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June 19, 2020

VIA ELECTRONIC MAIL ONLY: MCGEEND@MICHIGAN.GOV

Mr. Daniel McGeen
Air Quality Division, Lansing District Office
Michigan Dep't of Environment, Great Lakes, and Energy
525 W. Allegan
First Floor Southwest
P.O. Box 32042
Lansing, MI 48909

Re: Mold Masters Company's Response to January 29, 2020 Violation Notice / SRN A2809 / PTI 368-08C

Dear Mr. McGeen:

Per your request in your January 29, 2020 Violation Notice and our subsequent communications regarding an extension of the time for Mold Masters Company to respond to the same, we wanted to follow up to answer the questions you have raised and to detail the response plan that Mold Masters Company proposes to follow to address AQD's concerns.

As your VN indicated, Mold Masters' FG Facility first exceeded the 9.0 TPY threshold for a hazardous air pollutant, "toluene," for the twelve-month rolling timeframe ending in May 2019. This was an ongoing exceedance, as indicated in the attached spreadsheet showing the twelve-month rolling average from January 2019 through the present. It resulted from an oversight as we had previously focused more on monitoring our aggregate emissions of hazardous air pollutants than on this individual pollutant. Since the exceedance for toluene was brought to our attention, we have taken immediate action to ensure that we are actively monitoring this individual pollutant and to evaluate remediation alternatives that will allow Mold Masters to maintain compliance moving forward. Additionally, Mold Masters' twelve-month rolling average for toluene has been in decline as a result of decreased operations stemming from the series of executive orders issued by Governor Whitmer in response to the COVID-19 pandemic. Specifically, Mold Masters was not in operation from March 16, 2020 through June 1, 2020, and when Mold Masters returned to operations this month, the company has operated at reduced capacity. Both of these have resulted in significant reductions to the company's overall emissions and concomitantly reduced the twelve-month rolling average for toluene at the FG Facility.

Nonetheless, Mold Masters understands that it needs to make a significant investment in abatement equipment to maintain long-term compliance with all emissions standards, and it is prepared to do so. To that end, Mold Masters engaged Stephanie Jarrett, Senior Environmental Engineer with Fishbeck, to evaluate remedial measures to correct the violation and to prevent any reoccurrence. Further, Mold Masters solicited several proposals to install abatement equipment that will reduce the FG Facility's toluene emissions. Attached are two of the proposals Mold Masters received in response to its search—one from Anguil Environmental Systems, Inc. proposing to install a Catalytic Recuperative Oxidizer and another from TKS Control Systems, Inc. proposing to install an SS Regenerative Thermal Oxidizer.

After evaluating both these proposals with Mold Masters' consultants, the company plans to pursue installation of an SS Regenerative Thermal Oxidizer. The SS Regenerative Thermal Oxidizer performs at a 98% continuous destruction and removal efficiency for volatile organic compounds, including toluene. Accordingly, Mold Masters anticipates that taking this measure will adequately control toluene emissions below the 9.0 TPY threshold. It is estimated that it will take roughly 12 to 14 weeks to install this equipment once approved. This proposed change will require Mold Masters to obtain a new Permit to Install. Accordingly, Mold Masters intends to submit a permit application by August 1, 2020. Depending on the time required for AQD to review and process the application, Mold Masters expects that it can have this equipment fully installed and operational within 12 months.

Please let us know if you have any questions in regard to this proposal. We look forward to working with AQD to ensure that the FG Facility performs in accordance with all environmental standards and that your concerns are adequately addressed.

Sincerely,

CLARK HILL PLC

/s/ Michael J. Pattwell

Attachments (3): Data on 12-month rolling averages; TKS Control Systems Proposal; Anguil Environmental Systems Proposal

MJP:zcl

PROPOSAL FOR A TKS - 1,500 SS REGENERATIVE THERMAL OXIDIZER

PROPOSAL NUMBER # 030920-1

PRESENTED TO:

Mr. John Hubbarth
Mold Masters Company
1455 IMLAY CITY ROAD
Lapeer, MI 48446

Air Pollution Control Project – SS Regenerative Thermal Oxidizer

PREPARED BY:

TKS Control Systems, Inc.
88 Templeton Drive
Oswego, Illinois 60543

Timothy Neal
President
630-554-3020

Specs on equipment

June 13, 2020

SECTION 1a: BASIS OF DESIGN

This application covers the design and supply of a Regenerative Thermal Oxidizer (RTO) for use of controlling VOC's from spray booth operation. The process will be exhausting approximately 653 ACFM. The exhaust will contain the VOC's such as toluene, xylene, ethylbenzene, and chlorobenzene . It will be assumed that there is at least 15% oxygen in the process stream, however the addition of fresh air will be required to assist in overall performance of combustion chamber. Based on data provided by customer we estimate 800 to 1500 scfm of ambient air will be required. The exhaust from the process will contain Mixed VOC's at a maximum VOC Loading of up to 16.25lbs. /hr. The TKS SS 1,500 (RTO is designed to remove 98.0% of the VOC's.

NOTES: *This TKS Stainless Steel 1,500 scfm RTO system has been designed to operate at a* ***maximum capacity of 1,800 scfm.***

The exhaust characteristics are expected to be:	
Exhaust Volume (low to high)	653 scfm to 1500 scfm
Exhaust Temperature	70 F -average to 120 F -maximum
Particulate	no
Liquid	no

VOC Species: Mixed VOC's- Toluene, Xylene, Ethylbenzene, Chlorobenzene

Based on the VOC concentration we calculate the following expected loadings and corresponding heat contents:

1,500 scfm

Various VOC's:	16.25 lbs. /hr.	X	18,495 BTU/lb.
Total:	**16.25 lbs. /hr.**	**X**	**=300,534 BTU/HR**

At maximum design flow with 95% TRE RTO will reach a self-sustain mode at approximately 10 lbs/hr. High VOC loading will require removal of media or addition of hot gas bypass system.

The final design engineering as noted in this proposal will incorporate all the necessary components to exceed the air compliance goals and operational requirements while using our proven and innovative design features to provide a long lasting - highly reliable

The exhaust characteristics from the process are expected to be:
Maximum volume of 653 scfm @ 77 F to 100 F with no liquid and 16.25lbs/hr of VOC's. This information was provided by customer representative and has not been verified by TKS.

The RTO booster fan must be capable of providing up to -2" WC at the fan inlet to adequately clear the exhaust ductwork.

BASIS OF RECOMMENDATION

TKS Control Systems, Inc. has worked with a variety of industries to develop a proven technique to eliminate VOC emissions from coating operations. Regenerative Thermal Oxidization in this application is being presented based on its ability to offer the lowest cost of compliance.

The final design engineering as noted in this proposal will incorporate all the necessary components to exceed the air compliance goals and operational requirements, while using our proven and innovative design features to provide a long lasting - highly reliable system. The TKS Regenerative Thermal Oxidization System recommended in this proposal will allow:

- Continuous VOC destruction across operational range
- Low cost of operation
- Fully automatic operation - without operator input
- Highest uptime with minimal maintenance

The TKS system design will include our innovative design features allowing for ***continuous VOC destruction***. The basis of the design will not place limitations on the client for solvent concentrations; it will provide a minimum +98.0% VOC destruction independent of solvent concentration. This continuous destruction ability is key to air pollution control design. The TKS system is not hindered by any operational characteristics.

The systems ***low cost of operation*** will center on the use of a 95% primary heat exchanger. This special heat exchange system will provide very low burner heating demands and provides very low static pressures for reduced electrical consumption. A control logic program constantly monitors the media bed temperatures. We monitor the system inlet, outlet and 4 positions in each media chamber.

The system will incorporate our "SCS" (Safety Control System) controls to provide ***fully automatic operation***. The system will incorporate our SCS control package supplied with all PLC logic, relays, and wiring for automated control.

Each TKS system is designed to allow the ***highest uptime reliability with minimal maintenance***. The maintenance requirements will be fully described in the supplied operator manuals, and only includes normal fan maintenance, linkage tightening, and bearing lubrication. The system uses a few moving parts, and all of these parts are accessible from outside of the system. There is no need to enter the oxidizer for normal maintenance.

NOTE: The system can accommodate higher VOC loading with modifications such as removal of media to lower heat exchanger efficiency, addition of hot gas bypass system or both. However the maximum flow of 1800 SCFM is not able to be increased.

SECTION 2: EQUIPMENT DESCRIPTION

1 GENERAL DESCRIPTION

TKS Regenerative Thermal Oxidizers are specially designed systems that provide industry leading VOC destruction, the lowest operating cost, and the highest uptime reliability.

The Regenerative process starts by using a system fan to draw in process emissions and force these gasses into the TKS Balanced-Flow Plenums. The process emissions are directed into one set of TKS Valves, for distribution into one of two media columns. TKS Valves in conjunction with the **TKS Balanced-Flow Plenums** are the basis for all TKS systems ability to provide continuous 98.0% VOC destruction. The design of these two revolutionary components takes advantage of leak-free construction and minimal flushing volumes. The results provide the user with only high performance and minimized costs.

From the exit of the TKS Valves, the un-treated exhaust enters one of the ceramic media filled media columns. Here the exhaust stream is heated from approximately *150 °F* to over *1,525° F.* The structured ceramic media used in the TKS Series Regenerative Thermal Oxidizer provides low (flange to flange) static pressures and the highest thermal rate efficiency. TKS systems pack more thermal heat transfer in a smaller package.

Upon exiting the media chamber, the exhaust will be oxidized in the combustion chamber, where the temperature will be raised to *1,400° F.* At this temperature +98.0% of the entering VOC's will be converted to CO_2 and Water vapor. When solvent loads are sufficient (usually + 3-5% LEL) the natural gas burner system can be shut off and self-sustaining operation is achieved. Optional accessories such as natural gas injection, hot-gas bypass, VOC polishing chamber, re-circulation system, etc. can all be recommended based on the needs of your application.

These combusted VOC are then forced into the second media column to give up the heat to the incoming un-treated air. The whole process is controlled via the SCS control system. TKS Valve positioning is monitored for precise destruction and thermal exchange effectiveness. No input is required by operators.

7 BURNER SYSTEM

The burner will be a Maxon Kinemax gas burner system. A nozzle mix burner uses external combustion air to provide sufficient oxygen even in an oxygen-deficient air stream and to provide a stable flame pattern throughout the operating range of the system. The burner is designed to promote mixing when fired horizontally into the combustion chamber and provides even heating during regenerator switching. This design provides the high velocity which creates a tremendous amount of turbulence and leads to the excellent temperature uniformity for which TKS RTO's are known.

The Maxon Kinemax allows a 50:1 turndown, requires 75% excess air.

The Maxon burner will include the following:

- 7.1 One (1) Maxon 2"- burner with alloy discharge sleeve pre-mounted into the combustion chamber
  - 7.1.1 1.0 MMBTUH installed capacity
  - 7.1.2 Natural gas operation per burner: 1,000 CFH - 1,000 BTU/ft3 @ 4-10 psig
- 7.2 Honeywell self-checking UV scanner with air purge for flame supervision
- 7.3 Eclipse CV gas control valve will be piped after the gas train and before the burner.
  - 7.3.1 Siemens electric operator and mechanical linkage
- 7.4 External combustion air blower
  - 7.4.1 The combustion air blower will be a Cincinnati or equal, radial type centrifugal fan complete with skid mounting of the following equipment:
  - 7.4.2 480v/3-ph/60-Hz, direct drive TEFC 5 HP motor
  - 7.4.3 Flanged inlet & outlets
  - 7.4.4 OSHA shafts & bearing guards with oversized shafts and split lock bearings
- 7.5 The combustion air blower will be field mounted – allowing convenient connection to the gas burner. The auxiliary equipment includes:
  - 7.5.1 Painted carbon steel weather hood with personnel protection
  - 7.5.2 Carbon steel manual control damper with locking lever arm
  - 7.5.3 Flex connection
  - 7.5.4 Painted carbon steel combustion air blower ducting from discharge of blower to inlet of burner.
  - 7.5.5 Includes burner back safety boot
    - 7.5.5.1 Welded pressure ports as necessary
  - 7.5.6 A Dwyer Instruments proof of air flow pressure switch will be provided and rated NEMA 4 (shipped loose for field mounting and piping by others).

8 BURNER GAS TRAIN

This natural gas train is designed pursuant to NFPA-86 and routinely exceeds the requirements of IRI & FM guidelines; and will include the following components:

8.1 The gas train will be a 1" dia. schedule 40 BI, threaded / welded construction:
- 8.1.1 Pre-piped and mounted to a stand with a weather shield
  - 8.1.1.1 The stand will be located at ground level for easy access
  - 8.1.1.2 Gas pipe from the gas train outlet to the burner inlet is factory installed and broken for shipment.
  - 8.1.1.3 Stainless steel flex connection mounted at burner elevation for both main gas and pilot
  - 8.1.1.4 Pre-wired to a NEMA 4 junction box. The junction box will be mounted to the gas train stand. The gas train will be wired to a terminal strip located inside of the junction box.
- 8.1.2 8000 V ignition transformer (mounted at on the gas train stand) in a NEMA 4 enclosure with ignition wire to burner
- 8.1.3 Shop leak tested prior to shipment.

8.2 Main shut-off valve

8.3 Inlet Strainer

8.4 MAIN GAS TRAIN:
- 8.4.1 One (1) Sensus Main gas regulators
- 8.4.2 Kromshroder Low gas pressure switch
- 8.4.3 Two (2) Maxon automatic shut-off valves
- 8.4.4 Kromshroder High gas pressure switch
- 8.4.5 Main gas shut-off valve

8.5 PILOT GAS TRAIN:
- 8.5.1 Two (2) Pilot gas shut-off valve
- 8.5.2 Sensus Pilot gas regulator
- 8.5.3 Three (3) Miljoco pressure indicator gauges with manual shut-off

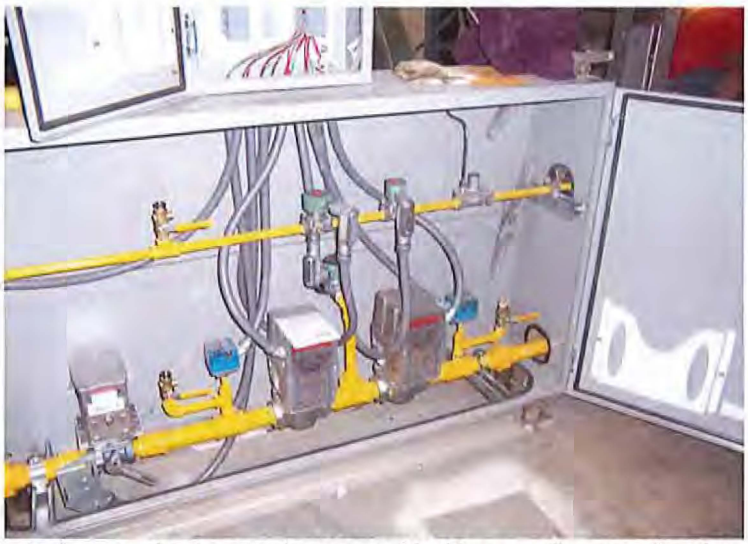


Photo shows a piped gas train mounted inside a weather-proof enclosure

MAIN PROCESS BLOWER (Induced Draft)

The Carbon Steel fan will be an Industrial Air Technology Corp. or equivalent manufacturer, Type PB 2210 centrifugal fan in arrangement 9.

9.1 25 HP 480v/3-ph/60-Hz, Invertor duty rated TEFC motor
9.2 Flanged inlet & outlets
9.3 Bolted access door
9.4 Ceramic shaft seal
9.5 OSHA shafts & bearing guards with oversized shafts and split lock bearings.
9.6 Expansion/isolation joint mounted at the fan outlet
9.7 Fan vibration switch
9.8 Blower Specifications:
- 9.8.1 Scfm: 1,500
- 9.8.2 Temp; 250 F
- 9.8.3 Acfm: 2,680
- 9.8.4 Static allowed:-2" (inlet)
- 9.8.5 BHP: 14.86
- 9.8.6 Installed HP: 25

Note: Process turn down ratio will be subject to fan performance. A minimum fan speed will be needed to push or pull process air through system based on pressure drop of media, poppet valves and duct.

10 VOLUME CONTROL

The volume control will be provided by a variable frequency drive controlled by the PLC receiving a signal from the inlet pressure transmitter. The system will include the following:

10.1 Altivar -25 HP
10.2 Pre-mounted in a NEMA12 Enclosure next to the SCS Control Panel or in control house
10.3 Assumes VFD is installed less than 100 feet from motor

11 SYSTEM CONTROL

The TKS Series Regenerative Thermal Oxidizer comes equipped, as standard, with a special control and monitoring package called **Safety Control System (SCS)**. It has been developed for the use of protecting the oxidizer and providing self-diagnostics.

The SCS-PLC panel allows the entire oxidizer system to be a one-button start/stop operation. This provides user-friendly operation and avoids costly operator errors. SCS controls temperature programming during all phases of the oxidizer's warm up, operating, and cool down cycles. This minimizes thermal stress on components and provides long equipment life. SCS will also integrate the process with the operation of the oxidizer for safe, economical operation.

The TKS - Series Regenerative Thermal Oxidizer process begins with the touch of a button, which activates the system's PLC-based Safety Control System (SCS). The SCS control system automatically retrieves media temperatures, selects the hottest bed for damper positioning, opens the fresh air purge/idle damper, energizes the booster fan, purges the system with fresh air, ignites the burner, cycles the valves, and gradually brings the system up to the correct operating temperature. The SCS also monitors the temperature in the regenerators, combustion chamber in three places, and in the valve assemblies' inlet and outlet. This helps safeguard the system from extreme temperature fluctuations that cause thermal stress and overall system fatigue.

As soon as the required operating temperature is reached, the SCS enables the process lines to feed into the oxidizer, or holds the system in idle mode until production is ready. When production is ready the fresh air purge damper closes and one or more of the diverting dampers open to draw the volatile organic compounds (VOC's) off of the process lines.

The fan draws one or more VOC-laden exhaust from your process lines into the system at a fixed duct static pressure. From there, VOC's are directed into one of the systems regenerators (an internally insulated vessel containing ceramic media). The contaminated gases are passed through the first regenerator where energy is transferred from the ceramic media to the gas in order to elevate the temperature. This elevated temperature approaches the ignition level for most solvents and then is directed from the ceramic bed into the combustion chamber. As the stream exits the ceramic bed and travels through the internally lined combustion chamber minimal heat is added to ensure a proper oxidation temperature and a designed dwell time is maintained for the ultimate destruction of the streams VOC's. The resultant clean, oxidized gases are redirected into a second regenerator bed to continue the energy transfer and oxidation cycle before being released to the atmosphere.

The SCS - Control panel will include the following components:

11.1 NEMA-12 indoor rated painted carbon steel enclosure for installation and final termination by others.
- 11.1.1 Color: TKS std. white epoxy
- 11.1.2 Codes – SCS control panels are designed to NEC standards. Unless specifically mentioned below, no other codes or standards apply:

11.2 480 V – 3ph – 60 Hz main disconnect
- 11.2.1 Fused or circuit breaker power disconnect
- 11.2.2 Step down 120v transformer

11.3 **Micro - Logix PLC** with the following:
- 11.3.1 Inputs and outputs as required to manage the oxidizer system and interlock for up to 1 source T-dampers or isolation dampers.
- 11.3.2 Remote Service Access via customer supplied Ethernet connection

11.4 **Parker CTC 10 HMI.** MMI will including the following:
- 11.4.1 10" color touch screen with Ethernet IP
- 11.4.2 Door mounted in the main control panel
- 11.4.3 Start/Stop functions
- 11.4.4 PID Loop Control of:
  - 11.4.4.1 Burner Temperature Control
  - 11.4.4.2 VF Drive Speed Control
  - 11.4.4.3 Valve Chamber Switching
  - 11.4.4.4 Bake-out Feature (if required)
- 11.4.5 Text messaging of system status & individual graphic screens
  - 11.4.5.1 System overview screen with First Fault Annunciation and Trouble Alarm History
  - 11.4.5.2 Combustion system detail screen
  - 11.4.5.3 Booster fan detail screen
  - 11.4.5.4 Maintenance screen
  - 11.4.5.5 Secure PID access screen

11.5 Honeywell high temperature limit shut off

11.6 Yokogawa paperless chart recorderFX1012-4-2-L/C7 (12 channel recorder)
- 11.6.1 Combustion Chamber Temperature

11.7 Honeywell RM7890A1002 flame safety system

11.8 Door mounted alarm horn

11.9 Control house with combination A/C – heater system

TKS SERIES REGENERATIVE THERMAL OXIDIZER

The systems ***low cost of operation*** will center on the use of a 95% primary heat exchanger. The heat exchanger is made up of ceramic materials. The layers of ceramic media are a unique structured designed to achieve the desired TRE's. This special heat exchange system will provide very low burner heating demands and provides very low static pressures for reduced electrical consumption. A sophisticated Volumetric/Temperature control program constantly analyzes the media temperature profiles via (9) separate thermocouple inputs. We also monitor the inlet air pressure which constantly adjusts the VFD's on the fan to help maximize the thermal rate efficiency of the system.

The system will incorporate our "SCS" (Safety Control System) controls to provide ***fully automatic operation***. The system will incorporate our SCS control package supplied with all PLC logic, relays, and wiring for automated control.

Each TKS system is designed to allow the ***highest uptime reliability with minimal maintenance***. The maintenance requirements will be fully described in the supplied operator manuals, and only includes normal fan maintenance, linkage tightening, and bearing lubrication. The system uses a few moving parts, and all of these parts are accessible from outside of the system. There is no need to enter the oxidizer for normal maintenance.

UNIQUE FEATURES OF THE TKS – SERIES REGENERATIVE THERMAL OXIDIZER

The TKS system is designed to be very easy to assemble, and is comprised of three modular units:

- The media chambers, which holds the media
- The TKS Balanced-Flow plenums, which contain the TKS Valves
- The combustion chamber, which is installed on top of the media chambers

The modular system is structurally sound and designed to be placed on a foundation or support structure. All three modular components are fit together in our shop prior to shipment to insure proper field assembly.

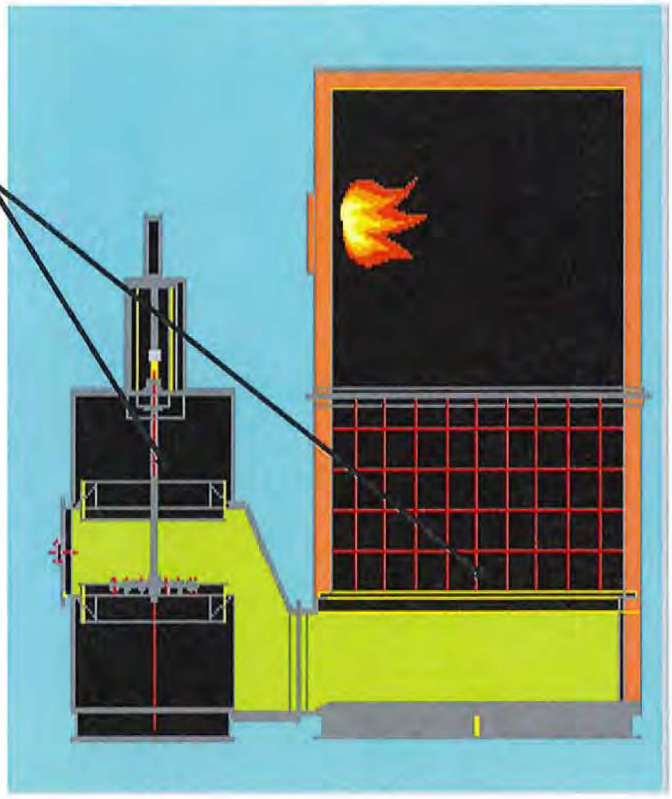
The chamber or chambers arrive on a flat-bed truck to be mounted on the foundation

Items to Note:

1) The flanged assembly simplifies connection to the TKS Balanced–Flow Plenums
2) Structurally superior cold face support
3) Multiple thermocouple connections for better temperature monitoring
4) Structural reinforcements ensure a long useful equipment life

The TKS Balanced-Flow Plenum design ensures that the smallest volume of air is released during valve cycling.

The TKS Balanced-Flow Plenum keeps the flow Symmetrical and consistent which allows for the highest VOC DRE Rates and maintains flow uniformity across the entire media bed.



The TKS Balanced-Flow Plenums are mounted
Directly next to the media chambers

Note:

1) The minimized size (volume) of our TKS Balanced-Flow Plenums is extremely important at insuring high VOC destruction

2) No field installation of the valves is required insuring proper operation at time of installation.

3) Compact and efficient design of both the media chamber and the TKS Balanced-Flow Plenums.

Anguil Environmental Systems, Inc. Catalytic Oxidizer

Date: June 10, 2020
Proposal #: AES-04868A

Prepared for:

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Environmental and Energy Solutions that Ensure Cleaner Air and Water for Future Generations.

Founded in 1978, Anguil Environmental Systems is a second generation family owned and operated environmental technology supplier headquartered in Milwaukee, WI USA with offices in Asia and Europe. With annual sales in excess of $50 million globally, Anguil has been a trusted air and water solutions supplier for over 40 years.

The Anguil Advantage

- Business stabliity and unparalleled expertise with over 40 years in business.
- Single source provider of fully integrated air and water pollution control systems for lowest cost of ownership.
- Over half of Anguil staff are degreed engineers.
- Regulatory compliance is guaranteed.
- Broad range of technology solutions ensure an unbiased equipment selection.
- Comprehensive Quality Assurance program and procedures.
- An established safety program with continuous training for Anguil field service engineers.
- Custom solutions developed specific to your application that maximize efficiency and minimize system life operation costs.

40 **Years in Clean Air and Water**

AIR TECHNOLOGIES

Air pollution control systems for VOC, HAP, and odor abatement—capable of 99+% destruction efficiency.

- Regenerative thermal oxidizers (RTO)
- Catalytic, recuperative, and direct-fired thermal oxidizers and vapor combustors
- Emission concentrator systems

Over 1,900 oxidizers installed on six continents in a wide variety of applications!

ENERGY RECOVERY

Heat and energy recovery systems for improved efficiency and reduced operating costs.

- Air-to-air heat exchangers
- Air-to-liquid heat exchangers
- Heat-to-power
- Energy evaluations

WASTEWATER TREATMENT

Wastewater treatment technologies for industrial and remediation applications.

- Fully integrated and turnkey systems
- Single source provider
- Engineering assistance, rentals, and pilot programs available
- Technology agnostic approach
- Advanced instrumentation, controls, and automation

AFTERMARKET & SERVICE

Service and maintenance on any make or model, regardless of original manufacturer.

- 24/7 emergency service response
- Operating cost reviews
- System upgrades and retrofits
- Spare parts and component packages
- Preventive Maintenance Evaluations

Executive Summary

1. Equipment Description

Anguil is proposing to route the VOC emissions to a Model 10 (1,000 SCFM) Catalytic Recuperative Oxidizer (Catox). Within the Catox the VOCs will be oxidized prior to being emitted to atmosphere via the exhaust stack.

2. Facility to be Controlled

Mold Masters facility in Lapeer, MI

3. Thermal Energy Recovery

50% Nominal Thermal Energy Recovery to minimize gas usage

4. Proposed Equipment

Model 10 (1,000 SCFM) Catalytic Recuperative Oxidizer (Catox)

5. Anguil Benefits

* Seamless integration with the current process
* Fully automated PLC based controls
* Ethernet communications for remote diagnostics
* Field Tested and proven technology
* Full equipment warranty
* Factory test prior to shipment
* 24 hour service support

6. Results

* Anguil guarantees the conversion efficiency of 98% or an outlet concentration of 20 ppmv as C1 (methane), whichever is less stringent per EPA Method 25A.

ANGUIL ENVIRONMENTAL SYSTEMS, INC. www.Anguil.com
8855 N 55th Street Milwaukee, WI 53223 USA 414.365.6400 414.365.6410 info@anguil.com

Customer Process Specifications

- Process Flow: 653 SCFM
- Process Temperature: Ambient

Compound	Design Value (lb/hr)
Toluene	14.63
Xylene	0.81
Ethyl Benzene	0.16
Chlorobenzene	0.16

* Assumed no silicones, phosphorus, sulfur or sodium bearing compounds are present.

- Facility Operating Schedule: Two shifts/day, 5 days/week
- Facility Power: 460V / 60 Hz / 3 Ph
- Fuel Source: Natural Gas
- Process Water Content: Assumed to be no more than 0.01 lb water / lb air
- Process Oxygen Content: Assumed to be at least 18%
- Process Particulate: Assumed to be negligible
- Performance Requirements: 98% VOC destruction assumed
- Catox location on Site: Assumed to be Indoors
- Desired Operational Date: TBD

Note: Equipment has been designed and sized based on these customer parameters.

ANGUIL ENVIRONMENTAL SYSTEMS, INC. www.Anguil.com
8855 N 55th Street Milwaukee, WI 53223 USA 414.365.6400 414.365.6410 info@anguil.com

Design Specifications

Size and Weight

• Maximum Airflow:	1,000 SCFM
• Approximate Footprint / Weight:	6' x 12.5' / 5,000lbs
• Stack Height / Diameter:	30' / 10" (height from grade, can be adjusted as required)
• Oxidizer Control Panel Location:	NEMA 12 panel on oxidizer

Utilities Required

• Fuel Requirements:	0.5 MMBTU/hr at 5 psig
• Electrical Power:	240V / 60 Hz / 3 Ph
• Required Compressed Air:	80-100 psig (-40°F dewpoint)

Operation Information

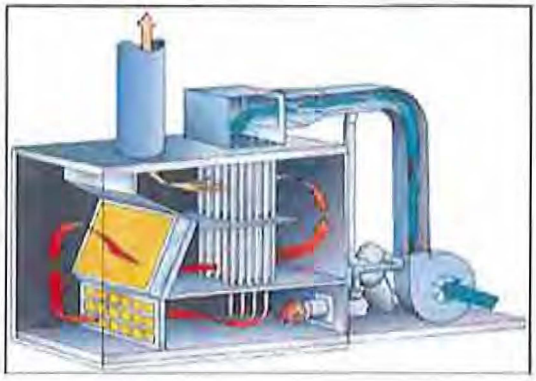
• VOC Destruction Efficiency:	98% or an outlet concentration of 20 ppmv as C1 (methane), whichever is less stringent per EPA Method 25A.
• Nominal Thermal Efficiency (TE):	50%
• System Process Fan Draft Design:	Forced
• System Process Fan HP:	7.5 HP (15 HP with ID fan option)
• Operating Set Point:	600 - 650°F

***Note: All weights, dimensions, horsepower ratings, burner sizing, and specific engineering details within the proposal are approximate and will be confirmed by Anguil Environmental following order placement.**

ANGUIL ENVIRONMENTAL SYSTEMS, INC. www.Anguil.com
8855 N 55th Street Milwaukee, WI 53223 USA 414.365.6400 414.365.6410 info@anguil.com

Standard Equipment Specifications

One Anguil Model 10 Catalytic Recuperative Oxidizer will process up to 1,000 SCFM of VOC laden air, providing 98% destruction efficiency.



During the system operation, VOC laden air will be exhausted from the process into the system fan and discharged into the primary heat exchanger where it will be preheated. The VOC laden air will then move through the burner section and will be heated to the preset catalyst inlet temperature. When the VOC laden air passes through the catalyst an exothermic reaction will take place. The hot purified air will then pass through the opposite side of the heat exchanger where it will preheat the incoming air. The purified air will then finally be exhausted to atmosphere.

REACTOR

- 316 stainless steel interior reactor shell
- Aluminized steel exterior reactor shell
- High-density ceramic and mineral wool placed between reactor shells
- Exterior shell painted with 2 coats of UV resistant polyurethane paint
- Access door allows for service and inspection of interior catalyst and reactor

SYSTEM FAN

The system fan is sized for -1" W.C. at the Catox inlet. Additional inlet pressure is available if necessary by request.

- New York Blower, AirPro or equal
- VFD rated, TEFC motor
- Flexible connection on inlet/outlet of fan
- Fresh air damper allows for oxidizer to brought up to catalyst ready temperature with 33% outside air

BURNER(S)/FUEL TRAIN

The burner installed capacity is higher than required during normal operation. This allows the system to respond rapidly to significant airflow increases, preventing loss of proper Oxidizer operation temperatures. The burner capacity is also sufficient to maintain system operating temperature during full airflow, VOC free conditions.

- Eclipse burner or equal
- Fuel Train fabricated to NFPA 86 and FM Global specifications
- 3" burner view port
- Flame rod with flame strength signal

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FRESH AIR/PURGE DAMPER

The Fresh Air / Purge Damper is used during oxidizer purging, start-up, or offline idle. It allows for safe start-up and shut-down on ambient air. The damper is also used if additional dilution air is required during periods of high VOC loading or low process flow. It is controlled by a signal from the PLC.

- Modulating damper with actuator
- Bird screen included

SYSTEM CONTROLS

The system controls are in a **NEMA 12 control panel enclosure.** In the event of a system shutdown, the touch screen will indicate the cause of the shutdown via a digital message in English.

- NEMA 12 control panel enclosure to be mounted on the oxidizer skid (assumes the panel is in a temperature controlled environmental, 85F)
- Allen Bradley Logix family PLC (Programmable Logic Controller) controls
- Allen Bradley Color Touchscreen HMI
- Digital chart recorder: monitors combustion chamber and exhaust stack temperatures
- Ethernet communications for remote diagnostics and service support

VARIABLE FREQUENCY DRIVE (VFD)

The variable frequency drive regulates the airflow through the system. It is controlled by a pressure transmitter located up-steam from the system fan. The VFD is mounted with the system controls in the control enclosure. It aids in minimizing operating cost by providing system fan turn-down during periods of low airflow.

- Mounted in a NEMA 12 enclosure on the oxidizer skid
- VFDs provided for the oxidizer system

HEAT EXCHANGER

- 50% nominal efficiency
- Shell and tube type design
- 316 stainless steel construction
- Continuously seam welded
- Leak testing assures no cross contamination
- Equipped with automatic hot-side bypass damper for over-temperature protection

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EXHAUST STACK

- Constructed of **316 stainless steel**
- Supported by guy wires
- Two (2) EPA tests ports: 90° to each other
- Stack is sandblasted, zinc primed and high temperature coating applied

CATALYST

- The catalyst will conform to the following specifications to achieve the required 98% non-methane hydrocarbon (NMHC) destruction efficiency.
- Catalyst Type: BASF 300S
- Volume: ~3 ft^3
- Gas Hourly Space Velocity: ~14,000 / hr for 700 SCFM
- Expected Catalyst Life: 30,000 Operating Hours
- Expected HCl generation: 13 ppmv
- Maximum HCl allowed: 1,000 ppmv

PAINTING

All exposed surfaces of the oxidizer shall be primed coated with a high solids epoxy coating. The finish coat shall be a gloss high solids polyurethane multi-function weather resistant coating. The natural gas and compressed air piping will be primed and painted with one (1) coat of Anguil's standard coating. All other equipment will be the manufacturer's standard paint and color. Prior to painting, all welds will be caulked.

- UV resistant polyurethane paint
- Paint color can be specified by the customer

OPERATION & MAINTENANCE MANUALS

- Anguil to provide a link to the Operation and Maintenance manual, available for electronic download. Paper hard copies available by request only.
- Electronic copies of all vendor bulletins

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FINAL ASSEMBLY AND SHOP TEST

We pre-assemble and pre-test modular components in our factory to provide significant savings of time and money during installation and start-up. Units are prewired and pre-piped at the factory for improved quality control and trouble-free start-up.

- Temporary assembly of system
- Inspection of the unit for manufacturing quality
- Check fuel and electrical connections
- Warning labels are installed
- Test ports are installed
- Run electrical rigid conduit
- Fans and motors installed, cleared of debris and checked for quality
- Temporary wiring of components that are shipped loose from the RTO skid
- Valves to be cycled and set
- Customer is invited to witness shop testing

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	Tons Toluene	Year	Rolling 12 Month
Jan	0.48	2019	8.38
Feb	0.75	2019	8.62
Mar	0.62	2019	8.73
Apr	0.47	2019	8.55
May	1.37	2019	9.06
June	1.5	2019	9.06
july	0.69	2019	9.09
Aug	1.08	2019	9.99
Sept	0.96	2019	10.06
Oct	1.47	2019	10.73
Nov	1.29	2019	11.39
Dec	0.8	2019	11.48
Jan-20	0.79	2020	11.79
Feb	1	2020	12.04
Mar	0.89	2020	12.31
Apr	0	2020	11.84
May	0.03	2020	10.5
June	0.89	2020	9.89
July	0.69	2020	9.89
Aug	0.89	2020	9.7
Sept	0.89	2020	9.63
Oct	0.89	2020	9.05
Nov	0.89	2020	8.65
Dec	0.69	2020	8.74
Jan	0.89	2021	8.64
Feb	1	2021	8.64
Mar	1	2021	8.75

Forecast