LeDoux, Erica

From: Eric Quiat [equiat@zephyrenv.com]
Sent: Monday, July 01, 2013 4:52 PM
To: LeDoux, Erica
Cc: Tammy Lasater / FDDE; Robinson, Jeffrey; Magee, Melanie
Subject: RE: Formosa Plastics Corporation - Low Density Polyethylene Plant
Attachments: FPC TX Response to EPA 07-01-2013 LDPE GHG Application.pdf

Ms. LeDoux,

On behalf of Formosa, please find an attached response to your questions below on the LDPE GHG application deficiency letter responses. Please let us know if you have any other questions.

Regards,

Eric Quiat, P.E.
Project Engineer
Zephyr Environmental Corporation
2600 Via Fortuna, Suite 450
Austin, Texas 78746
512-579-3823 (direct)
512-329-5544 (main line)
512-329-8271 (fax)
www.zephyrenv.com

From: LeDoux, Erica [mailto:LeDoux.Erica@epa.gov]
Sent: Thursday, June 20, 2013 12:37 PM
To: Tammy Lasater / FDDE
Cc: Robinson, Jeffrey; Magee, Melanie
Subject: Formosa Plastics Corporation - Low Density Polyethylene Plant

Tammy,

Thank you for Formosa Plastics Corporation (FPC) response to the GHG Application Determination Letter for the Low Density Polyethylene (LDPE) Plant. Please provide written clarification to the following questions.

1) On page 3 of 7 and page 5 of 7 of the response provided by FPC, where FPC addresses the request for comparison data and supporting calculations for the assertions to the following design choices:

- Comparison of proposed LDPE process technology to similar emission units on production rates, energy demands, higher conversion rates (less reactants available for side reactions)
- Regenerative thermal oxidizer (RTO) with the unique natural gas system (NGS) that reduces natural gas consumption up to 20% (approximately 79,000 MMBTU/yr)
- Proposed plant design that reduces/minimizes LDPE plant waste gas to the flare by approximately 4.3 million tons /yr CO2e

The tables containing the comparison data identifies the emission units as A, B, and C. Please provide supplemental, non-confidential information that identifies the actual source for your information (e.g., literature, company, etc).

Thank you,

Erica G. Le Doux, Environmental Engineer
U.S. EPA Region 6
Air Permits Section (6PD-R)
1445 Ross Ave.
Dallas, TX 75202
Office: (214) 665-7265
Fax: (214) 665-6762
le doux.erica@epa.gov

Attachment

The following is provided in response to the information request in EPA email dated June 20, 2013. Each request for information is repeated below in bold italics followed by FPC TX response and supplemental information.

1. ***On page 3 of 7 and page 5 of 7 of the response provided by FPC, where FPC addresses the request for comparison data and supporting calculations for the assertions to the following design choices:***

   - ***Comparison of proposed LDPE process technology to similar emission units on production rates, energy demands, higher conversion rates (less reactants available for side reactions)***
   - ***Regenerative thermal oxidizer (RTO) with the unique natural gas system (NGS) that reduces natural gas consumption up to 20% (approximately 79,000 MMBTU/yr)***
   - ***Proposed plant design that reduces/minimizes LDPE plant waste gas to the flare by approximately 4.3 million tons /yr CO2e***

   The tables containing the comparison data identifies the emission units as A, B, and C. Please provide supplemental, non-confidential information that identifies the actual source for your information (e.g., literature, company, etc.).

   FPC TX Response: The information for LDPE process design configurations A, B, and C (as shown in Table 1 of the April 29, 2013 response letter) was obtained from documents a candidate process technology licensor provided FPC TX during license discussions. The specific literature containing the process technology options obtained from the licensor during those discussions is marked business confidential. The table FPC TX provided is an exact replica of the information in that business confidential document with the names replaced with design configuration identifiers A, B, and C.

   FPC TX obtained information regarding the natural gas system features and resulting natural gas consumption for the proposed RTOs in communications with Eisenmann Corporation, a candidate RTO vendor. Attached, please find literature from Eisenmann Corporation which describes the proposed RTO features including the natural gas conservation system.

   The estimated GHG reductions from minimizing LDPE plant waste gas to the flare were calculated in Table 3 of the April 29th response letter. The annual waste gas flow rates (routed to the flare) for the maximum and minimum design cases are the primary inputs for the calculations presented on Table 3. This information was obtained from comparing the

estimated quantity of waste gas routed to the flare in the preferred design case (minimum waste gas flow) versus the design case without ethylene recycle, where these recycle streams are purged to the flare. The ethylene recycle stream flow rate was obtained from FPC TX discussions with the licensor and is marked business confidential.

EISENMANN

VRTO-C

- *Fewest moving parts*
- *Smallest footprint available*
- *Highest reliability in the industry*

VRTO-C

Since 1951, EISENMANN has relied on repeat business and word-of-mouth to grow into a highly respected leader and turnkey supplier of industrial systems. Our goal is to provide our customers with the best technology and lowest cost of ownership. With this goal in mind, EISENMANN "raised the bar" for the entire RTO industry with the development of the Valveless RTO (VRTO).

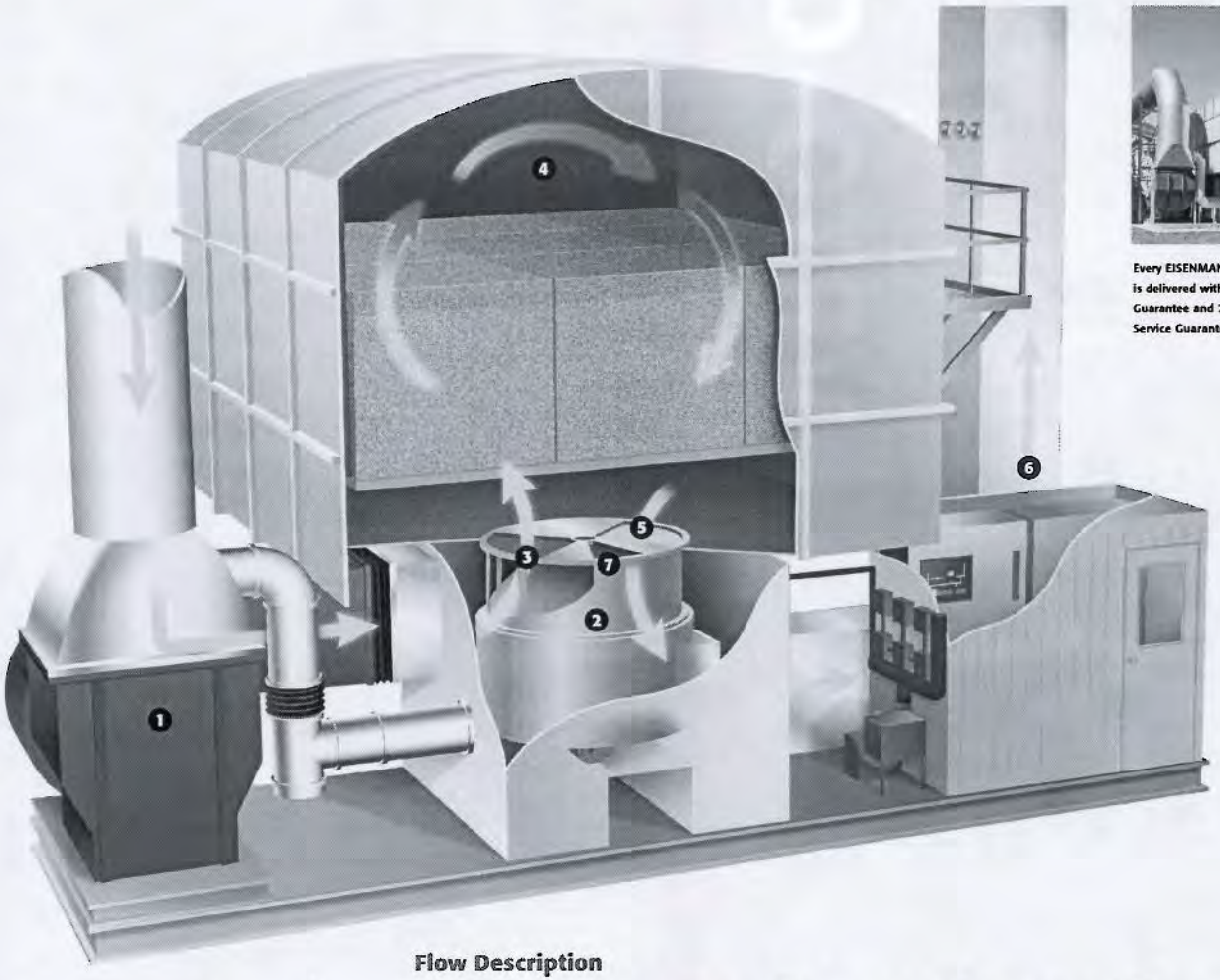
For over twenty years the RTO has been recognized as an efficient way to thermally treat pollutants. However, conventional RTOs are designed with multiple valves that direct air flow in and out of each oxidation chamber in the system. The multiple valve design is prone to maintenance problems, decreased efficiency and poor reliability over time.

EISENMANN evaluated the weaknesses surrounding the conventional and 2 can designs and spent the early 1990's developing the VRTO in our technical center. This innovative patented design eliminates the need for multiple valves and chambers and replaces many moving parts with a single, simple rotary distributor. By 1992, our first VRTO system was installed and operating in an industrial application. VRTO technology has been the choice for many companies that lead their particular industry. EISENMANN has over 400 units installed worldwide.

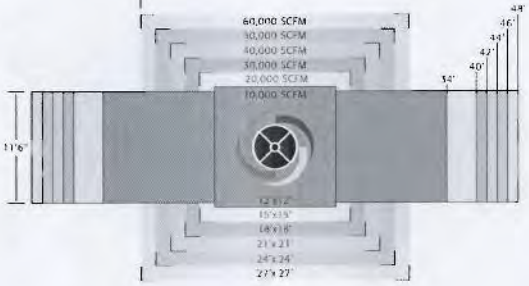
In 2001, EISENMANN successfully developed the VRTO-C, a compact, skid mounted system providing the same, patented valveless technology as the VRTO, with reduced installation time and the smallest footprint available per CFM of gas treated.

The Advantages of VRTO-C Performance:

- **High Uptime Reliability**
- **Less Maintenance**
- **Compact Design**
- **Minimal Pressure Functions**
- **Continuous Emissions Compliance**



Every EISENMANN VRTO-C system is delivered with a 100% Uptime Guarantee and 24/7/365 Response Service Guarantee.



Flow Description

1 The process exhaust stream is collected and directed through the VRTO vessel by a variable speed process fan.

2 The patented rotary distributor is the single moving devise that controls air flow through the inlet, purge, and outlet sections of the heat exchanger.

3 The exhaust stream is directed up through the inlet wedge of the rotary distributor and the corresponding heat exchanger sections. The airflow is preheated to near combustion chamber temperature as it travels upward.

4 The process exhaust is oxidized in the combustion chamber. A modulating burner provides additional heat, if required, to maintain oxidation temperature.

5 The exhaust or outlet wedge of the rotary distributor allows clean oxidized air to flow downward through the exchanger, where the exchanger media is preheated for the next cycle of incoming process exhaust.

6 Clean air exits the VRTO vessel and is released to the atmosphere through the stack.

7 The purge wedge of the rotary distributor follows in rotation behind the inlet wedge, continually flushing the exchanger media with clean oxidized air.

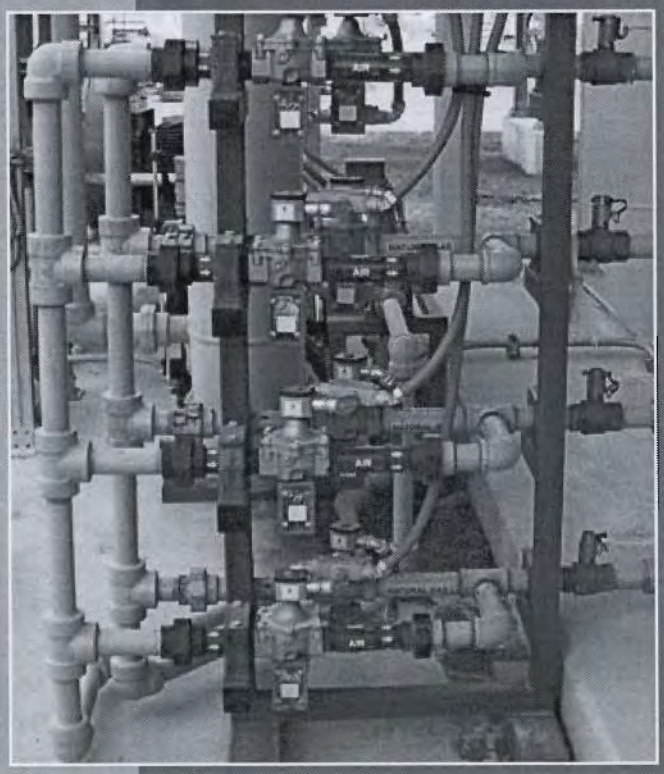
Pioneers of valveless regenerative thermal oxidation technology and 100% uptime for VOC abatement.

EISENMANN

EISENMANN Corporation
150 E. Dartmoor Drive
Crystal Lake, IL USA 60014
Phone 815-455-4100
Fax 815-455-1018
www.eisenmann.com

NATURAL GAS CONSERVATION SYSTEM

EISENMANN's Natural Gas Conservation (NGC) system allows you to reduce your Natural Gas consumption and eliminate burner generated NOx emissions. This simple and safe system, the only FM Approved system in the industry, introduces Natural Gas beneath the heat exchange media utilizing available Oxygen in the airstream eliminating the need for excess combustion air. This Patent Pending approach results in proven reduction in Natural Gas consumption of up to 25%. Return on investment for the complete system – including installation – is typically less than 18 months.



Provides up to 25% savings on natural gas

Significant advantages include:

- Up to 25% savings in natural gas consumption
- Eliminates burner-generated NOx
- Operates on free oxygen in air stream
- FM Approved
- Hardwired Relays and Safeties
- Integrated with the NFPA 86 Burner Management System
- Patent Pending

Proven energy savings results backed by thousands of hours of real world operation.

For more information please contact EISENMANN Industrial Services at 815.455.4100 info@eisenmann.com

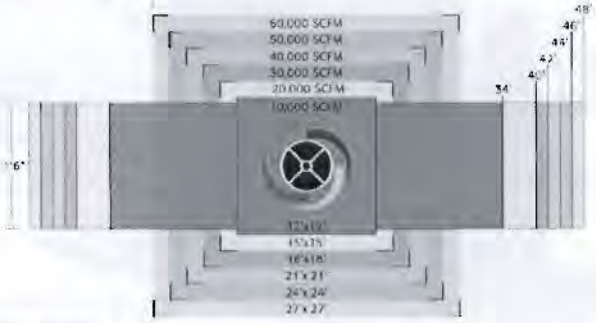
VRTO

EISENMANN Environmental Systems

RTO - ADVANTAGES

Compact Design:

Single vessel design reduces the required system space by as much as 30%. The compact design of the system provides the smallest footprint available per CFM of gas treated. This allows more space for future expansion. On the smaller units, up to 30,000 SCFM, the units are skid mounted (excluding middle and top sections) to reduce installation time and installation costs in the field.



System Resistance to Chloride:

Our solution to managing the chloride in the waste stream is to use medium nickel alloy for all surfaces seeing contact on the "cold" inlet side of the system (mostly AL6XN). After we get the chlorides above the acid gas dew point, we are use 316L SS metallurgy, with the exception of the last 10 feet of the outlet stack, where we use duplex 2205 steel to guard against any stack condensation. We insulate the outer shell of the VRTO-C to keep the inner 316L SS walls above the acid dew point, and use thermocouples placed around the system to confirm the temperatures.

Particulate Mater:

We use heat exchanger media with a wider opening on the bottom of the system to encourage moving the PM high enough in the bed to oxidize. The floor under the rotor will be sloped so that if the plant has an issue with molten plastic beads in the air stream, the plastic will flow towards an easy scrape / collection point.

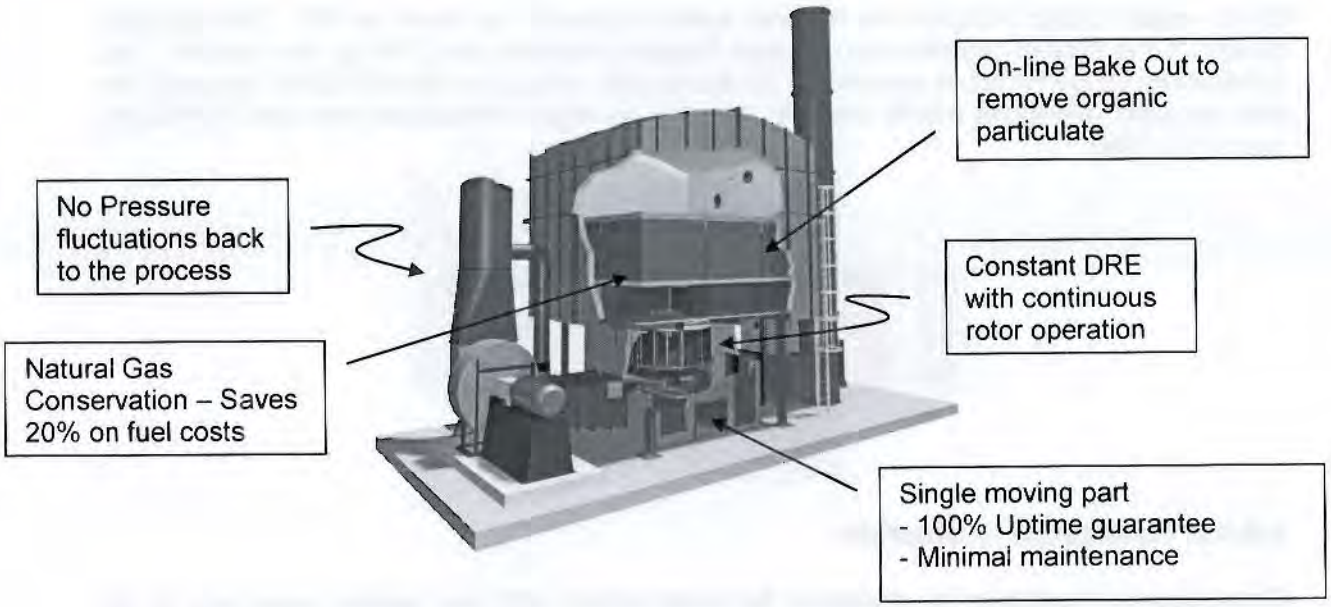
No Pressure Fluctuations:

The constant pressure rotary distributor maintains a pressure differential at the inlet to the system of less than 0.25 inches W.C. Conventional RTOs cannot achieve this due to flow interruptions as the dampers change position. Such pressure fluctuations can have adverse effect on the customer's process operations.

EISENMANN Corporation
150 East Dartmoor Drive • Crystal Lake, Illinois 60014
Phone: (815) 455-4100 • Fax: (815) 455-1018
www.eisenmann.com

Constant Destruction Efficiency:

Our continuous operation, without the redirection of the process stream, results in constant destruction removal efficiency (DRE) (unlike damper/poppet systems that exhaust a segment of the stream that was not processed in the combustion chamber). EISENMANN's rotor and air distributor eliminates any leaks or deterioration of VOC destruction.



Higher Uptime Reliability:

Utilizing a single, continuously operating rotor to manage the process stream, very little downtime is experienced with the EISENMANN system. This is unlike the configuration found in multi-vessel systems that use multiple dampers, valves and linkages. The EISENMANN system is a simpler design resulting in higher uptime reliability.

Less Maintenance:

A single, continuous moving part means fewer failure points and minimal maintenance, for the EISENMANN system. Compare that to damper systems that actuate 30 times/hr or 250,000 + times/yr with multiple moving parts that require adjustment. We eliminate that.