



Gulf Coast Environmental  
Systems

## CASE STUDY

VAPOR COMBUSTOR UNIT  
TANK TERMINAL | MAY 2019

### TANK TERMINAL

**Employees:** 5,700

**Industry:** Chemical and Gas Storage

**Project Type:** Tank Storage

**Project Goal:** Providing efficient pollution control for tank storage facility

**Location:** Deer Park, TX

**Equipment Type:** Vapor Combustor Unit

### EXECUTIVE SUMMARY:

Gulf Coast Environmental Systems was tasked with finding a pollution control solution for a tank terminal located near Houston, TX.

### CLIENT OVERVIEW:

This customer is the world's largest independent tank terminal operator specializing in the storage and handling of liquid and gaseous chemical and oil products with 69 tank terminals in 25 countries around the world. The facility we were asked to provide a solution for is located in Deer Park, TX on the Gulf of Mexico. This terminal currently holds 243 tanks that store a number of biofuels, chemicals, petroleum products, base oils, and lubricants.

### PROJECT OVERVIEW:

Gulf Coast Environmental Systems has extensive experience providing pollution control solutions to tank terminals. Tank terminals are a unique application, because the tanks hold several different gases, chemicals, and oils, all emitting different VOCs. This particular customer contacted us in regard to a very large tank terminal near the Port of Houston, which holds over 7,800,000 barrels of material. This equipment would need to abate ethanol and biodiesel vapors and provide 99.9% DRE. With the presence of the water vapor along with this group of VOCs and compounds, choosing an appropriate method of abatement was crucial for performance and safety requirements.



## SOLUTION:

After reviewing the VOCs in the tank and the amount of potential moisture, it was decided that a Vapor Combustor Unit (VCU) would be the best available technology for this specific application.

The VCU design for this customer is capable of processing up to 70,000,000 british thermal units per hour (btu/hr) of waste vapor.

The method of reduction of Volatile Organic Compounds (VOCs) in a Vapor Combustor Unit (VCU) revolves around thermal destruction. The chemical process of vapor combustion is quite simple; the exhaust stream temperature is raised to a point that the chemical bonds that hold the molecules together are broken. The VOCs in the process exhaust stream are converted to various combinations of carbon dioxide (CO<sub>2</sub>), water (H<sub>2</sub>O), and thermal energy by the high temperature of the combustion chamber.



The VCU for this project is heated by an independent burner package in a vertical refractory-lined steel chamber. A small blower was provided to direct fresh air to the burner assembly for purging the system prior to ignition and to cool the burner assembly during operation.

Heat from combustion then induces a natural draft to help bring in the required amount of cooling air through a dilution air fan. The cooling air is required during periods in which the vent gas has sufficient heating value to raise the VCU operating temperature above the operating set point.



The VCU chamber was lined with high temperature ceramic fiber insulation to protect the carbon steel shell. Soft refractory lining was installed to allow for rapid heat up without thermal shock issues that would accompany hard refractory designs. Soft refractory undergoes minimal expansion and contraction and is ideal for applications such as this, that require high levels of on/off or cyclic operation.

Different than a potential condition inside a Thermal Oxidizer, a VCU processes a vent stream that is not flammable until it reaches the inside of the VCU combustion chamber. The waste gas either contains very little to no oxygen or is inerted out of any flammable ranges before entering the destruction chamber. A Thermal Oxidizer often processes waste gases where make-up air is the best option to get the vent stream to below 50% of the Lower Flammability Limit (LFL).



With most tank terminals housing hundreds, if not thousands of storage tanks, uptime and reliability is of the utmost importance. These tanks store potentially dangerous and toxic petrochemicals and liquids that when not properly stored and handled become incredibly dangerous. When gases and vapors collect, they increase the risk of explosion or dangerous chemical fires. These explosions then allow these chemicals to be released into the air endangering the lives of the surrounding communities and wildlife as well as increasing the risk of expensive fines or shut-down. A Vapor Combustor Unit is the perfect solution to handle and abate these risky compounds and save tank terminals a lot of unnecessary stress.



## COMPLETION:

The team at Gulf Coast Environmental Systems was able to use their extensive experience in the oil and gas industry to design the perfect system for this customer. GCES continues to maintain and service this equipment which has been in continuous use since installation.