate, the Spectra data were converted to hourly averages and substituted for the Sumas data. The maximum hourly average value was 2.07 gr/100 scf; this value was used to calculate both 1- and 3-hour average SO<sub>2</sub> emission rates.