SVE System Equipment List
Kirtland Bulk Fuels Facility

Soil Vapor Extraction Skid(s)

T-1001	Vapor Liquid Knockout Pot	(3ft Dia. x 6 ft)
P-1001	SVE Liquid Pump	(centrifugal – 10 gpm x 50 ft head)
T-1002	SVE Liquid Storage Tank	(2500 gal)
B-1001	SVE Extraction Blower	(1000 SCFM at 11-in. HG vac)

SVE skid equipment includes silencers and sound enclosure on blower as well as all required piping, valves, electrical, instruments and control panel.

Thermal Oxidizer Skid

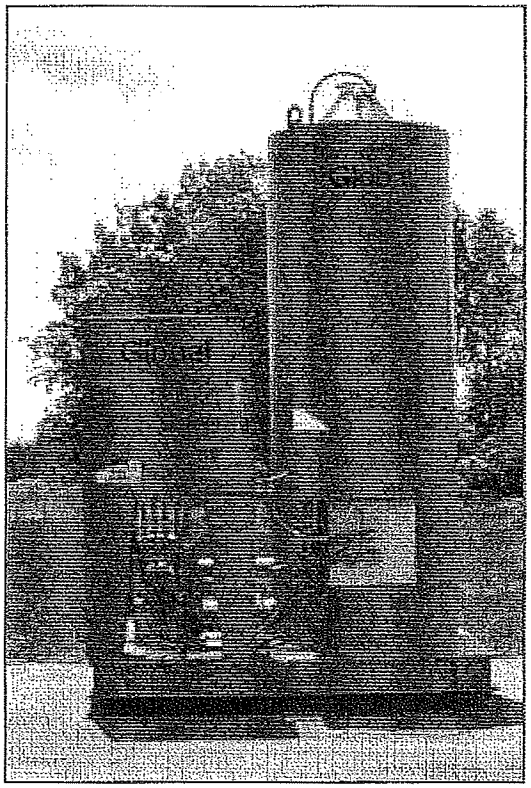
Z-1001	Thermal/Catalytic Oxidizer System
B-2003	Combustion Air Blower

Thermal oxidizer skid is a Dual Thermal/Catalytic Oxidizer System, complete with combustion air blower, exhaust stack and all instrumentation and controls. Hydrocarbon destruction efficiency is at least 98%. Unit can run in pure thermal oxidation mode when SVE gas is high in hydrocarbons and in catalytic mode (to reduce fuel consumption) when gas concentrations taper off. An optional heat recovery exchange is available. Auxilary fuel in all cases is natural gas.

Global Technologies

The remediation division of Anguil Environmental Systems, Inc.

Proposal for SVE Blower System and Dual Thermal/Catalytic Thermal Treatment System



Date: March 9, 2012

Proposal #: AES-120851

Project Name: Kirtland AFB

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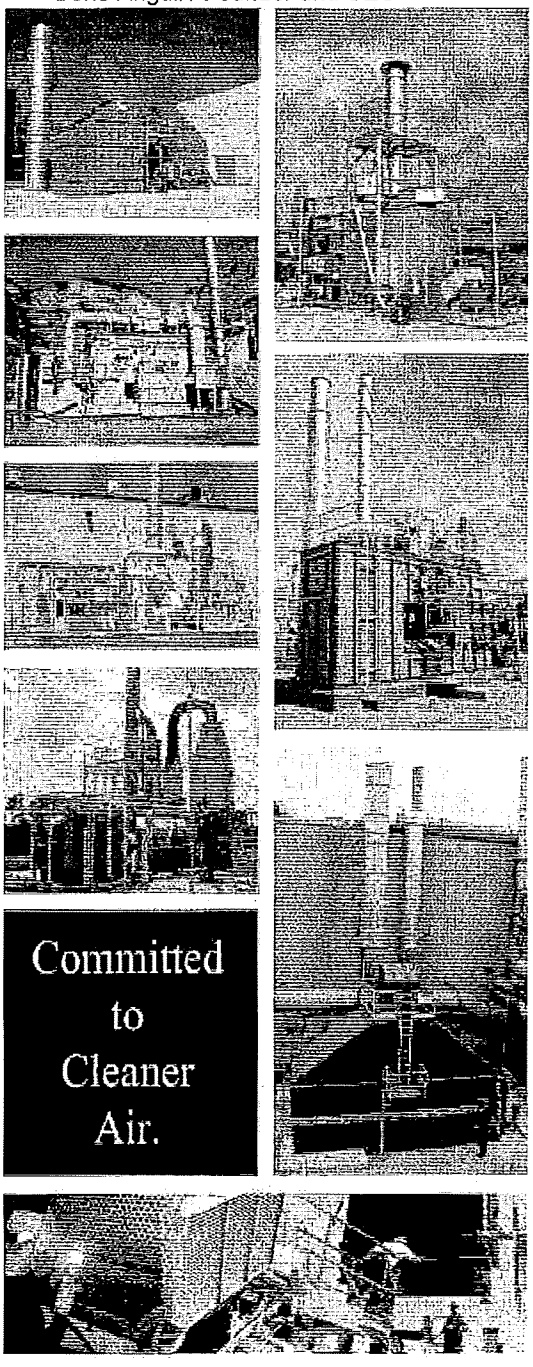
"Our goal is to provide solutions today which help our customers remain profitable tomorrow"
– Gene Anguil / Founder and CEO



Background:
- Founded in 1978
- Second generation family owned and operated
- Headquartered in Milwaukee, WI, USA with offices in Asia and Europe
- Over 1,650 oxidizers and countless heat recovery systems installed on six continents in a wide variety of industries

Company Size and Make-up:
- Annual sales in excess of $25 million
- In-house engineering staff consists of chemical, mechanical and electrical engineers
- Highly motivated employees who enjoy profit sharing and a rewarding work environment

What Makes Anguil Unique?
- Regulatory compliance is guaranteed
- Broad range of technology solutions that ensure an unbiased equipment selection
- Quality assurance program with complete factory acceptance testing prior to shipment
- An established safety program with continuous training for Anguil technicians
- Equipment is designed in Solidworks, ensuring accuracy and rapid completion

Products:

Air pollution control systems...
- Regenerative Thermal Oxidizers (RTO)
- Catalytic, Recuperative and Direct-Fired Thermal Oxidizers
- Concentrator systems
- Permanent Total Enclosures

...for VOC, HAP and odor abatement

Heat and energy recovery systems...
- Air-to-air heat exchangers
- Air-to-liquid heat exchangers
- Heat-to-power
- Energy Evaluations

...for improved efficiency and reduced operating costs

Aftermarket:

Service and Maintenance...
- 24/7 Emergency service response
- Operating cost reviews
- System upgrades and retrofits
- Spare parts and component packages
  - Preventive Maintenance Evaluations (PME)

... on any make or model, regardless of original manufacturer

Partial List of Satisfied Customers:

Boeing, Dow Chemical, Northrop Grumman, ExxonMobil, Johnson and Johnson, Peterbilt, Qualcomm, Rexam Beverage, Silgan Containers, Wyeth

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Executive Summary

1. Equipment Description

Shaw Environmental & Infrastructure Group has requested a proposal for equipment to destroy VOCs produced from their SVE remediation operation. The proposed Dual Thermal/Catalytic Oxidizer will process the VOC stream and provide the required destruction efficiencies.

2. Facility to be Controlled

Kirtland AFB/ WERS Kirtland AFB

3. Proposed Equipment

Model 10 (1,000 SCFM) Dual Thermal/Catalytic Oxidizer. A shell and tube heat exchanger is quoted as an option to reduce the supplemental fuel use of the oxidizer.

4. Anguil Benefits

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

5. Results

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

Customer Process Specifications

- Process Producing Emissions: Contaminated soil vapors
- Process Flow: 1,000 SCFM
- Process Temperature: 60°F to SVE blower
- VOCs*: BTEX: 0 – 4,800 ppmv
  GRO ~ 5500 ppmv

**Assumes no halogenated or sulfur bearing compounds are present*

- Facility Operating Schedule: 24 hr/day, 7 days/wk
- Facility Power: 480 V / 60 Hz / 3 Ph
- Fuel Source: Natural Gas
- Process Water Content: Assumed negligible
- Process Oxygen Content: Expected to be at least 18% by volume
- Process Particulate: Assumed to be negligible
- Performance Requirements: 98% VOC Destruction Efficiency per spec
- Electrical Area Classification: General, with NEMA 4 panel (it is our understanding that C1D2 and NEMA 7 panel is not required although listed in the specification)
- Oxidizer location on Site: Outdoors

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

SVE Blower Specifications

The SVE blowers will be provided per the following specifications.

B-1001

- **One SVE Model FVP125X3-Roots 821 RCS-J rated for 1,000 SCFM at 11" HG Vacuum with .25 PSI Discharge Pressure (89 dba without the sound enclosure)** with the following:

  - **125 HP Premium Efficiency EXP 230/460 VAC 1750 RPM motor.**
  - **Roots Model 821 RCS-J** positive displacement rotary lobe vacuum pump with Blower Manufacturers warranty.
  - 12" inlet, with 12" Butterfly Valve, Vacuum gauge, temperature gauge, and sample port.
  - One (1) Inlet Vacuum Transmitter
  - One (1) 12" 10 micron in-line filter between tank and vacuum pump.
  - Mini Magnehelic to monitor differential pressure across filter element.
  - Vacuum relief valve on inlet side of pump, field adjustable from 0 to 15"
  - Easily replaceable sheaves and bushings.
  - Adjustable motor slide base.
  - One (1) 4" dilution valve with silencer
  - Two (2) 10" Discharge Silencers in series
  - One (1) Discharge Pressure Switch
  - Pressure gauge w/sample port, and temperature Gauge on discharge.
  - One (1) 12" Averaging pitot tube flow sensor with Magnehelic Gauge one on Inlet
  - One (1) 10" Averaging pitot tube flow sensor with Magnehelic Gauge one on Discharge
  - Two (2) 4 to 20 Flow Transmitters
  - Low Vacuum Switch
  - High Discharge Pressure Switch
  - Steel Base Frame with fork lift pockets
  - 125 HP VFD

T-1001

- **"Cyclonic Action" Knockout tank with Internal Demister Pad**
  - 36" diameter Internal Demister Pad and removable top cover
  - 12" Flanged Inlet and a 12" Flanged Discharge
  - Sight gauge, 6" cleanout, and bottom drain with check valve
  - High Liquid Level Shutdown Switch
  - Heat Trace and Insulation of tank

P-1001

- **Automatic Drain Pump**
  - Gould 1st 1E7D4 Centrifigal Pump rated for 10 GPM at 50 feet TDH
  - 1 HP EXP motor
  - Two (2) Pump Control Float Switches
  - Inlet wye strainer, Check valve, and Ball Valve
  - Discharge Check Valve, Gate Valve, and Pressure gauge w/sample port
  - Manual Flow Meter and Totalizer Pulse Output

- **One (1) Sound Enclosures for SVE Blower and Motor**

  - 6' by 7' Steel Framed sound enclosure around blower and motor with hinged access panels for Blower maintenance
  - One (1) Layer of 2" Convoluted Polyester Noise Absorption Foam panels
  - Inlet Air Vents, Exp Vent Fan
  - **This enclosure will reduce the sound by 2-5 dba**

The interconnecting duct from the SVE blowers to the oxidizer is not included.

Design Specifications - Thermal Oxidizer Z-1001

Size and Weight

• Oxidizer processing capacity:	1,000 SCFM
• Approximate Oxidizer Footprint:	12' x 6'
• Approximate Oxidizer Weight:	5,500 lbs
• Stack Height:	30' from grade
• Stack Diameter:	14"
• Oxidizer Control Panel Location:	Outdoors on oxidizer skid

Utilities Required

• Fuel Requirements:	5 psig
• Electrical Power:	460V / 60 Hz / 3 Ph
• Required Compressed Air:	80-100 psig (-40°F dewpoint) 5-10 SCFM

Operation Information

• VOC Destruction Efficiency:	98% or an outlet concentration of 20 ppmv as C1 (methane), whichever is less stringent per EPA Method 25A.
• Operating Set Point:	Thermal Mode: 1400-1500°F Catalytic Mode: 500 - 600°F catalyst inlet temperature

***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.**

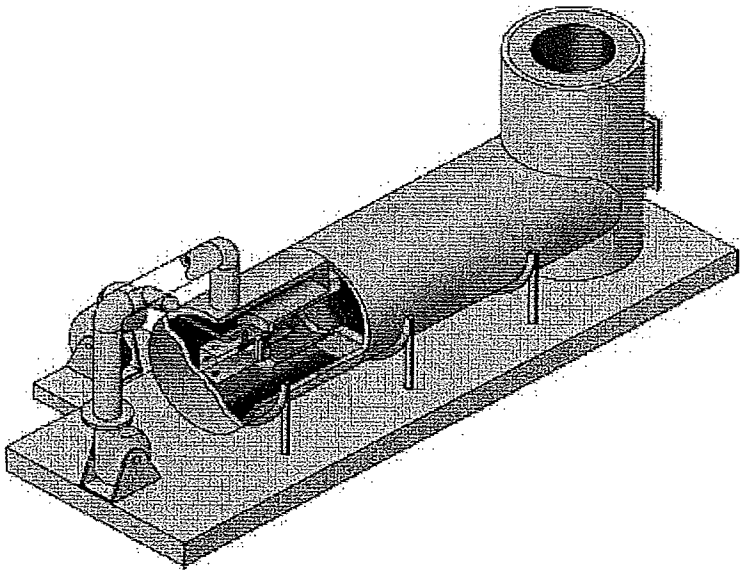
Standard Oxidizer Equipment Specifications

The Dual Thermal/Catalytic Oxidizer destroys Hazardous Air Pollutants (HAPs), Volatile Organic Compounds (VOCs) and odorous emissions that are discharged from industrial processes.

Design Basis -
The Therm-Cat model is designed to operate in both thermal (1400° - 1500°F) and catalytic (500° - 600°F) modes for maximum operational flexibility. The Therm-Cat is capable of adjusting to the changing conditions of any remediation site.

During startup, the Therm-Cat operates in thermal mode to effectively destroy the high concentration of VOCs in the airstream (up to 50% LEL). Later in the lifecycle of the site, as the VOC concentrations decrease, the VOCs can be cost-effectively destroyed by switching the Therm-Cat to catalytic mode. The addition of catalyst to the Therm-Cat lowers the operating temperature and reduces operating cost.

How the Dual Oxidizer Works-
During the system operation, VOC laden air will be exhausted from the SVE blowers into the system fan and discharged into the burner section and will be heated to the preset oxidation (catalyzing) temperature. When the VOC laden air is oxidized (passes through the thermal combustion chamber Reactor or catalyst) an exothermic reaction will take place. The VOCs in the air stream are converted to carbon dioxide and water. The hot purified air will then finally be exhausted to atmosphere, or through the optional heat exchanger. The heat exchanger will further reduce operational cost by preheating the process exhaust gas prior to entry into the burner section..



The equipment will be assembled, factory pre-wired and supplied per the following specifications:

REACTOR

The reactor is a circular cross-section constructed of carbon steel. In order to allow for routine service and inspection of the interior reactor, an access door complete with gaskets is included.

- "L" shaped reactor with circular cross section
  - Internally insulated: 8" thick, 8# density ceramic module insulation
  - Insulation rated for 2300°F
- Exterior shell painted with 2 coats of UV resistant polyurethane paint
- Reactor designed for a 1 second residence time at a temperature of 1500° F to guarantee a destruction efficiency of 98%
- **Optional catalyst insert** will be slid into a fully welded 321 or 309 stainless steel configuration with high temperature gasketing to ensure no VOC bypass
- Thermocouples will be located before and after the reactor (catalyst) to ensure proper temperature control
- Access door with gaskets

HEAT EXCHANGER (quoted as an option)

will be purchased if warranted by expected savings in natural gas cost.

- 50% nominal efficiency
- Shell and tube type design
- 321L or 309 stainless steel construction
- Continuously seam welded
- VOC laden air will pass through the shell side, hot purified air will pass through the tube side

FLAME ARRESTOR

- Metal grid type
- Placed between system fan and oxidizer inlet

LEL MONITOR (quoted as an option)

will be purchased

- With the fresh air dilution capability, a LEL monitor is not required, but provided as an option to meet the specifications
- Monitor located at oxidizer inlet with sufficient distance between the sensing point and isolation valve to allow the valve to shut on high alarm condition
- Monitor will shut down oxidizer at high LEL concentrations
- Control Instruments PrevEx flame type for quick response time

COMBUSTION AIR FAN B-2003

- Sized to provide the proper amount of fresh air to the burner for oxidation and temperature control
- Twin City Fan, New York Blower or equal
- Pre-piped and pre-wired
- Inlet filter
- Independent controlled fuel and combustion air valves

BURNER/GAS TRAIN

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

- Fuel source –natural gas
- Fuel Trains fabricated to FM Global specifications
- Burner selected to bring reactor up to oxidation temperature with 25% ambient air during start-up
- Burner will have capacity to maintain system operating temperature during VOC free, full flow conditions
- Expected system heat up time from cold start is 30-60 minutes
- 3" burner view port
- Fireye flame safety control with self-checking dynamic UV scanner

EXHAUST STACK

- Constructed of 304 stainless steel
- Supported by guy wires
- Two (2) EPA tests ports: 90° to each other

SYSTEM CONTROLS

The system controls are located in a NEMA 4 purged control panel enclosure to be mounted on the oxidizer skid. In the event of a system shutdown, the touch screen will indicate the cause of the shutdown via a digital message in English.

- NEMA 4 purged control panel enclosure to be mounted on oxidizer skid
- Allen Bradley MicroLogix PLC (Programmable Logic Controller) controls
- Allen Bradley Panelview Plus 600 color display
- Digital chart recorder: monitors Reactor Combustion Chamber temperature
- Ethernet modem for remote diagnostics and service support

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 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

- Two (2) hard copy sets of the Operation and Maintenance Manuals (O&M) containing the sequence of operation and drawings
- CD-ROM of all Vendor Bulletins

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
- Starting of burner and fuel train
- Warning labels are installed
- Test ports are installed
- Run electrical rigid conduit
- Fans and motors installed, cleared of debris and checked for quality
- Customer is invited to witness shop testing