FPL

December 13, 2010

Laxmana Tallam, P.E.
Palm Beach County Health Department
800 Clematis Street
West Palm Beach, FL 33402

RE: FPL 45th Street Terminal
Response to Request for Additional Information
Air Construction Permit Application

Dear Mr. Tallam:

Florida Power & Light Company (FPL) is pleased to submit to the Palm Beach County Health Department its response to a request for additional information received on September 28, 2010 for the FPL 45th Street air construction permit application file number 0990123-009-AC. The original application and this follow up information is provided to seek authorization to install and operate a natural gas compressor station at the existing 45th Street Terminal facility.

If you have any comments or questions regarding the attached, please feel free to contact me at (561) 691-7518 or Jacquelyn Lorne at (561) 691-7063. You may also contact Mr. Ken Kosky of Golder Associates at (352) 336-5600 for technical questions.

Sincerely,

Barbara P. Linkiewicz
Florida Power & Light Company
Director of Environmental Licensing

cc: Al Linero, FDEP Bureau of Air Regulations
Michael Halpin, FDEP Siting Office
Jackie Lorne, FPL

FPL Martin OSF & PDC; Air Construction Permit for Natural Gas Compressor Station

File No. 0990123-009-AC

Request for Additional Information September 28, 2010

This document provides the additional information requested dated September 28, 2010, concerning the minor source air construction permit for a natural gas compressor station to be located at Florida Power & Light Company's (FPL's) Martin OSF and PDC facility. The additional information is being provided in the same order as requested.

1. *Page 9, List of Pollutants*: All pollutants are classified as "A" (major source). Please revise appropriately.

Additional Information: Please find attached an updated "List of Pollutants Emitted by the Facility" reflecting the appropriate pollutant classifications.

2. *Page 29, Allowable Emissions for PM*: Please explain the basis for the 10% opacity. Is this limit requested by the permittee?

Additional Information: The basis for the 10-percent opacity is the exclusive use of natural gas. This opacity limit has been proposed for particulate matter (PM) emissions.

3. *Page 37, Detailed description of control Equipment*: Please submit details/specification for the catalytic converter as supplied by the manufacturer.

Additional Information: The catalytic converter for each compressor engine will be manufactured by MIRATECH® Corporation (or equivalent design). The MIRATECH® catalyst is composed of a proprietary steel foil coated with a high surface area alumina based material and a combination of catalytically active Platinum Group Metals (PGM). This combination of foil coating and active catalyst varies to best suit the application. Together these materials provide high specific catalyst activity, low pressure drop, and resistance to vibration and shock. The catalyst is assembled in a modular monolith design to provide easy maintenance, inspection, and cleaning of the catalyst. Each removable module has an integrated Easy Grab Handle (Patent Number 7,157,060) to improve sealing around the catalyst and provide a lifting surface for easier installation and removal. A manufacture brochure on MIRATECH® Corporation's oxidation catalyst is attached.

The MIRATECH® catalyst will consist of a VORTEX® catalyst substrate. VORTEX® is a corrugated foil substrate layered and stacked in an off-set angled channel pattern to form a rectangular catalyst element. At each point where adjacent layers overlap, the foil is electric resistance welded for increased durability. The overlapping channels also increase the turbulence of the exhaust as it flows through the element for improved reduction efficiencies. A manufacturer brochure describing the catalysts substrate is attached.

The MIRATECH® natural gas oxidation catalyst is designed to simultaneously reduce carbon monoxide (CO), hydrocarbon (HC), formaldehyde (CH_2O), and other hazardous air pollutants (HAPs) from lean burn natural gas engines operating with exhaust oxygen content greater than 4 percent (typically 5 to 15 percent). The oxidation catalyst requires a minimum exhaust temperature of 550 degrees Fahrenheit (°F) [288 degrees Celsius (°C)] for CO reduction but requires higher temperatures for hydrocarbon reduction. The chemical reactions that occur simultaneously across the oxidation catalyst include:

- $CO + 1/2\ O_2 => CO_2$
- $H_2 + 1/2\ O_2 => H_2O$
- $C_xH_y + O_2 => CO_2 + H_2O$
- $CH_2O + O_2 => CO_2 + H_2O$

The CO, HC, and CH_2O are converted into carbon dioxide (CO_2) and water.

The catalyst will be housed in in-line with the silences and exhaust stack. An example of the inline catalyst arrangement is attached. Please note Attachment OSF-EU1-13 has been revised to reflect the catalyst vendor.

4. *Page 3 of 4 of the Caterpillar details*: Note #8 states "THC, NMHC, and NMNEHC do not include aldehydes." Please revise the VOC estimations, if necessary.

Additional Information: It is not necessary to revise the VOC calculations as the information from Caterpillar reflects "NMNETC (VOCs)." Note 9 defines VOCs as "Volatile organic compounds as defined in U.S. Environmental Protection Agency (EPA) 40 Code of Federal Regulations (CFR) 60, Subpart JJJJ". The definition of volatile organic compounds (VOCs) in 40 CFR Part 60 Subpart JJJJ, Section 60.4248 is: "Volatile organic compounds means volatile organic compounds as defined in 40 CFR 51.100(s)." Pursuant to 40 CFR 50.100(s) VOC means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. This is the same definition of VOCs in Rule 62-210.200 Florida Administrative Code (F.A.C.): "Volatile Organic Compounds (VOC)" – Any one or more volatile organic compounds as defined at 40 CFR 51.100, adopted and incorporated by reference at Rule 62-204.800, F.A.C. Therefore the information provided is for VOCs as defined by the Florida Department of Environmental Protection (FDEP).

5. Please provide reasonable assurance that the catalytic converter meets the control efficiencies for CO and formaldehyde. Please note that the emission factors for formaldehyde increases as the load of the engine decreases.

Additional Information: The control efficiencies for CO and formaldehyde of 93 percent and 82 percent, respectively, will be achieved by using multiple catalyst elements. Please note that the guaranteed control efficiencies reflect minimum control efficiencies resulting in worst-case emissions. Also please see the additional information provide for Question 3.

Regarding the CO and formaldehyde emissions at lower loads, although there are the slightly higher emission rates at lower loads the mass uncontrolled emissions are much lower for lower loads. As a result, the emissions at full (100 percent) load reflect the maximum potential emissions. This is illustrated in Table 5-1. As shown in the table, the uncontrolled emission increases slightly but the mass emissions at 100-percent load is considerable. The control efficiencies will be maintained since there is no decrease in exhaust temperature, a primary factor in catalytic oxidation. As shown in the information provided for the Caterpillar G3612 engine, the exhaust temperatures at 100-, 75- and 50-percent loads are 838°F, 876°F, and 925°F, respectively. As shown by the data, the temperature is maintained at lower loads with no decrease in control efficiency.

Table 5-1
VOC and HCHO Emissions with Load

Load	Units	100%	75%	50%
Power	Bhp	3550	2663	1775
VOCs	g/bhp-hr	0.64	0.66	0.68
	g/hr	2272	1757.58	1207
HCHO	g/bhp-hr	0.4	0.44	0.48
	g/hr	1420	1171.72	852

bhp = brake horsepower

6. Our preliminary analysis of the compressor engines using AERMOD shows the 7th highest concentration exceeds the National Ambient Air Quality Standards (NAAQS) for NO2 (1-hour average time). Please provide reasonable assurance that this project does not exceed any of the NAAQS.

Additional information: Although air modeling is required for major sources or major modification, air modeling was performed as requested to address the potential nitrogen dioxide (NO_2) impacts for the natural gas-fired compressor engines compared to the ambient air quality standard (AAQS). The 1-hour NO_2 AAQS is met when the 3-year average of the 98th percentile of the daily 1 hour maximum concentrations is less than 100 parts per billion (ppb) [188 micrograms per cubic meter ($\mu g/m^3$)]. The annual NO_2 AAQS is 100 $\mu g/m^3$. It should be noted that NO_2 is the only pollutant that is above the significant emission rate for these engines' emissions if the facility were considered a major source. The pollutant emissions for other pollutants are below the significant emission rates and therefore would not trigger review for those pollutants even if it were considered a major source. As a result, estimated pollutant emission increases for other pollutants are considered to be insignificant and not expected to cause or contribute to exceedances of the NAAQS. Therefore, these analyses address only the NO_2 impacts for the natural gas-fired compressor engines.

To determine whether a project's emissions will not cause or contribute to a violation of an AAQS, EPA generally establishes significant impact levels (SILs) that would potentially limit the air modeling analyses required. If a project's impacts are predicted to be less than the SIL, then the project's impacts are presumed to be insignificant and no additional modeling is required to demonstrate compliance with the AAQS. If the project's impacts are predicted to be greater than the SIL, then additional analysis would be required to determine compliance.

The annual NO_2 SIL is 1 $\mu g/m^3$. EPA has not yet defined a SIL for NO_2 1-hour impacts. However, as guidance, EPA has recommended an interim 1-hour SIL of 7.5 $\mu g/m^3$ (4 ppb) based on 4 percent of the AAQS. This guidance is presented in EPA memo from Anna Marie Wood, Acting Director, Air Quality Policy Division, June 28, 2010. For the purposes of this analysis, the daily maximum 1-hour concentration is summarized for every year modeled and compared to the interim SIL of 7.5 $\mu g/m^3$.

The nitrogen oxide (NO_x) emission data and operating data for the compressor engines are those presented in the application. The maximum hourly and annual NO_x emissions from these engines are estimated to be 15.85 pounds per hour (lb/hr) and 68.6 tons per year (TPY), respectively.

Hourly concentrations were calculated using AERMOD, Version 09292, which is the most recent available version on EPA's Internet web site, Support Center for Regulatory Air Models (SCRAM) within the Technology Transfer Network (TTN). The following regulatory default options, as recommended by EPA, were used:

- Use of elevated terrain algorithms,
- Stack-tip downwash,
- Missing data processing routines,
- 4-hour half-life for exponential decay of sulfur dioxide (SO_2) for urban sources,
- Calm wind processing routines.

Meteorological data used in AERMOD to predict air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations from the National Weather Service (NWS) office located at the Palm Beach International Airport (PBI) and upper air sounding data collected in Miami at Florida International University. The 5-year period of the meteorological data is from 2001 through 2005.

Concentrations were calculated at receptors in a Cartesian receptor grid in which receptors were located at the following intervals and distances:

- Every 50 meters (m) along the facility's fenceline;
- Every 100 m from the fenceline to 2,000 m; and
- Every 250 m from 2,000 to 5,000 m.

The heights above mean sea level (msl) for all receptors were extracted from 1-second National Elevation Dataset (NED) data obtained from the US Geological Survey's seamless server. The NED data were extracted for all sources and receptors using AERMOD's terrain preprocessing program AERMAP, Version 09040.

EPA recommends a multi-tiered screening approach for estimating annual NO_2 concentrations, where the first two tiers are as follows:

- Tier 1 assumes full conversion of NO_x to NO_2
- Tier 2 assumes a 75 percent ambient equilibrium ratio of NO_2 to NO_x.

EPA requires justification if Tier 2 is used to estimate the 1-hour average concentrations. The Tier 2 approach was not used in this analysis for estimating the 1-hour average concentrations.

A summary of the results of this analysis is shown in Table 6-1. As shown in Table 6-1, the maximum 1-hour NO_2 concentrations for the project are predicted to be above the presumptive 1-hour SIL of 7.5 μg/m^3 and annual SIL of 1 μg/m^3. Therefore, additional analysis was performed to demonstrate compliance with the AAQS. For this analysis, the two existing boilers at the Martin OTF and PDC were modeled because they are the sources most likely to interact with the proposed engines, particularly for the 1-hour average concentrations. The maximum hourly and annual NO_x emission data for the boilers are estimated to be 9.1 lb/hr (residual oil-firing) and 16 TPY, respectively, are presented in the application. Total quality impacts were based on the project impacts added to a background concentration estimated from monitoring data. The total air quality impacts were based on the maximum 1-hour average concentration over the 5-year period based on EPA modeling guidance.

Monitoring data for NO_2 used to estimate non-modeled background concentrations were obtained from the FDEP monitor located in West Palm Beach (No. 12-099-1004)], Palm Beach County, and is the nearest NO_2 monitor to the facility. For this analysis, hourly NO_2 concentrations that were measured for the period when the project's impacts were predicted were assumed to represent background and added to the project's impacts to estimate total air quality impacts. The maximum annual NO_2 concentration measured at this monitor from 2005 to 2009 were assumed to represent non-modeled background concentration.

The results of this analysis to estimate total air quality impacts are shown in Table 6-2. Based on these modeling analyses, the maximum total 1-hour and annual NO_2 concentrations are predicted to be less than NO_2 AAQS.

A professional engineer's certification of the information being submitted is attached.

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: **Kennard F. Kosky** Registration Number: **14996**
2.	Professional Engineer Mailing Address... Organization/Firm: **Golder Associates Inc.**** Street Address: **6026 NW 1st Place** City: **Gainesville** State: **FL** Zip Code: **32607**
3.	Professional Engineer Telephone Numbers... Telephone: **(352) 336-5600** ext. Fax: **(352) 336-6603**
4.	Professional Engineer E-mail Address: **kkosky@golder.com**
5.	Professional Engineer Statement: *I, the undersigned, hereby certify, except as particularly noted herein*, that:* *(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and* *(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.* *(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.* *(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.* *(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.* Signature [signed] Date 12/13/10 (seal)

* Attach any exception to certification statement.

**Board of Professional Engineers Certificate of Authorization #00001670.

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
PM	**B**	**N**
PM10	**B**	**N**
VOC	**B**	**N**
SO2	**SM**	**N**
NOx	**SM**	**N**
CO	**SM**	**N**

MIRATECH CORPORATION INFORMATION

MIRATECH CORPORATION

Oxidation Catalysts for Gas Engines

PRODUCT ADVANTAGE

To handle carbon monoxide (CO), volatile organic compounds (VOCs), hazardous air pollutants (HAPs) and more, your best bet is the MIRATECH Oxidation Catalyst. Together with the MIRATECH SCR system, specially designed to reduce oxides of nitrogen (NOx) in the oxygen-rich leanburn engine exhaust stream, the MIRATECH Oxidation Catalyst keeps your operation on the right side of emissions regulations, with easy installation and maintenance – and fewer headaches for you and your people.

FEATURES AND BENEFITS

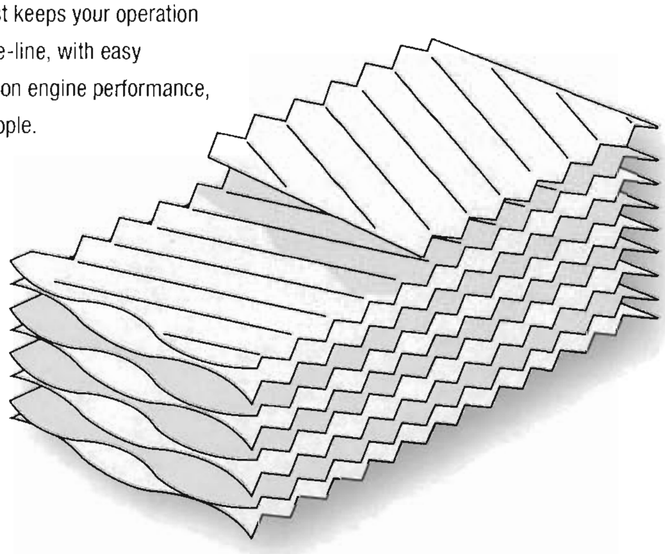
Efficient and Durable Solution

The VORTEX's corrugated substrate allows every layer of the catalyst to be stacked in an off-setting pattern. The off-set, aside from producing beneficial turbulence, forms overlapping points that are fused together by resistive welding. This makes the VORTEX significantly more efficient and durable than conventional open-foil catalysts.

The MIRATECH Oxidation Catalyst gives you a reliable, lowcost, no-hassle solution in lean-burn engine CO, hydrocarbons, VOCs and HAPs. Together with MIRATECH SCR control of lean-burn engine exhaust NOx, the Oxidation Catalyst keeps your operation on the right side of the noncompliance fine-line, with easy installation and maintenance, less impact on engine performance, and fewer headaches for you and your people.

Creates turbulent airflow through the length of the substrate

+ Improves catalytic reaction within the substrate channel
+ Reduces pollutants more effectively than open-foil catalysts
+ Stronger than conventional open-foil catalysts
+ Compatible with non-MIRATECH housings (including GT Exhaust Systems, Johnson Matthey and Maxim Designs)
+ Off-the-shelf availability for many sizes
+ Rectangular structure allows MIRATECH to modularly design catalysts of any size
+ Two-Year Warranty, only one in the *industry*



WHY MIRATECH?

- Advanced Technology
- Cost-Effective, Comprehensive Solutions
- Unsurpassed Experience & Expertise
- Fast, Responsive, Customer-Focused Service & Support
  - *Prevent Non-Compliance Fines*
  - *Improve Engine & Catalyst Performance*
  - *Cut Maintenance Costs*
  - *Maximize Catalyst Life*

INDUSTRY SOLUTIONS

- Gas Compression
- Power Generation
- Rail
- Marine
- Water Pumping
- Air Compression
- Drilling Rigs

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420 SOUTH 145TH EAST AVENUE • TULSA, OK 74108

MIRATECH CORPORATION

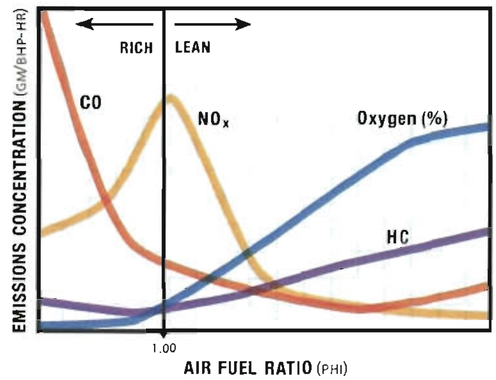
Oxidation Catalysts for Gas Engines

Better Designed. Better Built

Our Flat-Top Bonnettm design eliminates blow-by enhances catalyst efficiency. In real-world operation, nothing prevents nesting or resists vibration and shock better than the MIRATECH catalyst's corrugated metal foil construction – with the multi-layered honeycomb design adding durability. Chemisorption catalyst impregnation produces a cost-effective, long-lasting element that resists masking and catalyst "poisoning." And the patented MIRATECH banding and pinning process is your assurance of superior mechanical strength and high-temperature tolerance.

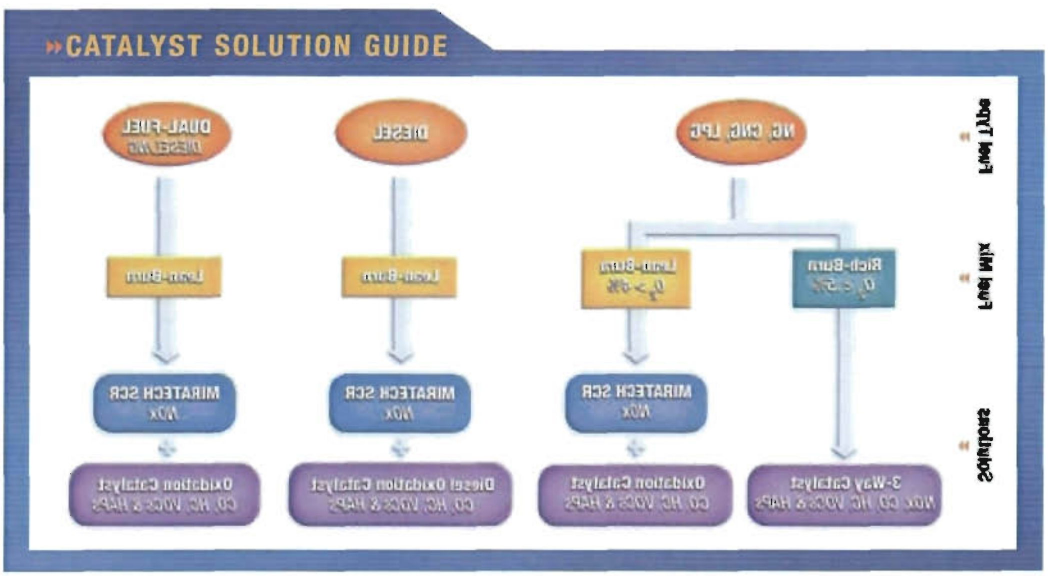
Each element is wrapped in tough, 304 stainless steel for virtual indestructibility, as well as personnel safety. The hard outer band, with its "Easy-Grab" lift-shelf, protects workers from injury and makes element insertion and removal quick and easy.

UNCONTROLLED EMISSIONS: RICH-BURN & LEAN-BURN ENGINES



MIRATECH Replacements

MIRATECH manufactures replacement elements for our MBA, EQ and IQ catalytic converters, as well as our RCS/RHS Catalyst-Silencer combos. Custom designs to replace elements from other manufacturers – with the hallmark quality, performance and value of MIRATECH Diesel Oxidation, 3-Way and Oxidation Catalysts – are also available.



O_2: Oxygen / CO: Carbon Monoxide / NO_x: Oxides of Nitrogen / HC: Hydrocarbons / VOCs: Volatile Organic Compounds / HAPs: Hazardous Air Pollutants

Contact MIRATECH

To learn more about MIRATECH emissions solutions, simply call us at 1.800.640.3141; email us at info@miratechcorp.com or visit our website at www.miratechcorp.com.

WHY MIRATEC HHAPS CATALYSTS?

Cost-Effective, No-Hassle, HAPs Compliance. Simultaneous Non-HAPs Compliance.

- Rich-Burn: CO, NOx, HC, VOCs
- Lean-Burn: CO, HC, VOCs
- Better Designed, Better Built, Better Value

APPLICATIONS

- Rich-Burn & Lean-Burn Stationary Engines
- Natural Gas, LPG, Diesel, Dual-Fuel
  - Gas Compression
  - Air Compression
  - Power Generation
  - Chillers
  - Water Pumps & Irrigation

SUMMARY OF FEATURES & BENEFITS

- Prevent Non-Compliance Fines
- Minimize Catalyst Cost Of Ownership & Operation
- Quick & Easy Element Insertion & Removal
- Flat-Top Bonnettm Design Eliminates Blow-By & Enhances Catalyst Efficiency
- Low Pressure-Drop
- Resists Vibration & Shock
- Minimize Impact On Engine Performance
- Durable & Long-Lasting
- 304 Stainless Steel Metal Monolith
  - Virtually Indestructible & Safer For Workers
- Patented Banded & Pinned Construction
  - Superior Mechanical Strength & Thermal Durability
- Independent Corrugated & Flat-Foil Construction Honeycomb Design
  - Prevents Nesting, Masking & "Poisoning"
- NEXT & VORTEX Two-Year Warranty

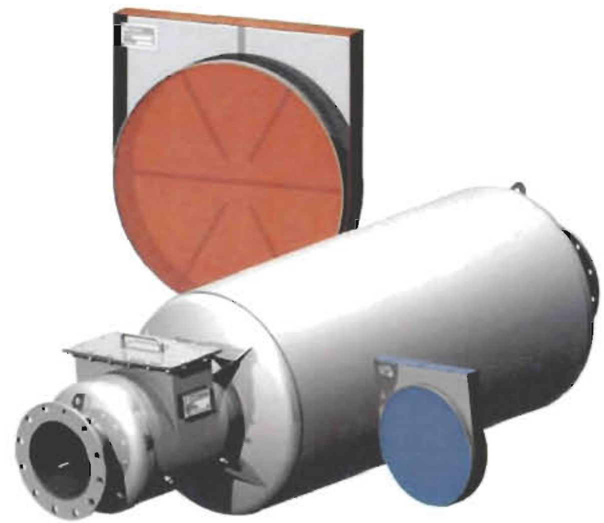
MIRATECH EMISSIONS SOLUTIONS

NEXT™ and VORTEX™

Greater Turbulence for Better Performance

Increased Strength for Enhanced Durability

NEXT - Round Substrate

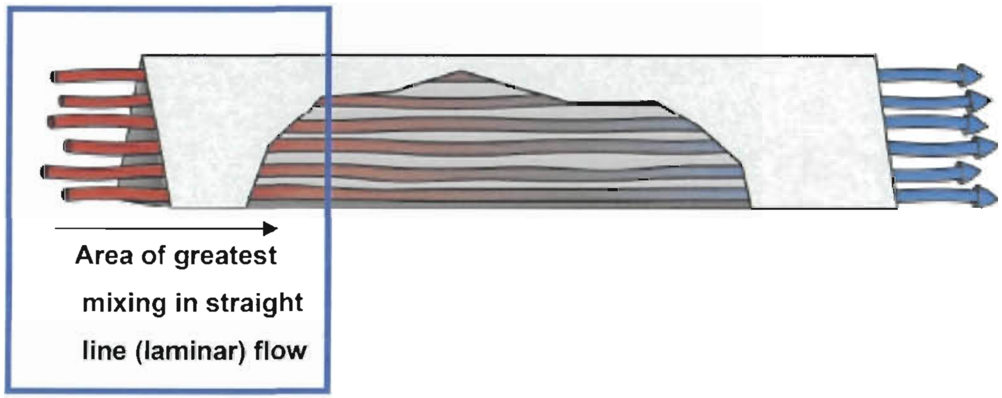


MIRATECH EMISSIONS SOLUTIONS

Turbulence is Important

Catalyst Reaction Basics

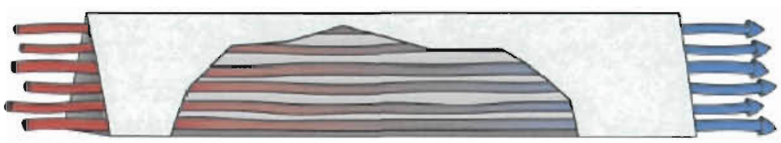
- Turbulent exhaust flow moving across the catalyst substrate yields better mixing with the catalyst precious metals in the substrate wash-coat.
- Laminar (straight-line) exhaust flow produces mixing only in the first fraction of the total catalyst substrate



MIRATECH
EMISSIONS SOLUTIONS

NEXT – Excellent Turbulence Factor

NEXT Has a superior Turbulence Factor (the percent of Turbulence across the length of the substrate)



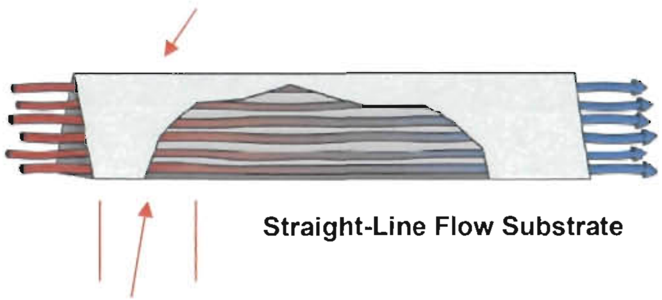
- **Straight line flow substrates -** Lack the turbulence-generating groves found in NEXT. Airflow is primarily laminar. Laminar exhaust flow diminishes catalyst capability because fewer pollutants are exposed to the precious metal compound that lines the walls of the substrate.

- **NEXT Catalyst Substrate** – Each groove in the NEXT substrate creates a separate turbulent zone in the channel. Multiple turbulent zones boost catalyst performance because more pollutants are allowed to react with the precious metal compound that lines the substrate

MIRATECH
EMISSIONS SOLUTIONS

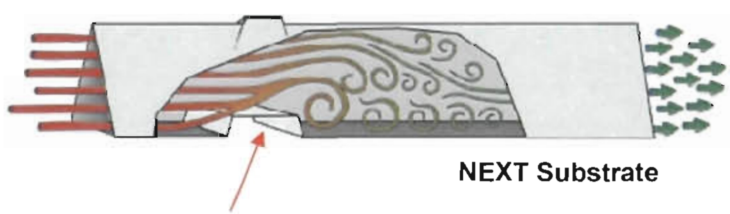
How NEXT Creates Turbulence

- 90% of chemical reactions happen in the turbulent area (the more the exhaust comes in contact with the catalyst, the better the reductions).



Straight-Line Flow Substrate

- The turbulent area occurs in only the first few millimeters of the substrate.



NEXT Substrate

- NEXT substrate has creases in the foil to create more turbulent zones (in turn improving performance).

NEXT Turbulent Zones

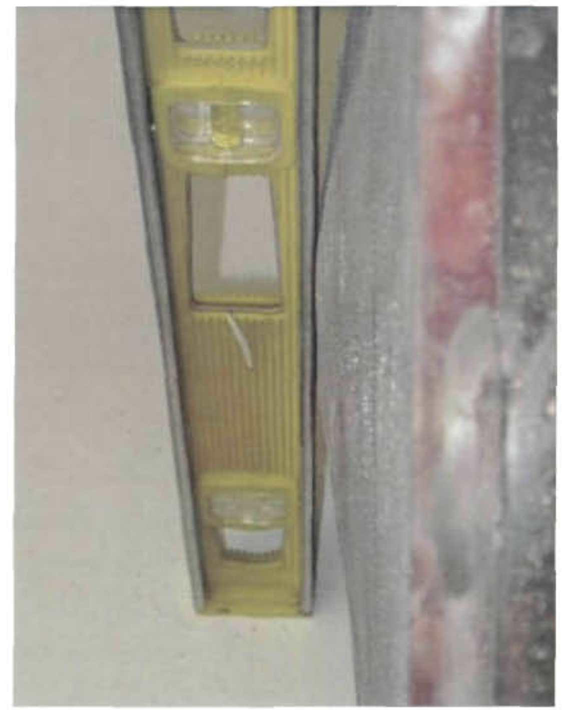
MIRATECH
EMISSIONS SOLUTIONS

Element Durability is Critical

Two Critical Issues of Sagging or Telescoping

- Catalyst performance: Sagging or telescoping of catalyst elements leads to gaps or leaks in the catalyst substrate channels - and untreated exhaust.

- Removing or replacing a sagging or telescoped catalyst element can be time-consuming, costly and difficult.



MIRATECH EMISSIONS SOLUTIONS

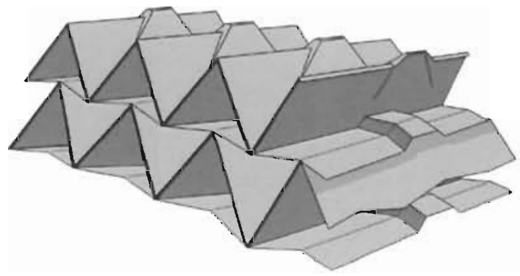
▸▸ NEXT Minimizes Telescoping/Sagging

- The grooves or creases in the MIRATECH NEXT enable every layer of the catalyst substrate to be interlocked.

- This feature not only strengthens NEXT, it reduces incidences of telescoping while still accommodating back-pressure limits.

- The self locking system joins the flat and corrugated strips together, making the matrix strong and stable.

- NEXT prevents the strip layers from telescoping.

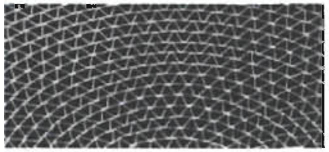


MIRATECH EMISSIONS SOLUTIONS

Open Frontal Area - Less Backpressure

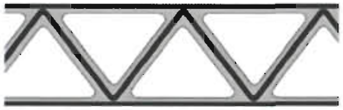
Why NEXT has lower backpressure than traditional substrate

- NEXT has higher percentage of open substrate frontal area (OFA) than traditional straight-line flow substrates. NEXT is optimized for maximum reactivity with low back pressure.



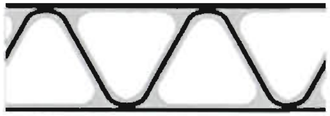
NEXT has high percentage of open frontal area

- The NEXT 60° triangular channels offer a maximum Open Frontal Area.



NEXT 1.7 OFA = 85 - 90%
Channel height = 1,7 mm

- A same sized traditional substrate will have more backpressure than NEXT.



Conventional Substrate
OFA = 70 - 80%
Channel height = 1,3 mm

MIRATECH EMISSIONS SOLUTIONS

NEXT Integration

NEXT Crosses Across Round MIRATECH Product Lines

- NEXT substrate will be used in the MN, MBA, QCC, QCH, IQ, RCS and RHS elements (MN and IQ element lines)
- Mantles will be required for the QCC, QCH, IQ, RCS and RHS elements

IQ Element

MN

MBA

IQ Housing

RCS/RHS

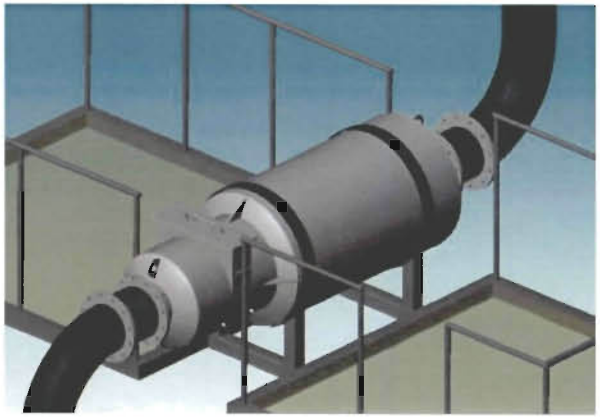
QCC/QHS

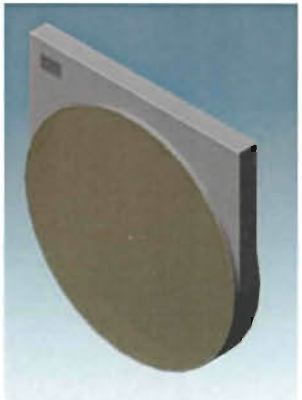
MIRATECH EMISSIONS SOLUTIONS

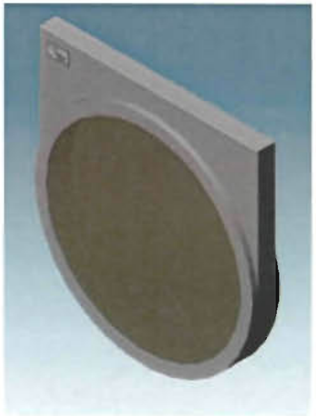
NEXT Field Test – Gills Onions

Gills Onions - California

- Caterpillar 3512 TA
  - 815 hp @ 1200 rpm
- MEC-2001-1
- RCS-3626-14-C2 (Prototype Housing)
  - 25.345" Exposed Diameter "C" Elements
  - 22.875" Exposed Diameter NEXT elements







NEXT Field Test Data

NEXT Exceeds SCAQMD Limits for NOx and CO

Gills Onions Round NEXT Prototype Testing Form

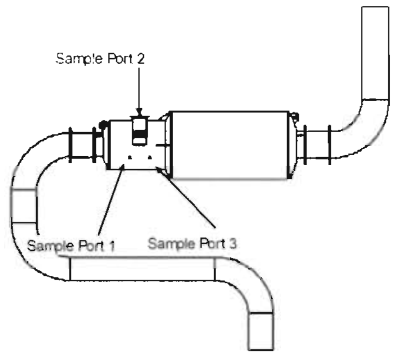
INSTALLATION DATE: August 16, 2002 ENG. INSTALLATION HOURS: 8719

ENGINE SET-UP INFORMATION	
Date:	August 16, 2002
Actual Load:	100%
Actual RPM:	1190
Avg. Exhaust Velocity (ft/min):	
Pipe ID (in):	12
EGO Target:	768 / 700

PACKAGE INFORMATION	
Engine Make:	Caterpillar
Engine Model:	G3512TA
Rated Power:	815
Rated RPM:	1200
Air/Fuel Controller:	MEC-2001-1

SCAQMD LIMITS	
Nox	30 ppm
CO	200 ppm

EXHAUST GAS DATA	Engine Out Port	NEXT Layer 1 Port	Next Layer 2 Port
NO (ppm):	29.54.2	77.7	2.5
NO2(ppm):	81.2	0.0	0.0
NOx (ppm):	3035.4	77.7	2.5
CO (ppm):	3583.5	30.6	0.0
CO2 (%):	11.6	11.7	11.7
O2 (%):	0.2	0.0	0.0
Combustibles (%)	0.00	0.00	0.00
Temp (F):	833	895	874
Exhaust Back Pressure(in Hg):			



ENGINE RUN DATA			
Intake Man Press (psia/kpa):	25.4		
Intake Manifold Tempature:	127		
Valve Position:			
Engine Hours:	9261		
MEC Hours:			
Installation MEC Hours:	7737	MEC Run Hrs:	-7737.0
Ambient Conditions:	Clear calm 76 f		

REDUCTION	MID	POST
NOx	97.44	96.78
CO	99.15	100.00
CO2	-0.86	0.00
O2	100.00	#DIV/0!
Combust	#DIV/0!	#DIV/0!
Temp	62	-21
Exhaust BP	0.00	0.00
Operating Hrs.		

NOTES

MIRATECH EMISSIONS SOLUTIONS

NEXT Availability – IQ Replacements

NEXT Inventory Means Better Element Availability

- **NEXT Raw Materials On-Hand**
  - **Past sales history plus 50%**
- **NEXT Finished Elements**
  - **1-6 elements based on sales history for each IQ element size**
- **Better Availability**
  - **Increased raw materials on-hand, plus**
  - **Increased finished materials in stock, plus**
  - **Fabrication lead times are shortened, plus**
  - **Equals: OUT THE DOOR SOONER**

NEXT Marketing Materials

- Sales Flyer
  - Printed
  - .PDF
- Web Site Download Availability
- PowerPoint
- Press Release

MIRATECH
EMISSIONS SOLUTIONS

NEXT – Features/Benefits

NEXT FEATURE	NEXT BENEFIT
NEXT has a superior Turbulent Factor (T-Factor). Four Turbulent Zones (entrance and three grooves) creates turbulent exhaust flow through the length of the substrate.	NEXT has greater turbulence and less backpressure across the length of the catalyst substrate. In straight line foil substrates, 90% of the catalyst reaction occurs in the first half-inch of the element. NEXT's grooved design and four turbulent zones means improved mixing for better catalyst performance.
NEXT spreads ash and poison deposits over four zones.	Longer lasting catalyst, longer intervals between washings.
Every layer of catalyst is mechanically interlocked with NEXT's grooved design.	NEXT is stronger than conventional open foil catalyst. NEXT reduces catalyst sagging with increased structural durability. NEXT Virtually eliminates telescoping which means easier insertion and removal.
Top Hat With Easy Grab Handle	Easier handling and serviceability
Interlocked grooved foil design eliminates the need for pinning.	Eliminates durability problems associated with pinning.
NEXT finished elements in stock and on the shelf for MIRATECH IQ and RCS/RHS.	Best in industry availability for new or replacement elements. Same day shipping on orders received as late as 3 p.m. CST.
NEXT is compatible with non-MIRATECH housings (including DCL, Johnson Matthey, Sud-Chemi and others).	MIRATECH is your one-stop-shop for catalyst elements.
Low pressure drop. Lower backpressure than traditional substrates	Engines breathe easier plus better exhaust system flexibility.
24 month warranty of catalyst	Durable and dependable performance you can trust

MIRATECH
EMISSIONS SOLUTIONS

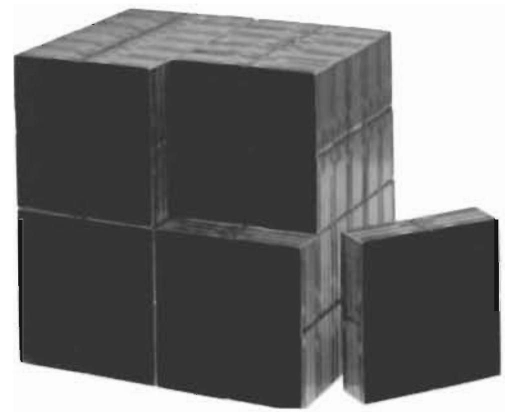
VORTEX - Rectangular Substrate

MIRATECH
EMISSIONS SOLUTIONS

VORTEX Products/Markets

Rectangular Elements for Targeted Markets

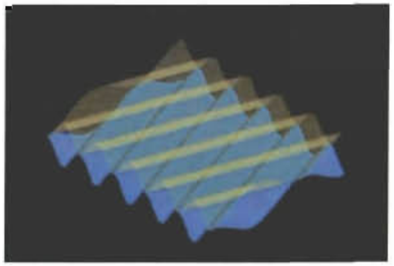
- **V-CAT - Locomotive Marine Engine Applications**
  - **Large Horsepower/Diesel Oxidation**
- **Ground Access – Gas Compression Application**
  - **Large Horsepower/Oxidation**
- **VXC – Gas Compression with Integrated Silence**
  - **Low Horsepower (50 to 240 hp) 3-Way**
- **ZCS/ZHS**
  - **Mid-range Horsepower/3-way and Oxidation**
- **GT/Maxim/Englehard replacement**
  - **Mid-range Horsepower (1,000 – 3,000 hp) 3-**

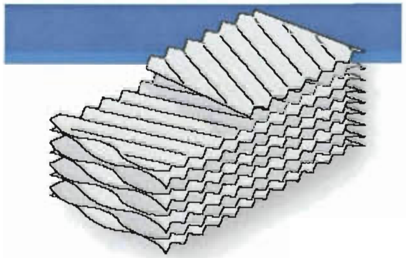


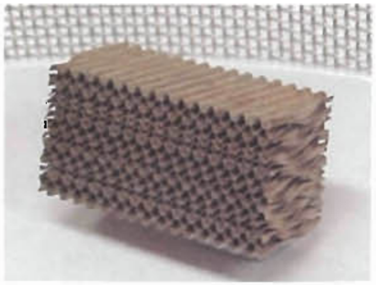
VORTEX – Turbulence & Strength

VORTEX Design Provides Turbulence & Strength

- **VORTEX's corrugated foil substrate yields superior static mixing, mass transfer and stability.**
- **VORTEX is layered and stacked in an off-setting angled-channel pattern. This prevents nesting**
- **Each overlapping point is electronically resistant welded for superior strength.**
- **The angled overlapping channels combined with resistant weld-points creates turbulent air-flow through the length of the substrate.**







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VORTEX Marketing Materials

- Sales Flyer
  - Printed
  - PDF
- Web Site Download Availability
- PowerPoint
- Press Release

MIRATECH
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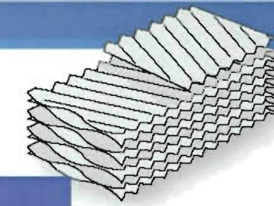
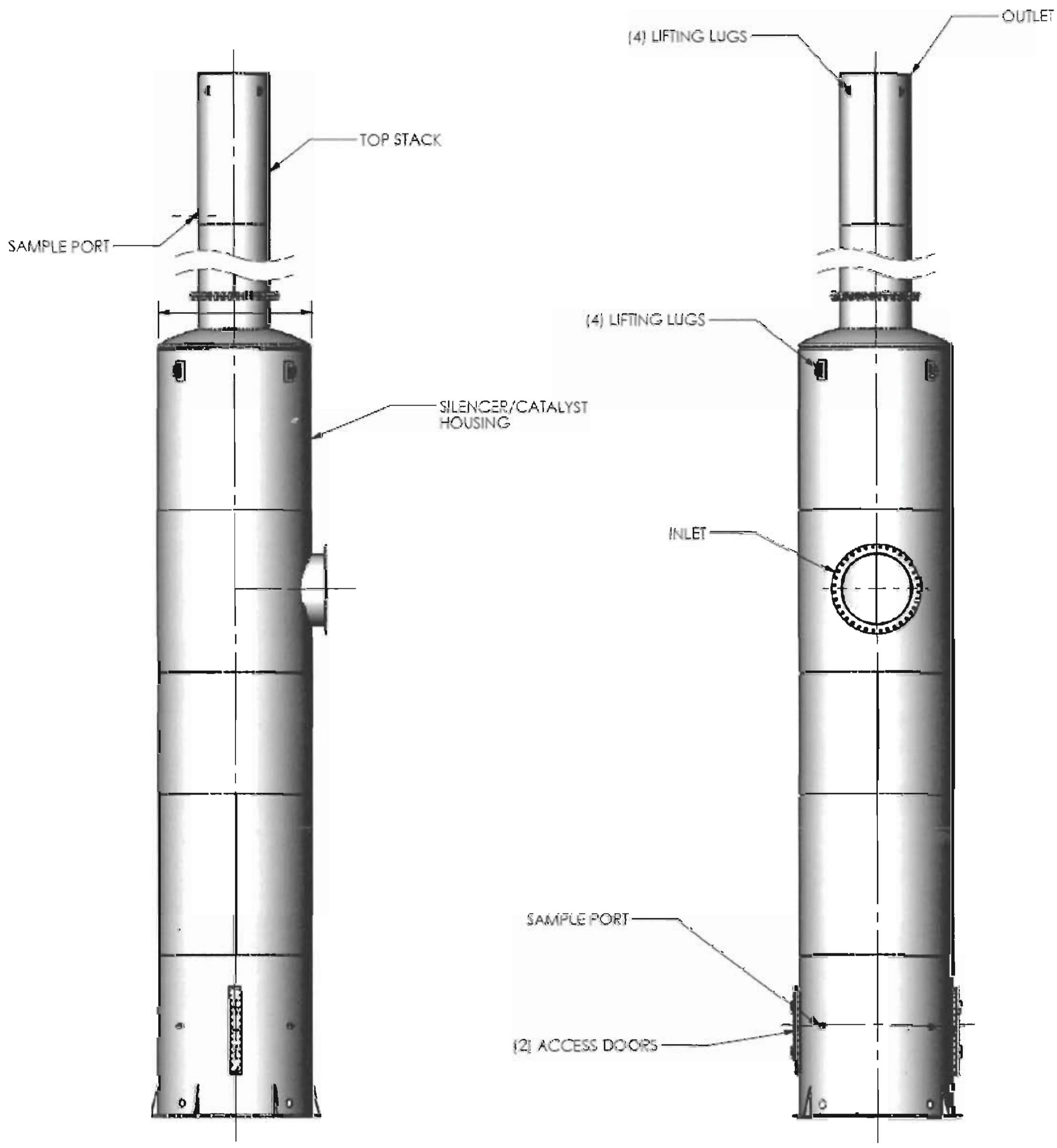
VORTEX – Features/Benefits



VORTEX FEATURE	VORTEX BENEFIT
Superior Turbulent Factor (T-Factor).	Angled overlapping channels combined with resistant weld-points creates turbulent air-flow through the length of the substrate.
Multiple turbulent zones.	Opposing layers are offset to create turbulent airflow and static mixing of gases through the length of the substrate for improved catlytic reaction, reducing pollutants more than traditional straight-line flow substrates.
Electrical resistant welding at contact points.	Tougher more durable substrate. Reduced telescoping issues.
Offset layers.	Eliminates element nesting.
Compatible with non-MIRATECH housings (including GT, Maxim and WPI , Johnson Matthey.	MIRATECH is your one-stop-shop for catalyst elements.
Lower backpressure than traditional substrates.	Engines breathe easier plus better exhaust system flexibility.
24 month warranty of catalyst	Durable and dependable performance you can trust
Banding	Provides operator protection and sealing support.

MIRATECH
EMISSIONS SOLUTIONS



FRONT VIEW

RIGHT VIEW

MIRATECH EMISSIONS SOLUTIONS

Ground Acces
Preliminary Drawing

PROJECT NUMBER	-
SALES ORDER NO.	-
FABRICATION P.O.	-

PROPRIETARY AND CONFIDENTIAL

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DO NOT SCALE DRAWING

DRAWN	DATE	SIZE	REV
DAF	5/7/2008	A	0

REVIEWED BY	DATE
-	-

ATTACHMENT OSF-EU1-I3

CONTROL EQUIPMENT PARAMETERS (a)

CATALYTIC CONVERTER

Manufacturer		MIRATECH Corporation*	
Model No.		SP-RHSIGA-66S2424-20x41-28-H4*	
Date of Installation		2011	
Inlet/Outlet Pipe Size		28	inches
Inlet Height		16.5	feet
Overall Height		50	feet
Diameter		66	inches
Converter Pressure Loss		5.34	inches
Temperature Limits (Inlet)		550-1,250	°F
Control Efficiency*	- Carbon Monoxide	93	%
	- Volatile organic Compounds	67	%
	- Formaldehyde	82	%

*Or equivalent.

Based on manufacturer's quote.

TABLE 6-1
SUMMARY OF MAXIMUM NO2 CONCENTRATIONS PREDICTED FOR 4 COMPRESSOR UNITS COMPARED TO EPA CLASS II SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Time	Year	Maximum Concentration[a] ($\mu g/m^3$)	EPA Class II Significant Impact Levels [b] (ug/m^3)
NO_2 (Tier 1)[c]	Annual	2001	19.2	1
		2002	20.9	
		2003	19.5	
		2004	21.5	
		2005	18.9	
	1-Hour	2001	144	7.5
		2002	145	
		2003	146	
		2004	146	
		2005	148	
NO_2 (Tier 2)[c]	Annual	2001	14.4	1
		2002	15.7	
		2003	14.6	
		2004	16.1	
		2005	14.2	

[a] Based on highest predicted concentrations from AERMOD using five years of hourly surface and and upper air data from the National Weather Service stations at Palm Beach International Airport and Florida International University, respectively.

[b] 1-hour SIL based on assumed SIL of 4% of AAQS.

[c] Tier 1 approach assumes 100% conversion of NO_x to NO_2 emissions. Tier 2 approach is based on Tier 1 results and assumes annual national default NO_2 to NO_x ratio of 0.75.

TABLE 6-2
SUMMARY OF MAXIMUM NO2 CONCENTRATIONS PREDICTED
4 COMPRESSOR UNITS AND BOILERS COMPARED TO AAQS

Pollutant	Averaging Time	Year	Maximum Concentration (µg/m³)[a] Modeled Sources	Back-ground	Total	AAQS (ug/m³)
NO_2	Annual[c]	2001	15.5	19	35	100
		2002	16.5	19	36	
		2003	16.0	19	35	
		2004	17.4	19	36	
		2005	15.8	19	35	
	1-Hour	5-year average[b] based on:			173	188
		2001	158	32	190	
		2002	157	21	178	
		2003	152	11	163	
		2004	159	8	166	
		2005	155	11	166	

[a] Based on highest predicted concentrations from AERMOD using five years of hourly surface and and upper air data from the National Weather Service stations at Palm Beach International Airport and Florida International University, respectively.

[b] Modeled source impacts based on 98th percentile.

[c] Based on Tier 2 approach using annual national default NO_2 to NO_x ratio of 0.75.