EXECUTIVE SUMMARY:

Gulf Coast Environmental Systems was tasked with finding an odor control solution for a fishmeal processing facility in the Northwestern United States.

CLIENT OVERVIEW:

This customer is a fishmeal processing plant in the Northwestern United States. This facility processes fish waste that would otherwise be thrown out, and turns it into fish meal, fish oil, fish soluble, and fish bone products. This customer prides themselves on their environmental initiatives and goals, and makes it a point to focus on supporting their local community and industry. This includes seeking out the best technologies available for odor control, and industrial sustainability. Gulf Coast Environmental Systems is proud to have had the opportunity to partner with an organization that has such a strong commitment to protecting natural resources.
This customer had a history of struggling to meet local odor control guidelines. However, they understood the importance of correcting these issues, to support their local residential communities and economy. They worked closely with the Regional Clean Air Agency and the Department of Ecology (DOE) to define exactly what was required, in order to meet their goals. They required a quick solution to their odor issues, so a pre-owned solution presented the best opportunity for efficiency, timing, and cost.

**SOLUTION:**

Gulf Coast Environmental Systems looked at the customer’s process, timeline, sustainability goals, and the regulatory requirements, and determined a pre-owned 20,000 SCFM 3 canister Regenerative Thermal Oxidizer was the most cost effective and best available technology. This unit was first built and commissioned in 1994, and was in excellent condition. GCES spent the time refurbishing and customizing the unit to meet the customer’s specific needs. A new fan, gas train, and burner were added, as well as extra media for heat recovery.

A Regenerative Thermal Oxidizer was chosen for this application, because they excel in odor control. This is because RTOs offer low operating costs for these high air flow, low volatile organic compound (VOC) fume streams. Rather than allowing the clean hot air to exhaust to atmosphere, the RTO unit captures up to 95% of the heat prior to exhausting it to atmosphere.

### Application Stream:
- Cooking Odors

### Process Stream Volumes:
- 20,000 SCFM @ 70°F

### Normal Operating Temp:
- 1,400°F

### Maximum Chamber Temp:
- 1,800°F

### Heat Exchanged Efficiency:
- 90%

### Destruction Removal Efficiency:
- 99%

### Oxidizer Location:
- Outside

### Fuel Choice:
- Natural Gas

### Electrical Voltage:
- 480V / 60Hz / 3 Phases

### VOC Type:
- Odorous Non-condensables
An RTO works in a 2-step process...

Step 1: The RTO unit is brought up to combustion temperature using supplemental fuel such as natural gas, propane, diesel or bio-fuel. During this start up period, the RTO unit initially purges itself with fresh air and continues to process fresh air until it reaches combustion temperature equilibrium. The RTO unit is now ready to switch over to process air and begin the thermal oxidation of VOC with destruction efficiency up to 99%.

Step 2: The RTO switches from start-up mode, running on clean air, to operating on VOC process air from the source. To maximize heat recovery, the RTO will automatically cycle or alternate the inlet and outlet (see diagrams below) via a series of pneumatic valves.

Because the RTO is so efficient at reclaiming effluent heat, the units often times are capable of sustaining combustion temperatures without any supplemental fuel, utilizing the VOC as the only source of fuel.
A 3-can system was chosen for this application because of its high vapor, and low VOC content. The high DRE available, in excess of 99%, ensures the fish odor and remaining organic material is nearly completely destroyed. Through this process, this 3-can RTO converts the pollutants in the stream into carbon dioxide and water vapor, all while recovering thermal energy that is used to reduce the cost of operating the equipment. The process in which this is accomplished is very similar to that of a two-canister RTO. The exhaust stream, laden with odor causing VOC, enters the heat exchange bed using a high-pressure fan system. Here, the stream passes directly through the media, heating it in preparation for the combustion chamber. The combustion chamber then heats the stream further using burners, to the optimal temperature for combustion, in order to complete the oxidization process. After that, the clean stream is lead to the heat recovery chamber, where it passes through the media bed, which cools the air and heats the media. The final step, which makes the 3-can regenerative thermal oxidizer more efficient, occurs in the final chamber, where the chamber is purged with clean air. This final step is not available in a 2-can RTO, which is why a 3-can RTO can is a better option for this application.

The heat exchange media for this unit consisted of a chemically resistant ceramic media. The quantity of media and bed configuration allow this unit to reach 90% thermal recovery efficiency at the maximum design flow conditions. All of the media new, and the existing saddles in this pre-owned unit were only used as filler around the sides, due to the round canister design.

This RTO was already equipped with a natural gas injection system at the inlet to each of the canisters. After this unit is at temperature and in operation, the burner will turn off, and the natural gas injection system begins to operate as the principle fuel source for maintaining temperature in the RTO. The injection of natural gas in the unit will minimize the amount of NOx formation in the combustion chamber, as the natural gas is thermally oxidized with the VOC’S – and not combusted in the burner. The oxidation of the natural gas virtually eliminates formation of thermal NOx – thermal NOx formation is a constant concern in all combustion burners. The combination of a low NOx burner with natural gas injection assured an overall lower annual NOx emission from the RTO.
SUMMARY:

Summary: Gulf Coast Environmental Systems was thrilled to be able to provide an innovative and efficient technology to this customer, whose focus on environmental sustainability is such a big part of who they are as an organization. This RTO was refurbished at our Conroe facility, and is provided a reliable solution for decades to come.