

## **Appendix F**

Refinery Fuel Gas Total Reduced Sulfur (TRS) Data

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#### TRS Background

While the BPH refinery's refinery fuel gas amine treatment system is extremely effective in removing hydrogen sulfide (H<sub>2</sub>S), it does not remove other sulfur species such as methyl mercaptan (CH<sub>4</sub>S) which are present in some refinery fuel gas streams, especially in the fuel gas produced from Coking units.

Non-H<sub>2</sub>S sulfur species in refinery fuel gas streams have not traditionally been monitored or specifically regulated in the refining industry (e.g.; only H<sub>2</sub>S is monitored is required per NSPS Subparts J and Ja). However, in recent years, industry and US EPA have become aware of the potential for significant quantities of non-H<sub>2</sub>S sulfur in some refinery fuel gas streams.

#### Toledo TRS Test Results

BPH recently conducted a testing program to measure the total amount of sulfur, including Total Reduced Sulfur (TRS) in the BPH refinery fuel gas streams. The data from this Toledo refinery testing provides a more accurate basis for estimating past actual and future potential SO<sub>2</sub> emissions from heaters versus the historic method utilizing only fuel H<sub>2</sub>S data.

The BPH Toledo refinery conducted testing of TRS in the fuel gas system during three different testing periods (Nov. 2010, Feb. 2011, and May 2011). Each of the three testing periods consisted of at least 50 hours of continuous monitoring of TRS. Table F-1 shows the results for each of the refinery's three refinery fuel gas systems. These TRS results include H<sub>2</sub>S and non-H<sub>2</sub>S sulfur.

As shown, the highest TRS values were found in the Coker 3/EPA fuel gas stream. The intermediate concentrations of organic sulfur compounds found in the TIU fuel gas are believed to result primarily from Coker fuel gas that becomes a constituent of the TIU fuel gas.

**Table F-1 Average Refinery Fuel Gas TRS Testing Results**

<b>Test Date</b>	<b>Average Test Results (TRS ppm<sub>v</sub>)</b>		
	<b>East Side Mix Drum</b>	<b>TIU Mix Drum</b>	<b>Coker 3/EPA Fuel Gas</b>
November 2010	35	192	272
February 2011	Not tested	190	460
May 2011	Not tested	329	372
<b>Average (used for Past Actual calculations)</b>	<b>N/A</b>	<b>237</b>	<b>368</b>
<b>Approx. Future TRS with TFO project planned improvements</b>	<b>N/A</b>	<b>Approx. 70 (annual average)</b>	

**TFO Project Improvements affecting TRS**

As part of the TFO project, BPH will implement improvements to the Coker gas processing to provide better recovery of light hydrocarbons and organic sulfur compounds that currently enter the refinery fuel gas system. Reducing the amount of organic sulfur compounds in the refinery fuel gas system will lower SO<sub>2</sub> emissions from many refinery heaters. BPH estimates that the total sulfur in both the Coker 3 and TIU fuel gas streams will be reduced to approximately 70 ppm on an annual average basis.