Improving Incinerator Operation With Advanced Flue Gas Analysis.

BACKGROUND

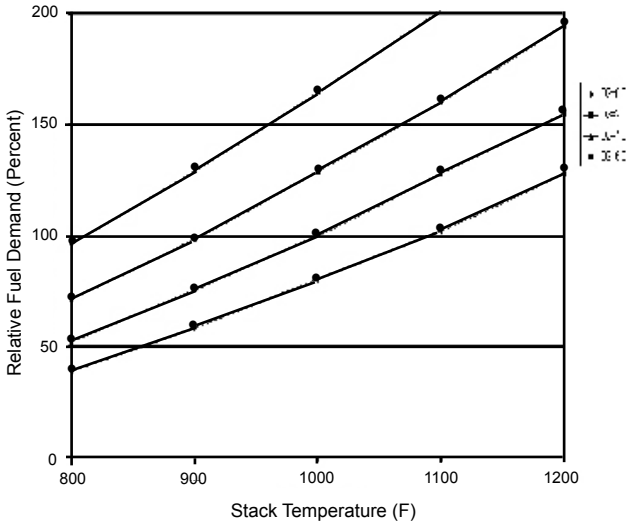
Sulfur plant tail gas incinerators are used to oxidize sulfur compounds that cannot be released directly into the atmosphere. These sulfur compounds include H_2S, COS and CS_2. Incinerators are operated at temperatures that are sufficient for oxidation of the sulfur compounds to SO_2 as well as providing the required mechanism for proper plume dispersion.

Sulfur plant incinerator control is typically based on a closed loop control on the fuel gas flow providing the incinerator temperature required. Natural draft dampers that are manually opened or closed traditionally supply combustion air. Modern incinerator design incorporates forced draft air for combustion air. This allows closed loop temperature control where combustion air is provided based on the required ratio to fuel gas. Closed loop control based on excess oxygen can be used to optimize fuel gas control.

OPTIMIZING SULFUR INCINERATOR OPERATION WITH AN IN SITU OXYGEN ANALYZER SULFUR

Ideal operation of these incinerators is to provide an excess of oxygen in the flue gas stream that ensures complete oxidation of all sulfur compounds to SO_2. Sulfur plant incinerators are typically operated with excess oxygen levels of 6 to 10 percent.

The recommended operating range for excess oxygen is 2 to 5 percent. Operating below 2 percent may result in insufficient oxidation of the sulfur compounds to SO_2. This may result in a violation of the allowable concentrations of H_2S, COS and CS_2 allowed in the incinerator effluent. Operating above 5 percent will result in an excessive use of incinerator fuel gas. Figure 1 illustrates the relationship between relative fuel demand, stack temperature and excess oxygen concentration.



Relative Fuel Demand for Sulfur Plant Stack Operated at Various Temperatures and O_2 Concentrations

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OPPORTUNITY

The most significant advantage of operating within the recommended range is two-fold:

Operating above the minimum recommended 2 percent excess oxygen would ensure proper oxidation of sulfur compounds.

Operating below the maximum recommended value of 5 percent will provide a reduction in fuel gas usage from typical operating ranges of 6 to 10 percent.

An added bonus of operating with a decrease in excess oxygen is the reduction CO_2 (a greenhouse gas) emissions associated with a decrease in fuel gas consumption.

SOLUTION

It is possible to monitor excess oxygen concentrations within the sulfur plant incinerator by using the zirconium-oxide measurement principle. Zirconium oxide is an in situ measurement that provides a fast and reliable outlook on what is happening within the sulfur plant incinerator. To counteract the poisoning affect that SO_2 has on standard zirconium-oxide sample cells, new sulfur resistant cells are available.

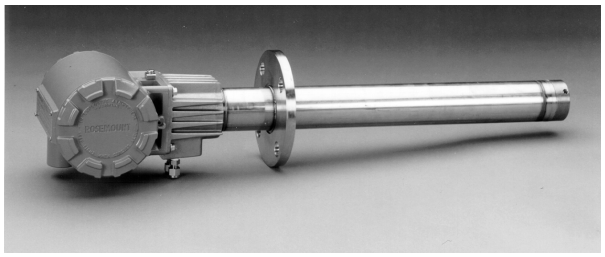
Instrumentation that will allow the optimal monitoring and control of the sulfur plant incinerator include:

SUMMARY OF BENEFITS

Environmental:
- Reduction in fuel gas consumption.
- Reduction in greenhouse gas emissions.

Economics:
- Reduction of fuel gas consumption.
- Reduction in combustion air blower requirements.

Analyzer Performance:
- 0.75% of reading or 0.05% O_2.
- Withstands high sulfur process gases.



Direct Replacement Oxymitter Probe to provide a more accurate and reliable measurement without replacing existing electronics. Works with all Westinghouse and Rosemount Analytical electronics. Also works with the following competitor's electronics: Yokogawa ExaOxy and ZA 8A,Thermox 215 model, Enotec SME 5, Fujii and COSA.

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