APPLICATIONS

Energy Savings on Process Heating Units

The Customer

This specialty chemical company is a leading supplier of performance polymers. Their products are used in a wide range of applications including adhesives, coatings, consumer and personal care products, sealants, lubricants, medical, packaging, automotive, paving, roofing and footwear products.

The Project

The company was increasing the production capabilities of one of its four polymer process lines. The increase in production capabilities would come from the upgrade of several process heating sources such as heat exchangers, and dryers, as well enhancing the safety of these systems to accommodate increased production loads.

The company worked with the Regional EPA in their Pollution Prevention (P2) Program to add an appropriate-sized oxidizer and enhance their flare operations for its increased production capabilities and to upgrade their LFL monitoring system on their batch dryer for safety reasons.

The goal was to increase energy efficiencies and optimize productivity while reducing emissions, thus saving money.

The polymer production process reacts with various VOCs including styrene, butadiene and isoprene in organic carrier solvents. The VOC and particulates are emitted from this manufacturing process. This process includes storing, blending, mixing, batching, drying and packaging. Depending upon where in the process the VOCs are emitted from, the VOC emissions are controlled by either a flare or a catalytic oxidizer.

The company is considered a “major” source (those that have the potential to emit 10 tons/year or more of a listed pollutant or 25 tons/year or more of a combination of pollutants) and therefore requires the use of MACT (Most Achievable Control Technology) control efficiencies.

As defined as a major source, the permit requirement was initially to achieve >98% destruction efficiency on the flare and a > 95% destruction efficiency on the oxidizer.

The Scope of Work

The company planned to use a continuous Total Hydrocarbon (THC) monitor on their catalytic oxidizer to track their annual VOC emissions on an hourly basis. This would not only give them real-time data of their annual emissions, but it also would help them understand their short term emission limits. This monitoring would give them a real indication of their emissions, giving them more flexibility in making changes to their process than calculations would have produced.

The Company then planned to use a real-time continuous BTU analyzer to read the lower heating value of their waste stream going into their flare. The intent would be to inject natural gas into the flare gas stream if the heating value of the waste stream were to drop below 350 BTU/scf to keep the flare operating >98% destruction efficiency.

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On their batch dryers, the company decided to upgrade their LFL analyzers to measure the % LFL in the dryer stream that removes low levels of hydrocarbon solvent from their product. This would allow the dryers to be shut down quickly in the case that the % LFL may get too high.

The Solution

In all cases, the company chose to use Control Instruments' Gas Detection Analyzers due to their ability to read multiple gases at different concentration levels accurately under rugged industrial conditions. All products operate on the same platform, providing for ease of operation and maintenance.

The Model 650 FID was used to measure the total hydrocarbons at the outlet of their oxidizer for destruction efficiency assurance in accordance to CFR40 Part 60 Method 25A. It is heated up to 200°C and mounts right on the ductwork for accurate and efficient monitoring.

The CalorVal BTU Analyzer was used to monitor the lower heating value of their varying waste stream accurately and quickly in order to be used in their control scheme to inject natural gas as necessary according to EPA's CFR 60.18. This analyzer is a stand-alone, fully- heated analyzer that keeps all VOCs and water in vapor form providing for the most accurate BTU measurements while eliminating problems due to corrosion.

The PrevEx Flammability Analyzers were installed on their process dryers to read their varying gas composition on their batch dryers extremely accurately and quickly. Its fail-safe design and quick response time of < 1sec ensures proper safety while allowing optimum production levels to be made.

The Results

Their production increase yielded an increase of emissions from ~ 15 tpy to ~ 45 tpy. After 2.5 years of providing continual results to the EPA, the company has been able to show dramatic cost savings and high efficiencies of their processes:

- Flare - They have found that their waste gas is typically ~ 600 BTU/scf, which means that they do not need to use any natural gas to keep their flare operating! They are sustaining their flare from their own process gases.
- Oxidizer - They have continuously proven by using the readings of the Model 650 FID that their Catalytic Oxidizer is operating effectively and abating their VOCs at lower temperatures, and have thus been allowed to reduce the Destruction Efficiency rating from >95% to 90%; which is another dramatic fuel savings, not to mention a huge savings on catalytic bed replacement!
- Dryers - By upgrading the LEL systems, they have been able to increase product throughput of their process accurately and safely, which has resulted in improved delivery times.

Having realized concrete results, the customer has since installed more analzyers on their additional processes lines.