



Gulf Coast Environmental Systems

CASE STUDY

REFURBISHED THERMAL OXIDIZER
CHEMICAL | MARCH 2019

NUCLEAR POWER

Employees: 3,700
Industry: Specialty Chemical/Materials
Project Type: Chemical
Project Goal: A quickly commissioned pollution control solution
Location: Louisiana
Equipment Type: Refurbished Thermal Oxidizer

EXECUTIVE SUMMARY:

Gulf Coast Environmental Systems was tasked with finding a pollution control solution for a chemical application, which has an unusually tight timeline.

CLIENT OVERVIEW:

This customer manufactures and sells high-performance specialty chemicals and materials. One of the largest chemical providers in the world, this company operates in two separate segments; Catalyst Technologies, and Materials Technologies. Catalyst Technologies provides fluid catalytic cracking (FCC) catalysts to produce petroleum-based fuels, like gasoline and diesel. They also supply methanol-to-olefins catalysts for the conversion of methanol into petrochemical feeds, like ethylene and propylene.

PROJECT OVERVIEW:

Facing a tight timeline, the customer contacted Gulf Coast Environmental Systems (GCES) to assist with providing a 6,000 SCFM thermal oxidizer. GCES was able to locate an existing used system which, when retrofitted for the customer's process stream, would efficiently address their industrial air pollution and Class 1, Div. 2, Group D, T3, outdoor classification needs.



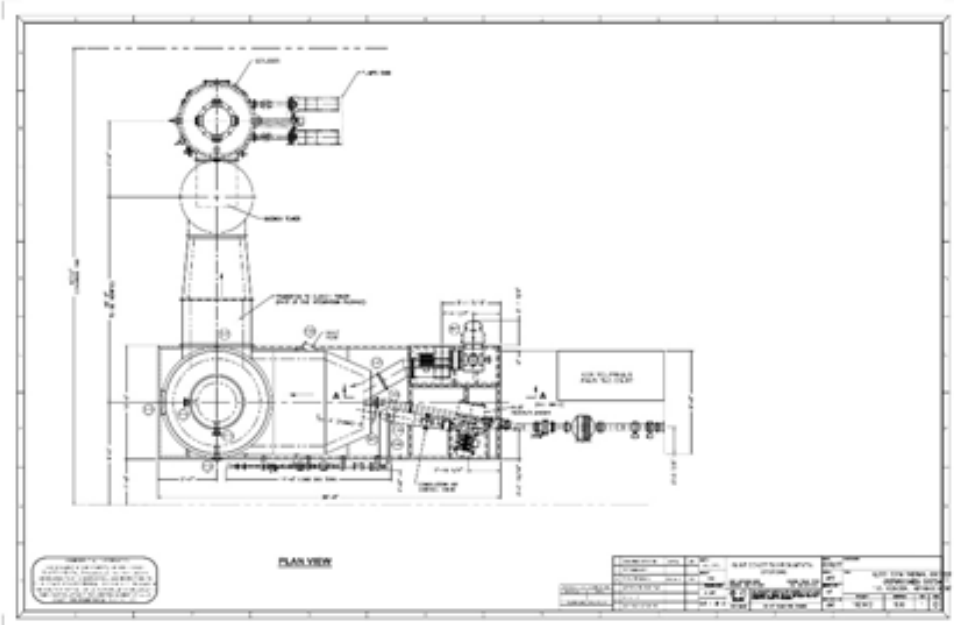


SOLUTION:

Recognizing that there was a very tight window to complete this project, GCES worked with the customer's team to quickly engineer, retrofit, install, integrate, and commission the thermal oxidizer chosen. GCES preemptively began working on the engineering before ever taking receipt of the components used to renovate the refurbished thermal oxidizer. Utilizing pictures, drawings, and specifications provided by the customer, GCES began procuring parts, programming the new control panel, and creating the connections that would exist between the thermal oxidizer, the existing boiler and scrubber, and the plant. GCES used a combination of the new equipment and components, as well as elements from an existing newly built unusable thermal oxidizer provided by the customer to retrofit the used thermal oxidizer in a 30-day time period. Our fabrication team of expert welders and electricians built or purchased new components for the oxidizer, such as a Hastelloy quench tower, a modern control panel capable of reading and responding to changes in reactions from the existing boiler and scrubber on site, new valves, gauges, etc. to retrofit and refurbish the used pollution control unit. Designed for high heat and highly corrosive environments, the integration of the quench tower included a transition and scrubber bypass damper. This responsive engineering and planning enabled GCES to meet the 30-day shipping goal providing the client with a custom solution within their tight deadline.

Thermal Oxidizer (TO) Method of Abatement:

The method of reduction of Volatile Organic Compounds revolves around thermal oxidation. The chemical process of thermal oxidation is quite simple; the exhaust stream temperature is raised to a point that the chemical bonds that hold the volatile organic molecules together are broken. The VOCs in the process exhaust stream are converted to carbon dioxide, H2O, and thermal energy by the high temperature of the combustion chamber.

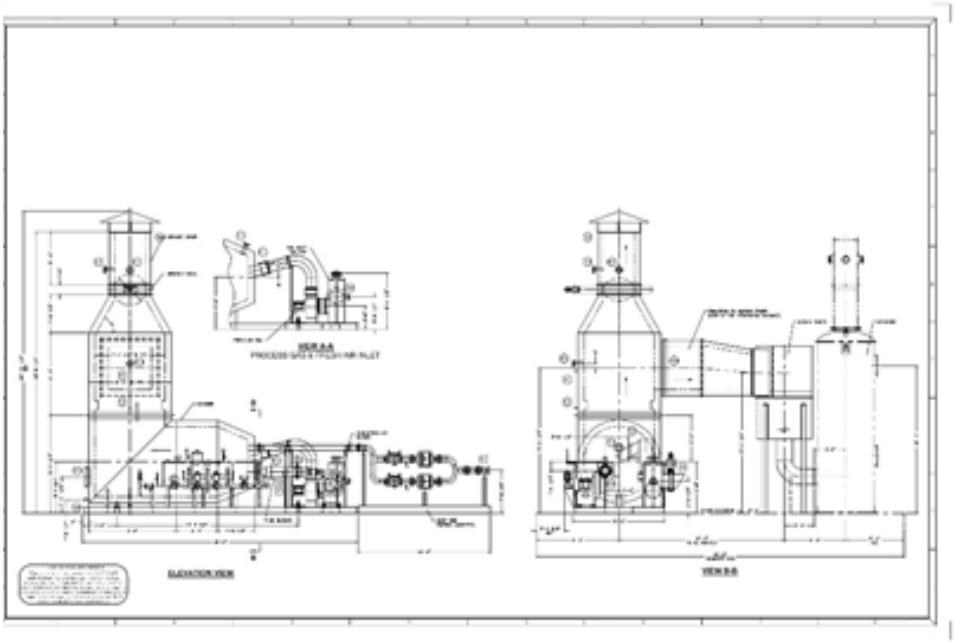






HCl Acid Gas Quench & Scrubber Method of Abatement:

In a wet scrubber, water or scrubbing liquid is the media which removes pollutants from the dirty incoming air. The contaminated air enters the bottom of a countercurrent vertical packed tower scrubber. Water and basic or acid solution is sprayed in the top of the tower. The acid or caustic gases are absorbed by the solution as the air passes up the column.



The air passes through a mist eliminator section to remove entrained water before exiting the scrubber column. When the water is re-circulated, addition of fresh water is necessary to purge contaminants that accumulate and to replace evaporation losses. Fresh water may be added to the recycle reservoir either continuously or on a periodic basis.

A sodium hydroxide solution and reducing agent (sodium sulfite, bisulfite, or metabisulfite) is added to the re-circulating water to neutralize the remaining HCl and Cl2 producing a near-neutral salt solution that can be discharged to the sewer. The basic addition shall occur as required based on a pH controller. A slightly negative Oxidation Reduction Potential (ORP) shall also be maintained by a ORP controller.

Watertube Boiler:

Water is circulated in tubes that are heated externally by the by-products of combustion, or flue gas, in a watertube boiler. Watertube boilers are safe in design and have the ability to reach very high temperatures with the use of superheaters. Economizers are often preferred to recover as much waste heat as possible from the boiler.





COMPLETION:

In order to minimize downtime and finalize the interface with all other components of the customer's facility, GCES provided an on-site GCES service team member to continue to fine tune the integration, complete the installation, and finalize the commissioning of all GCES provided pollution control component. This process took about 6-weeks, all of which spent on-site. Simultaneously, our engineering team finalized all procedures, manuals, and documentation required for regulatory compliance, safety, and effective operation of all equipment and components.