

Recuperative Thermal Oxidizer Provides Energy Savings at an LFG Facility While Destroying VOCs

Synopsis

The energy provider for the Tri-state area offered significant financial incentives to reduce gas and electric consumption to avoid capital expenditures necessary to add capacity. After leasing an oxidizer system from Pollution Systems for VOC abatement and seeing notable energy reductions, a landfill gas (LFG) facility wanted to implement a more permanent solution.

Initial Operating Issue

This alternative electric power generation facility had been leasing a Direct-Fired Thermal Oxidizer from Pollution Systems for approximately two (2) years at their LFG site in the Northeast. An energy study done on the site identified significant energy savings with very good payback. They reached back out to Pollution System to find a permanent abatement system that could help them advance their facility's energy savings while reducing their emissions.

The facility had multiple waste streams from the reclamation of landfill gas tanks, bioreactors, and media beds to oxidize. The client wanted to combine them to be treated by a single, permanent oxidizer system to reduce energy usage.

Critical performance goals for the customer were:

- VOC destruction rate efficiency (DRE) of 99% or 10 ppm as Methane @ 3% O₂
- Long-term continuous system operation with low maintenance and operating costs
- Automated operations with minimal interface requirements and
- Cost-effective, reliable design



Proposed Solution

After carefully reviewing the process application, Pollution Systems recommended installing a Recuperative Thermal Oxidizer with a 70% thermally efficient primary heat exchanger to preheat the incoming waste stream. A secondary heat exchanger (70% thermal efficiency) would function to reduce the preheat load for the siloxane purge process.



The Technology: How it Works

Thermal Oxidizers are proven technology for waste gas streams requiring heat recovery and are also effective for waste gas streams that contain particulates, like this process. By incorporating a heat exchanger with a combustion chamber, Recuperative Thermal Oxidizers can handle a wide range of process flow rates and VOC

concentrations. The heat exchanger preheats the VOC-laden air before entering the combustion chamber to reduce operating costs.

Implementation

Pollution Systems' engineering team designed and built a Recuperative Thermal Oxidizer Model #TO-5 RHE with a secondary heat exchanger sized to process the 4800 SCFM of VOC and siloxane-laden stream at a $\geq 99\%$ destruction rate efficiency. The fully automated system meant ease of startup and minimal operator interaction. The TO-5 RHE system's two (2) shell and tube heat exchangers also incorporated easy access doors for necessary, periodic cleaning of the tubes. With few significant moving parts other than system fans, the Recuperative Thermal Oxidizer provided very high on-stream time and met the facility's desire for long-term, continuous operation with low maintenance.

Results

Once installed, Pollution Systems successfully commissioned the unit on the process and trained the customer regarding its maintenance and operation. The Recuperative Thermal Oxidizer successfully abated $\geq 99\%$ DRE of the VOC from the multiple waste streams sent to the oxidizer for treatment. Overall, the customer was pleased with the cost, ease of operation, and reliability of the oxidizer system.

