**TITLE V OPERATION PERMIT
APPLICATION FOR
LAKELAND ELECTRIC WINSTON
PEAKING STATION PROJECT
POLK COUNTY, FLORIDA**



**Prepared For:
Lakeland Electric – Power Supply
City of Lakeland
501 East Lemon Street
Lakeland, Florida 33801**

**Prepared By:
Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500**

**March 2002
0137671**

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2 Copies - Lakeland Electric – Environmental Affairs
1 Copy - Golder Associates Inc.**

# Department of Environmental Protection

## Division of Air Resources Management

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## APPLICATION FOR AIR PERMIT - TITLE V SOURCE

See Instructions for Form No. 62-210.900(1)

## I. APPLICATION INFORMATION

**Identification of Facility**

| | |
|---|---|
| 1. Facility Owner/Company Name: **Lakeland Electric** | |
| 2. Site Name: **Winston Peaking Station** | |
| 3. Facility Identification Number: **1050352** [ ] Unknown | |
| 4. Facility Location: Street Address or Other Locator: **1200 Airport Road** City: **Lakeland** County: **Polk** Zip Code: **33811** | |
| 5. Relocatable Facility? [ ] Yes [ X ] No | 6. Existing Permitted Facility? [ X ] Yes [ ] No |

**Application Contact**

| |
|---|
| 1. Name and Title of Application Contact: **Ms. Farzie Shelton, Manager of Environmental Affairs** |
| 2. Application Contact Mailing Address: Organization/Firm: **Lakeland Electric** Street Address: **501 E. Lemon Street** City: **Lakeland** State: **FL** Zip Code: **33801-5079** |
| 3. Application Contact Telephone Numbers: Telephone: ( **863** ) **834 - 6603** Fax: ( **863** ) **834 – 8187** |

**Application Processing Information (DEP Use)**

| | |
|---|---|
| 1. Date of Receipt of Application: | 4/1/02 |
| 2. Permit Number: | 1050352-002-AV |
| 3. PSD Number (if applicable): | |
| 4. Siting Number (if applicable): | |

## Purpose of Application

### Air Operation Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[ ] Initial Title V air operation permit for an existing facility which is classified as a Title V source.

[ X ] Initial Title V air operation permit for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: **1050352-001-AC**

[ ] Title V air operation permit revision to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: ____________________

Operation permit number to be revised: ____________________

[ ] Title V air operation permit revision or administrative correction to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. (Also check Air Construction Permit Application below.)

Operation permit number to be revised/corrected: ____________________

[ ] Title V air operation permit revision for reasons other than construction or modification of an emissions unit. Give reason for the revision; e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit number to be revised: ____________________

Reason for revision: ____________________

### Air Construction Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[ ] Air construction permit to construct or modify one or more emissions units.

[ ] Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

[ ] Air construction permit for one or more existing, but unpermitted, emissions units.

## Owner/Authorized Representative or Responsible Official

1. Name and Title of Owner/Authorized Representative or Responsible Official:
   **Keith Hulbert, General Manager**

2. Owner/Authorized Representative or Responsible Official Mailing Address:
   Organization/Firm: **Lakeland Electric**
   Street Address: **501 East Lemon Street**
   City: **Lakeland** State: **FL** Zip Code: **33801-5079**

3. Owner/Authorized Representative or Responsible Official Telephone Numbers:
   Telephone: **( 863 ) 834 - 6541** Fax: **( 863 ) 834 - 6373**

4. Owner/Authorized Representative or Responsible Official Statement:

   *I, the undersigned, am the owner or authorized representative*(check here [ ], if so) or the responsible official (check here [* **X** *], if so) of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*

   Keith C. Hulbert (signature) 3/29/02

   Signature Date

* Attach letter of authorization if not currently on file.

## 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: **6241 NW 23rd Street, Suite 500**
   City: **Gainesville** State: **FL** Zip Code: **32653-1500**

3. Professional Engineer Telephone Numbers:
   Telephone: **( 352 ) 336 - 5600** Fax: **( 352 ) 336 - 6603**

4. 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.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [**X**], 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 schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit 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.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [**X**], 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: [signature] Date: 3/13/02

(seal)

* Attach any exception to certification statement.

Scope of Application

| Emissions Unit ID | Description of Emissions Unit | Permit Type | Processing Fee |
|---|---|---|---|
| 001- 020 | 20 GM EMD 20/645/E4B Diesel Engines and Associated Electric Generators | | |
| -- | Unregulated Emissions | | |
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Application Processing Fee

Check one: [ ] Attached - Amount: $: ____________ [ X ] Not Applicable

## Construction/Modification Information

| |
|---|
| 1. Description of Proposed Project or Alterations: |
| 2. Projected or Actual Date of Commencement of Construction: |
| 3. Projected Date of Completion of Construction: |

## Application Comment

**Initial Title V Operation Permit Application. The facility has the ability to fire distillate oil and natural gas. The facility currently uses distillate oil. Natural gas connections will be made in the future with compliance tests performed at that time.**

# II. FACILITY INFORMATION

## A. GENERAL FACILITY INFORMATION

### Facility Location and Type

| | | | |
|---|---|---|---|
| 1. Facility UTM Coordinates:<br>Zone: **17** | East (km): **400.2** | North (km): **3100.6** | |
| 2. Facility Latitude/Longitude:<br>Latitude (DD/MM/SS): **28 / 01 / 45** | | Longitude (DD/MM/SS): **82 / 00 / 53** | |
| 3. Governmental Facility Code:<br>**0** | 4. Facility Status Code:<br>**A** | 5. Facility Major Group SIC Code:<br>**49** | 6. Facility SIC(s):<br>**4911** |
| 7. Facility Comment (limit to 500 characters):<br>**The Winston Peaking Station consists of 20 nominal 2.5-MW GM EMD 20/645/E4B diesel engines, associated generators and a 294,000-gallon fuel oil storage tank. Each engine uses SCR and air/fuel ratio regulators for emission control. The units provide a nominal 50 MW of electrical power collectively. The fuel for the engines is distillate fuel oil with a maximum sulfur content of 0.05 % and natural gas. The facility can operate one single emission unit or all twenty emission units or in combination of. To accommodate "Attachment WP-FI-C10", Section G of this application the emissions have been characterized for the facility.** | | | |

### Facility Contact

| | | |
|---|---|---|
| 1. Name and Title of Facility Contact:<br>**Ms. Farzie Shelton, Manager of Environmental Affairs** | | |
| 2. Facility Contact Mailing Address:<br>Organization/Firm: **Lakeland Electric**<br>Street Address: **501 E. Lemon Street**<br>City: **Lakeland** | State: **FL** | Zip Code: **33801-5079** |
| 3. Facility Contact Telephone Numbers:<br>Telephone: ( **863** ) **834 - 6603** | Fax: ( **863** ) **834 - 8187** | |

## Facility Regulatory Classifications

**Check all that apply:**

| | |
|---|---|
| 1. [ ] Small Business Stationary Source? | [ ] Unknown |
| 2. [ X ] Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)? | |
| 3. [ ] Synthetic Minor Source of Pollutants Other than HAPs? | |
| 4. [ ] Major Source of Hazardous Air Pollutants (HAPs)? | |
| 5. [ ] Synthetic Minor Source of HAPs? | |
| 6. [ X ] One or More Emissions Units Subject to NSPS? | |
| 7. [ ] One or More Emission Units Subject to NESHAP? | |
| 8. [ ] Title V Source by EPA Designation? | |
| 9. Facility Regulatory Classifications Comment (limit to 200 characters):<br><br>**Emissions for the facility will be less than 250 TPY per each primary pollutant. NSPS Subpart Kb applies to the fuel oil storage tank.** | |

## List of Applicable Regulations

| | |
|---|---|
| **See Attachment WP-FI-A** | |
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## B. FACILITY POLLUTANTS

**List of Pollutants Emitted**

| 1. Pollutant Emitted | 2. Pollutant Classif. | 3. Requested Emissions Cap lb/hour | tons/year | 4. Basis for Emissions Cap | 5. Pollutant Comment |
|---|---|---|---|---|---|
| **$PM_{10}$** | **B** | | | | **Particulate Matter-$PM_{10}$** |
| **VOC** | **B** | | | | **Volatile Organic Compounds** |
| **$SO_2$** | **B** | | | | **Sulfur Dioxide** |
| **$NO_x$** | **A** | | **249.9** | **ESCPSD** | **Nitrogen Oxides** |
| **CO** | **A** | | | | **Carbon Monoxides** |
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## C. FACILITY SUPPLEMENTAL INFORMATION

**Supplemental Requirements**

| | |
|---|---|
| 1. | Area Map Showing Facility Location:<br>[ X ] Attached, Document ID: WP-FI-C1 [ ] Not Applicable [ ] Waiver Requested |
| 2. | Facility Plot Plan:<br>[ X ] Attached, Document ID: WP-FI-C2 [ ] Not Applicable [ ] Waiver Requested |
| 3. | Process Flow Diagram(s):<br>[ X ] Attached, Document ID: WP-FI-C3 [ ] Not Applicable [ ] Waiver Requested |
| 4. | Precautions to Prevent Emissions of Unconfined Particulate Matter:<br>[ X ] Attached, Document ID: WP-FI-C4 [ ] Not Applicable [ ] Waiver Requested |
| 5. | Fugitive Emissions Identification:<br>[ X ] Attached, Document ID: WP-FI-C5 [ ] Not Applicable [ ] Waiver Requested |
| 6. | Supplemental Information for Construction Permit Application:<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable |
| 7. | Supplemental Requirements Comment: |

## Additional Supplemental Requirements for Title V Air Operation Permit Applications

| |
|---|
| 8. List of Proposed Insignificant Activities:<br>[ X ] Attached, Document ID: WP-FI-C8 [ ] Not Applicable |
| 9. List of Equipment/Activities Regulated under Title VI:<br>[ ] Attached, Document ID:________<br>[ ] Equipment/Activities On site but Not Required to be Individually Listed<br>[ X ] Not Applicable |
| 10. Alternative Methods of Operation:<br>[ X ] Attached, Document ID: WP-FI-C10 [ ] Not Applicable |
| 11. Alternative Modes of Operation (Emissions Trading):<br>[ ] Attached, Document ID:_________ [ X ] Not Applicable |
| 12. Identification of Additional Applicable Requirements:<br>[ X ] Attached, Document ID: WP-FI-C12 [ ] Not Applicable |
| 13. Risk Management Plan Verification:<br>[ ] Plan previously submitted to Chemical Emergency Preparedness and Prevention Office (CEPPO). Verification of submittal attached (Document ID:________) or previously submitted to DEP (Date and DEP Office:_____ __________________)<br>[ ] Plan to be submitted to CEPPO (Date required:____________________________)<br>[ X ] Not Applicable* |
| 14. Compliance Report and Plan:<br>[ X ] Attached, Document ID: WP-FI-C14 [ ] Not Applicable |
| 15. Compliance Certification (Hard-copy Required):<br>[ X ] Attached, Document ID: WP-FI-C15 [ ] Not Applicable |

* RMP not required for on-site ammonia storage due to $NH_3$ concentration of less than 19% at all times.

# ATTACHMENT WP-FI-A

# LIST OF APPLICABLE REGULATIONS

# Attachment WP-FI-A Title V Core List Effective: 3/01/02

[**Note:** The Title V Core List is meant to simplify the completion of the "List of Applicable Regulations" for DEP Form No. 62-210.900(1), Application for Air Permit - Long Form. The Title V Core List is a list of rules to which all Title V Sources are presumptively subject. The Title V Core List may be referenced in its entirety, or with specific exceptions. The Department may periodically update the Title V Core List.]

***Federal:*** ***(description)***

40 CFR 61, Subpart M: NESHAP for Asbestos.

40 CFR 82: Protection of Stratospheric Ozone.
40 CFR 82, Subpart B: Servicing of Motor Vehicle Air Conditioners (MVAC).
40 CFR 82, Subpart F: Recycling and Emissions Reduction.

***State:*** ***(description)***

**CHAPTER 62-4, F.A.C.: PERMITS**, effective 06-01-01

62-4.030, F.A.C.: General Prohibition.
62-4.040, F.A.C.: Exemptions.
62-4.050, F.A.C.: Procedure to Obtain Permits; Application.
62-4.060, F.A.C.: Consultation.
62-4.070, F.A.C.: Standards for Issuing or Denying Permits; Issuance; Denial.
62-4.080, F.A.C.: Modification of Permit Conditions.
62-4.090, F.A.C.: Renewals.
62-4.100, F.A.C.: Suspension and Revocation.
62-4.110, F.A.C.: Financial Responsibility.
62-4.120, F.A.C.: Transfer of Permits.
62-4.130, F.A.C.: Plant Operation - Problems.
62-4.150, F.A.C.: Review.
62-4.160, F.A.C.: Permit Conditions.
62-4.210, F.A.C.: Construction Permits.
62-4.220, F.A.C.: Operation Permit for New Sources.

**CHAPTER 62-210, F.A.C.: STATIONARY SOURCES - GENERAL REQUIREMENTS**, effective 06-21-01

62-210.300, F.A.C.: Permits Required.
62-210.300(1), F.A.C.: Air Construction Permits.
62-210.300(2), F.A.C.: Air Operation Permits.
62-210.300(3), F.A.C.: Exemptions.
62-210.300(5), F.A.C.: Notification of Startup.
62-210.300(6), F.A.C.: Emissions Unit Reclassification.
62-210.300(7), F.A.C.: Transfer of Air Permits.

62-210.350, F.A.C.: Public Notice and Comment.
62-210.350(1), F.A.C.: Public Notice of Proposed Agency Action.
62-210.350(2), F.A.C.: Additional Public Notice Requirements for Emissions Units Subject to Prevention of Significant Deterioration or Nonattainment-Area Preconstruction Review.
62-210.350(3), F.A.C.: Additional Public Notice Requirements for Sources Subject to Operation Permits for Title V Sources.

62-210.360, F.A.C.: Administrative Permit Corrections.
62-210.370(3), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility.
62-210.400, F.A.C.: Emission Estimates.
62-210.650, F.A.C.: Circumvention.
62-210.700, F.A.C.: Excess Emissions.

62-210.900, F.A.C.: Forms and Instructions.
62-210.900(1), F.A.C.: Application for Air Permit – Title V Source, Form and Instructions.
62-210.900(5), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility, Form and Instructions.
62-210.900(7), F.A.C.: Application for Transfer of Air Permit – Title V and Non-Title V Source.

**CHAPTER 62-212, F.A.C.: STATIONARY SOURCES - PRECONSTRUCTION REVIEW**, effective 08-17-00

**CHAPTER 62-213, F.A.C.: OPERATION PERMITS FOR MAJOR SOURCES OF AIR POLLUTION**, effective 04-16-01

62-213.205, F.A.C.: Annual Emissions Fee.
62-213.400, F.A.C.: Permits and Permit Revisions Required.
62-213.410, F.A.C.: Changes Without Permit Revision.
62-213.412, F.A.C.: Immediate Implementation Pending Revision Process.
62-213.415, F.A.C.: Trading of Emissions Within a Source.
62-213.420, F.A.C.: Permit Applications.
62-213.430, F.A.C.: Permit Issuance, Renewal, and Revision.
62-213.440, F.A.C.: Permit Content.
62-213.450, F.A.C.: Permit Review by EPA and Affected States
62-213.460, F.A.C.: Permit Shield.

62-213.900, F.A.C.: Forms and Instructions.
62-213.900(1), F.A.C.: Major Air Pollution Source Annual Emissions Fee Form.
62-213.900(7), F.A.C.: Statement of Compliance Form.

**CHAPTER 62-296, F.A.C.: STATIONARY SOURCES - EMISSION STANDARDS,** effective 03-02-99

62-296.320(4)(c), F.A.C.: Unconfined Emissions of Particulate Matter.

62-296.320(2), F.A.C.: Objectionable Odor Prohibited.

**CHAPTER 62-297, F.A.C.: STATIONARY SOURCES - EMISSIONS MONITORING**, effective 03-02-99

62-297.310, F.A.C.: General Test Requirements.
62-297.330, F.A.C.: Applicable Test Procedures.
62-297.340, F.A.C.: Frequency of Compliance Tests.
62-297.345, F.A.C.: Stack Sampling Facilities Provided by the Owner of an Emissions Unit.
62-297.350, F.A.C.: Determination of Process Variables.
62-297.570, F.A.C.: Test Report.
62-297.620, F.A.C.: Exceptions and Approval of Alternate Procedures and Requirements.

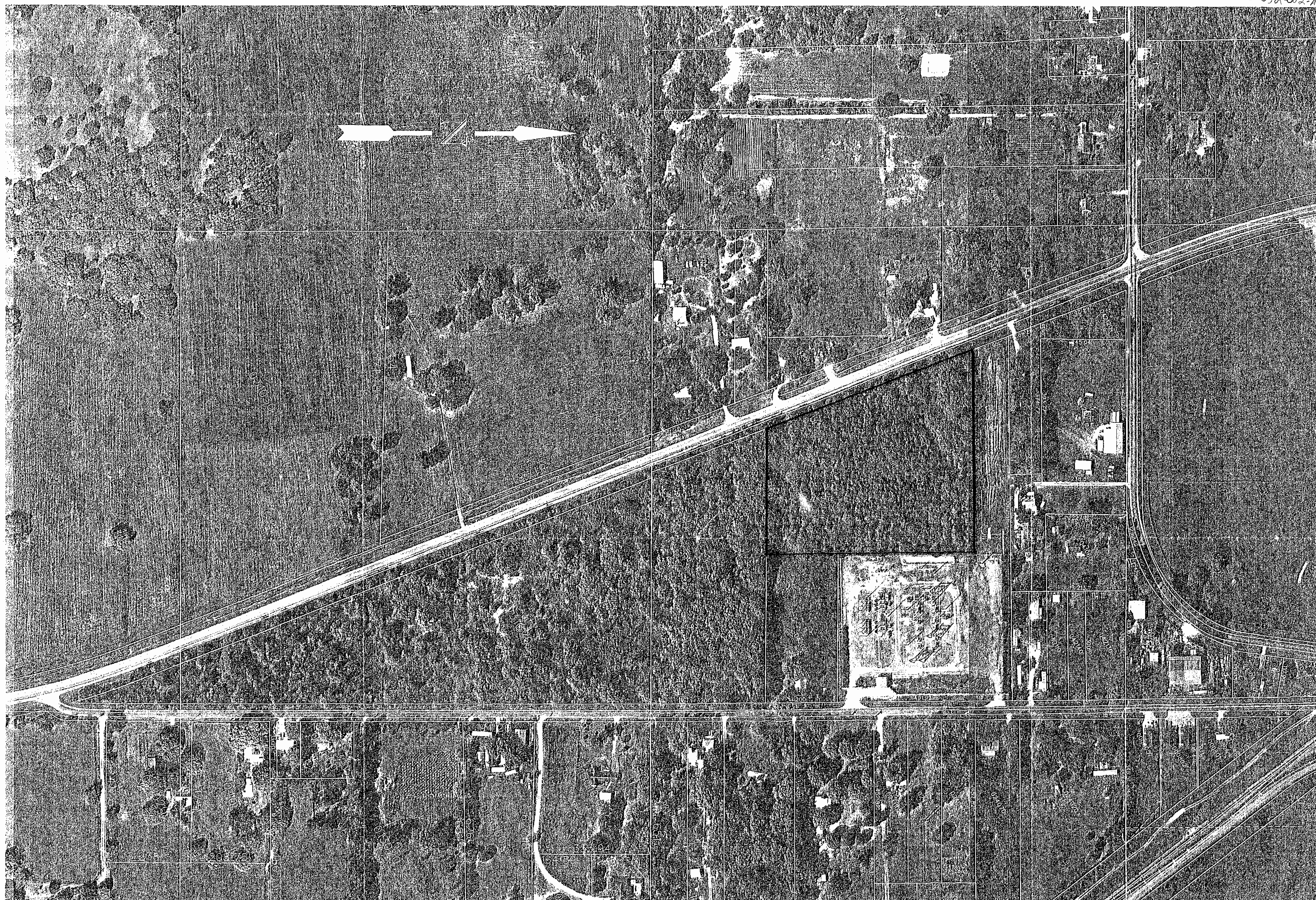
**Miscellaneous**:

**CHAPTER 28-106, F.A.C.:** Decisions Determining Substantial Interests
**CHAPTER 62-110, F.A.C.:** Exception to the Uniform Rules of Procedure, effective 07-01-98
**CHAPTER 62-256, F.A.C.**: Open Burning and Frost Protection Fires, effective 11-30-94
**CHAPTER 62-257, F.A.C.**: Asbestos Notification and Fee, effective 02-09-99
**CHAPTER 62-281, F.A.C.**: Motor Vehicle Air Conditioning Refrigerant Recovery and Recycling, effective 09-10-96

# ATTACHMENT WP-FI-C1

# AREA MAP SHOWING FACILITY LOCATION

1050352-002-AV (1)



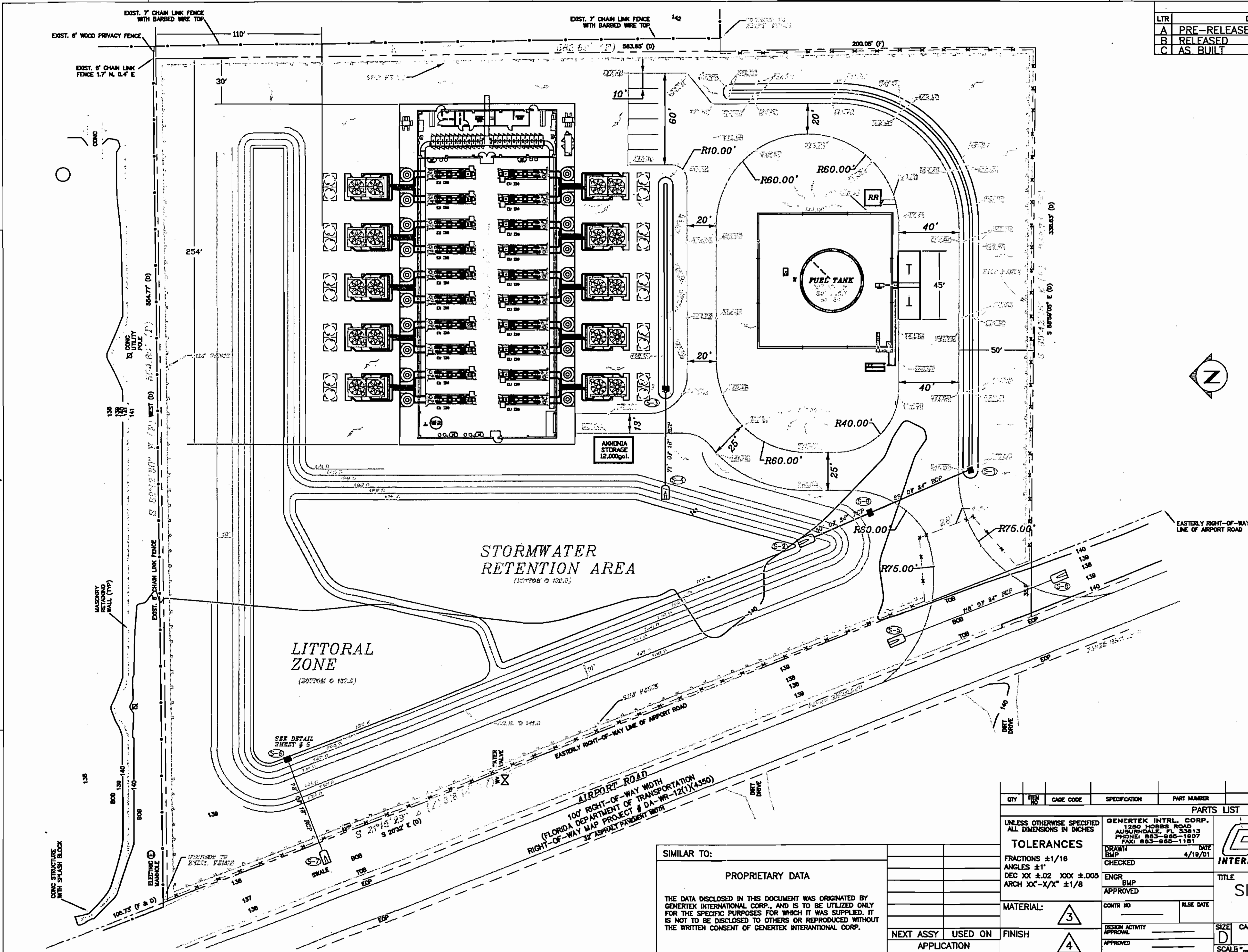
ATTACHMENT WP-FI-C2

FACILITY PLOT PLAN

DWG NO 20LA0039 | SH 1 | REV C

REVISIONS

| LTR | DESCRIPTION | DATE | APPROVED |
| --- | --- | --- | --- |
| A | PRE-RELEASE | | |
| B | RELEASED | 8/15/01 | BMP |
| C | AS BUILT | 3/28/02 | BMP |




| QTY | ITEM NO | CAGE CODE | SPECIFICATION | PART NUMBER | DESCRIPTION |
| --- | --- | --- | --- | --- | --- |

PARTS LIST

SIMILAR TO:

PROPRIETARY DATA

THE DATA DISCLOSED IN THIS DOCUMENT WAS ORIGINATED BY GENERTEK INTERNATIONAL CORP., AND IS TO BE UTILIZED ONLY FOR THE SPECIFIC PURPOSES FOR WHICH IT WAS SUPPLIED. IT IS NOT TO BE DISCLOSED TO OTHERS OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF GENERTEK INTERANTIONAL CORP.

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES

TOLERANCES

FRACTIONS ±1/16
ANGLES ±1°
DEC XX ±.02 XXX ±.005
ARCH XX"-X/X" ±1/8

MATERIAL: 3

FINISH 4

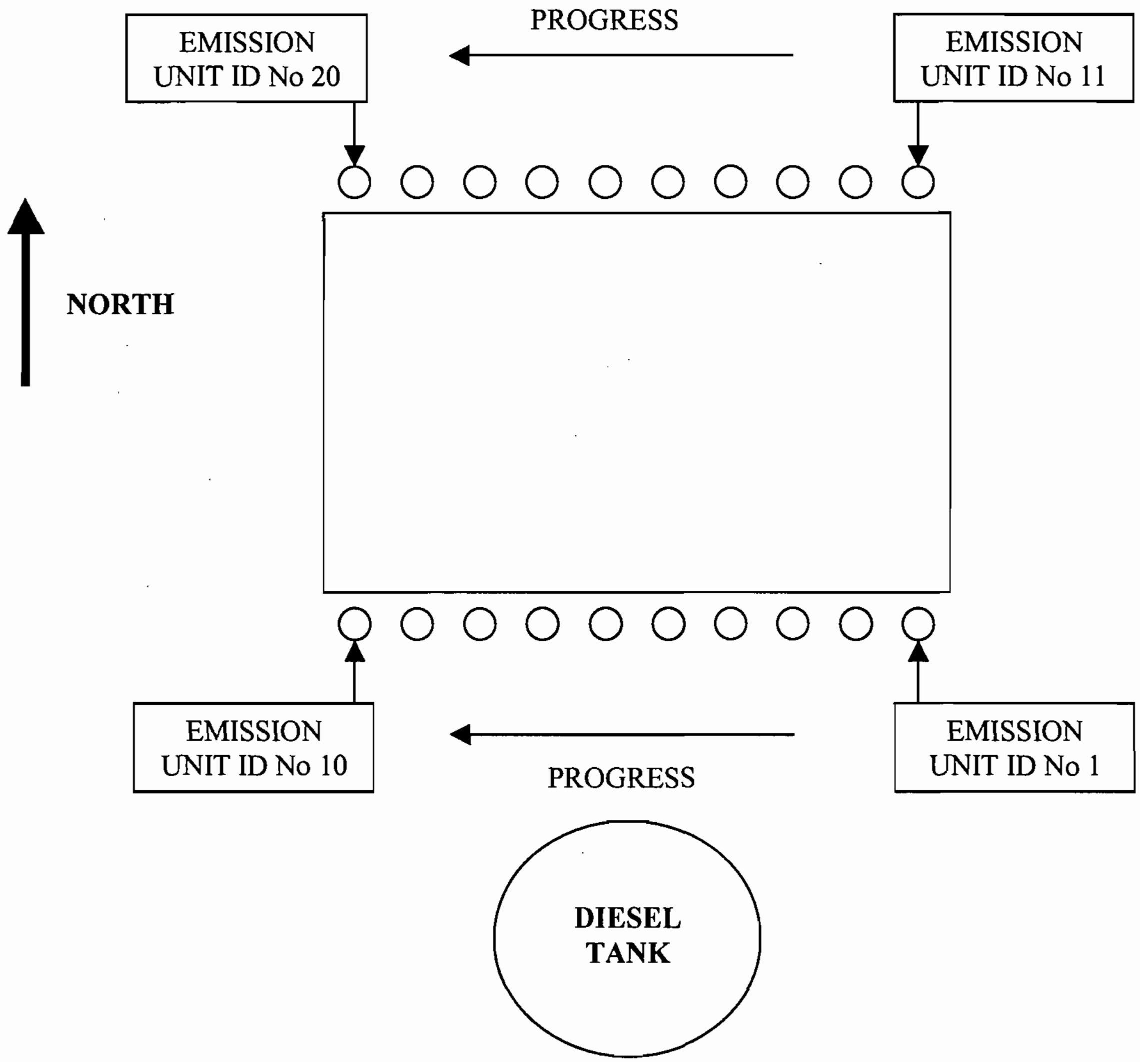
GENERTEK INTRL. CORP.
1250 HOBBS ROAD
AUBURNDALE, FL 33813
PHONE: 863-965-1907
FAX: 863-965-1181

DRAWN BMP | DATE 4/19/01
CHECKED
ENGR BMP
APPROVED
CONTR NO | RLSE DATE
DESIGN ACTIVITY APPROVAL
APPROVED

GENERTEK™ INTERNATIONAL CORPORATION

TITLE
SITE LAYOUT, CITY OF LAKELAND, 55 MW

SIZE D | CAGE CODE | DRAWING NO. 20LA0039 | REV C
SCALE 1"=30' | WEIGHT | SHEET 1 OF 1



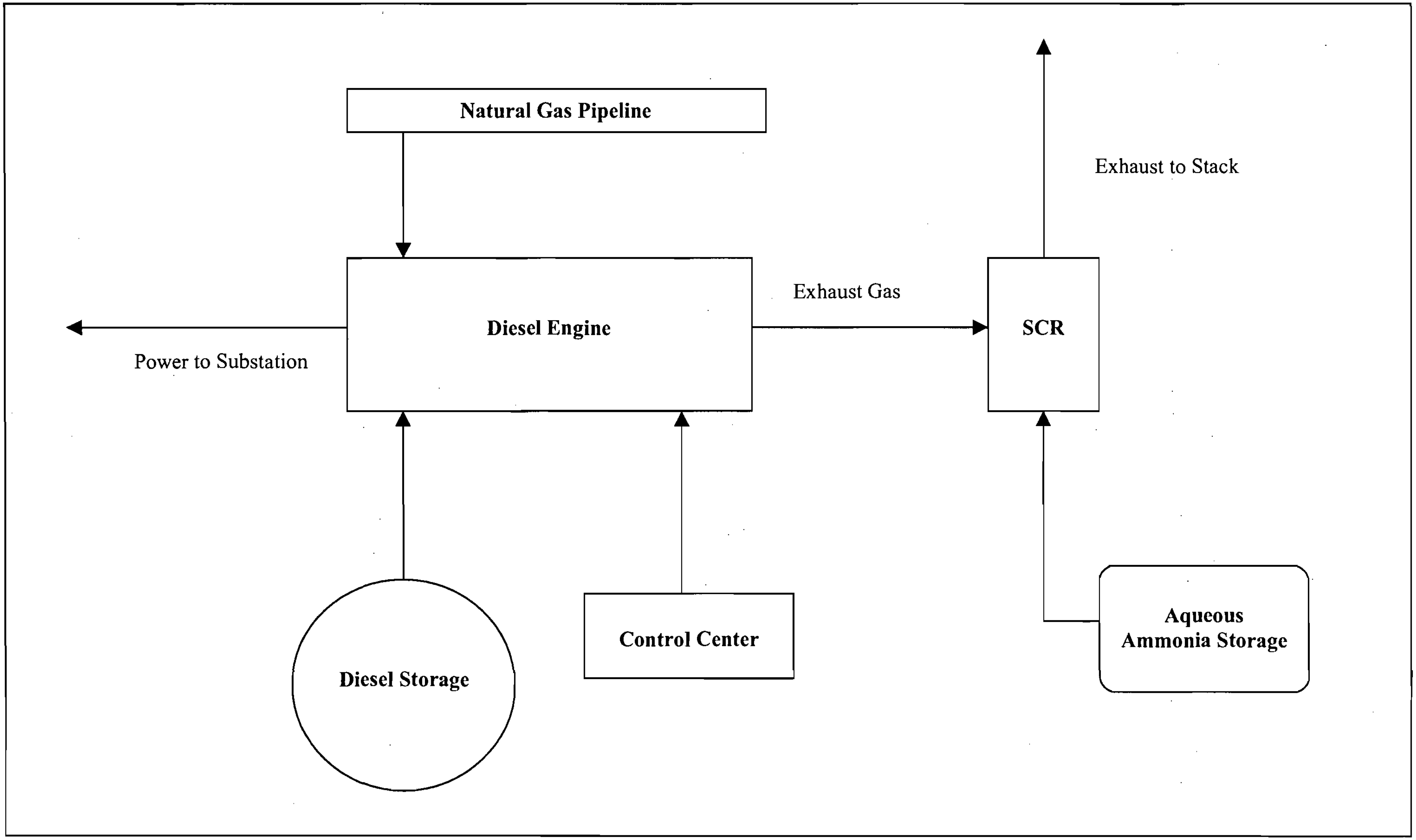

**Attachment WP-FI-C2**
**Winston Peaking Station EU ID No. Layout**

Source: Golder Associates Inc., 2000

Golder Associates

ATTACHMENT WP-FI-C3

PROCESS FLOW DIAGRAM




**Attachment WP-FI-C3**
**Simplified Flow Diagram of One GM EMD 20/645/E4B, Diesel Engine**

Source: Golder Associates Inc., 2001

Golder Associates

## ATTACHMENT WP-FI-C4

## PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

# ATTACHMENT WP-FI-C4
# PRECAUTIONS TO PREVENT EMISSIONS
# OF UNCONFINED PARTICULATE MATTER

- No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any activity, including vehicular movement; transportation of materials; construction, alteration, demolition or wrecking; or industrially related activities such as loading, unloading, storing or handling; without taking reasonable precautions to prevent such emissions.
- Any permit issued to this facility with emissions of unconfined particulate matter shall specify the reasonable precautions to be taken by that facility to control the emissions of unconfined particulate matter.
- Reasonable precautions include the following:
  - Paving and maintenance of roads, parking areas and yards
  - Application of water or chemicals to control emissions from such activities as demolition of buildings, grading roads, construction, and land clearing.
  - Application of asphalt, water, oil, chemicals or other dust suppressants to unpaved roads, yards, open stock piles and similar activities.
  - Removal of particulate matter from roads and other paved areas under the control of the owner or operator of the facility to prevent re-entrainment, and from buildings or work areas to prevent particulate from becoming airborne.
  - Landscaping or planting of vegetation.
  - Use of hoods, fans, filters, and similar equipment to contain, capture and/or vent particulate matter.
  - Confining abrasive blasting where possible.
  - Enclosure or covering of conveyor systems.
- In determining what constitutes reasonable precautions for a particular source, the Department shall consider the cost of the control technique or work practice, the environmental impacts of the technique or practice, and the degree of reduction of emissions expected from a particular technique or practice.

**[Rule 62-296.320(4)(c), F.A.C.]**

# ATTACHMENT WP-FI-C5

# FUGITIVE EMISSIONS IDENTIFICATION

# ATTACHMENT WP-FI-C5
# FUGITIVE EMISSIONS IDENTIFICATION

Many fugitive emissions at the plant site have been classified as "trivial activities". As a result, these activities are not included as part of this permit application. For example, emissions from general plant maintenance and upkeep activities at the facility would be considered fugitive emissions, but have been judged to be trivial since these activities are not conducted as part of the electricity generation process, not related to the source's primary business activity, and do not otherwise trigger a permit modification.

Fugitive emissions that may result from the operation of activities that are not trivial at the facility are addressed in fugitive emissions unit section. This emission unit section contains information on fugitive emissions that occur on a facility-wide basis. A summary of potential fugitive emission sources at the facility is presented in the following sections.

## Criteria and Precursor Air Pollutants

Lakeland Electric has not identified fugitive emission of sulfur dioxide, nitrogen oxides, carbon monoxide, or lead compounds which would exceed the thresholds defined in the permit application instructions.

## Volatile Organic Compounds (VOCs)

Fugitive emissions of VOCs include those resulting from the use of cleaners and solvents for maintenance and operation. VOCs are also emitted by the fuel oil storage tanks on the plant property. These tanks are a 4,000-gallon fuel oil storage tank inside the building which holds make up oil for the engines and the 294,000-gallon fuel oil storage tank outside, which holds fuel oil to be burned by the engines.

## Fugitive Ammonia Emissions

Fugitive emissions of ammonia ($NH_3$) may occur from the 12,000-gallon liquid ammonia storage tank on the plant property. This tank is an exempt emission unit based on the purity of the ammonia contained in the tank. This ammonia will always contain less than 19% $NH_3$ (usually around 12%).

# ATTACHMENT WP-FI-C8

# LIST OF PROPOSED INSIGNIFICANT ACTIVITIES

## ATTACHMENT WP-FI-C8

## LIST OF PROPOSED INSIGNIFICANT ACTIVITIES

Unregulated insignificant activities at the Winston Peaking Station include but are not limited to the following:

- Operation of a foam fire protection system Model CC S3-500 VDF, manufactured by Arrow Tank and Engineering Company. System to be used in case of emergency fire.
- Storage operations for the 4,000-gallon fuel oil tank inside the building. This fuel oil is used to supply makeup oil to the engines.
- Storage operations for the 12,000-gallon liquid ammonia tank which is used to supply ammonia for the Selective Catalytic Reduction (SCR) systems. Tank is exempt from regulation based on the $NH_3$ content being less than 19% at all times (usually around 12%).
- Miscellaneous maintenance and cleaning of the building, control room, and their contents.
- Stormwater retention basin maintenance (if required).

# ATTACHMENT WP-FI-C10

# ALTERNATIVE METHODS OF OPERATION

## ATTACHMENT WP-FI-C10

## ALTERNATIVE METHODS OF OPERATION

The engines shall be fired primarily with low sulfur (maximum of 0.05 weight percent sulfur) No. 2 fuel oil and natural gas (with 6 percent diesel fuel for ignition). They will operate at 100% load and peak load on fuel oil and 100% load on natural gas as follows:

**Fuel Oil Operation**

The maximum amount of No. 2 fuel oil to be burned in the twenty internal combustion engines combined is 8,184,480 gallons per year, which is equivalent to 43,000 engine-hours per year at 100% load. The engines may also operate a maximum of 17,520 engine-hours at peak load. The heat input to each internal combustion engine will not exceed 25 MMBtu per hour at 100% load or 28 MMBtu per hour at peak load.

**Natural Gas Operation**

The maximum amount of natural gas to be burned in the twenty internal combustion engines combined is 2,240 MMCF per year, which is equivalent to 89,200 engine-hours per year at 100% load. The heat input to each internal combustion engine will not exceed 29 MMBtu per hour at 100% load.

# ATTACHMENT WP-FI-C12

# IDENTIFICATION OF ADDITIONAL APPLICABLE REQUIREMENTS

RECEIVED

AUG 2 8 2001

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
**NOTICE OF FINAL PERMIT**

In the Matter of an
Application for Permit

Mr. Roger D. Harr, City Manager
City of Lakeland
501 East Lemon Street
Lakeland, Florida 33801-5079

Permit: 1050352-001-AC

Enclosed is the FINAL Permit, which allows installation of 20 (twenty) Internal Combustion Engines, each, rated at 2.5 MW nominal at Winston Peaking Station in Polk County. This permit is issued pursuant to Chapter 403, Florida Statutes and 62-4 through 297, F.A.C and 40 CFR 52.21 - Prevention of Significant Deterioration(PSD).

Any party to this order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, F.S., by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Legal Office; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 (thirty) days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

[signature], P.E.

for C.H. Fancy, P.E., Chief
Bureau of Air Regulation

**CERTIFICATE OF SERVICE**

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF FINAL PERMIT (including the FINAL permit) was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 8/20/01 to the person(s) listed:

Mr. Roger D. Harr, City Manager*
Mr. Gregg Worley, EPA
Mr. John Bunyak, NPS
Mr. Jerry Kissell, DEP-SWD
Mr. Jerry Campbell, EPCHC
Mr. Ken Kosky, P.E., Golder Associates, Inc.

Clerk Stamp

**FILING AND ACKNOWLEDGMENT FILED,** on this date, pursuant to §120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

[signature] 8/20/01
(Clerk) (Date)

MAR - 8 2002

# FINAL DETERMINATION

## Lakeland Electric
## Winston Peaking Station
## Installation of 20 Internal Combustion Engines
## DEP File Number 1050352-001-AC

An Intent to Issue an Air Construction Permit to Lakeland Electric Winston Peaking Station, located one-mile southeast of the intersection of Airport Road and Old Tampa Highway, Lakeland, Polk County, Florida, was distributed on July 27, 2001. The Public Notice of Intent to Issue Air Construction Permit was published in the Lakeland Ledger on August 1, 2001. Copies of the draft air construction permit were available for public inspection at the Department offices in Tampa and Tallahassee.

The Department received no comments from the public, the applicant, the EPA Region 4 office or the National Park Service.

The final action of the Department is to issue the construction permit as proposed.

# Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary


**PERMITTEE:**

City of Lakeland; Lakeland Electric
Winston Peaking Station
501 E. Lemon Street
Lakeland, Florida 33801-5079

| | |
|---|---|
| **ARMS Permit No.** | 1050352-001-AC |
| **Facility ID No.** | 1050352 |
| **SIC No.** | 4911 |
| **Expires:** | June 30, 2002 |

*Authorized Representative:*
Roger D. Harr
City Manager

## PROJECT AND LOCATION

The proposed project authorizes the installation of 20 internal combustion engines with electrical generator sets. The 20 engines are capable of producing a nominal 50 MW (55 MW at peakload) of electricity.

The project will be located in Polk County, one-mile southeast of the intersection of Airport Road and Old Tampa Highway, Lakeland, Florida. The UTM coordinates are Zone 17, 400.2 km E, 3100.6 km N.

## STATEMENT OF BASIS

This air pollution construction permit is issued under the provisions of Chapter 403 of the Florida Statutes (F.S.), and Chapters 62-4, 62-204, 62-210, 62-212, 62-296, and 62-297 of the Florida Administrative Code (F.A.C.). The permittee is authorized to install the proposed equipment in accordance with the conditions of this permit and as described in the application, approved drawings, plans, and other documents on file with the Department.

## APPENDICES

The following Appendices are attached as part of this permit.

Appendix GC - Construction Permit General Conditions

Howard L. Rhodes, Director
Division of Air Resources Management

## FACILITY DESCRIPTION

The facility will be located on a 6-acre parcel adjacent to an existing Lakeland Electric substation. Lakeland Electric will own the property and own/control the operation of the facility. Lakeland Electric will own the equipment and dispatch the units to supply electric power. The Project consists of the construction and operation of twenty nominal 2.5-MW GM EMD 20/645/E4B diesel engines and one 294,000-gallon fuel oil storage tank. The engines will use selective catalytic reduction, oxidation catalyst, and an air/fuel ratio regulator for emission reduction control. The units are designed for peaking service. The fuel for the engines will be distillate fuel oil with natural gas. Fuel oil will contain a maximum sulfur content of 0.05 percent. Completion of this project will result in the installation of 20 internal combustion engines with generators capable of providing a nominal 50 MW (55 MW at peakload) of electrical power.

## REGULATORY CLASSIFICATION

Title V Major Source: This facility is a Title V major source of air pollution.

PSD Major Source: Each pollutant with potential emissions greater than the Significant Emissions Rates specified in Table 62-212.400-2, F.A.C. requires a PSD review and Best Available Control Technology (BACT) determination. For this project, emissions of no pollutant are significant or subject to BACT standards, provided that the Emission Unit is operated as specified in this permit.

## PERMIT SCHEDULE

- 05-14-01: Date of Receipt of Permit Application
- 07-19-01: Application deemed complete
- 07-27-01: Intent issued
- 08-01-01: Notice published in the Lakeland Ledger

## RELEVANT DOCUMENTS

The documents listed form the basis of the permit. They are specifically related to this permitting action. These documents are on file with the Department.

- Application received 5-14-01
- Department letters dated 5-24-01 and 7-10-01
- Company letters dated 6-12-01 and 7-14-01
- Technical Evaluation and Preliminary Determination dated 7-24-01

## GENERAL AND ADMINISTRATIVE REQUIREMENTS

1. Permitting Authority: All documents related to applications for permits to construct, operate or modify an emissions unit should be submitted to the Bureau of Air Regulation (BAR), Florida Department of Environmental Protection (DEP), at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 and phone number 850/488-0114.

2. Compliance Authority: All documents related compliance activities such as reports, tests, and notifications should be submitted to the FDEP Southwest District Office, 3804 Coconut Palm Drive, Tampa, Florida 33619-8318. The phone number is 813/744-6100 and the fax number is 813/744-6084.

3. Terminology: The terms used in this permit have specific meanings as defined in the applicable chapters of the Florida Administrative Code.

4. General Conditions: The owner and operator are subject to, and shall operate under, the attached General Conditions listed in *Appendix GC* of this permit. General Conditions are binding and enforceable pursuant to Chapter 403 of the Florida Statutes. **[Rule 62-4.160, F.A.C.]**

5. Applicable Regulations, Forms and Application Procedures: Unless otherwise indicated in this permit, the construction and operation of the subject emissions unit shall be in accordance with the capacities and specifications stated in the application. The facility is subject to all applicable provisions of Chapter 403, F.S. and Florida Administrative Code Chapters 62-4, 62-110, 62-204, 62-212, 62-213, 62-296, 62-297 and the Code of Federal Regulations Title 40, Part 60, adopted by reference in the Florida Administrative Code (F.A.C.) regulations. The permittee shall use the applicable forms listed in Rule 62-210.900, F.A.C. and follow the application procedures in Chapter 62-4, F.A.C. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting or regulations. **[Rules 62-204.800, 62-210.300 and 62-210.900, F.A.C.]**

6. New or Additional Conditions: For good cause shown and after notice and an administrative hearing, if requested, the Department may require the permittee to conform to new or additional conditions. The Department shall allow the permittee a reasonable time to conform to the new or additional conditions, and on application of the permittee, the Department may grant additional time. **[Rule 62-4.080, F.A.C.]**

7. Modifications: No emissions unit or facility subject to this permit shall be constructed or modified without obtaining an air construction permit from the Department. Such permit shall be obtained prior to beginning construction or modification. **[Rules 62-210.300(1) and 62-212.300(1)(a), F.A.C.]**

8. Expiration: This air construction permit shall expire on **June 30, 2002**. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Department's Bureau of Air Regulation prior to 60 days before the expiration of the permit. **[Rules 62-210.300(1), 62-4.070(4) 62-4.080, and 62-4.210, F.A.C]**

9. Title V Permit: This permit authorizes construction and/or installation of the permitted emissions unit and initial operation to determine compliance with Department rules. A Title V operation permit is required for regular operation of the permitted emissions unit. The owner or operator shall apply for a Title V operation permit at least ninety days prior to expiration of this permit, but no later than 180 days after commencing operation. To apply for a Title V operation permit, the applicant shall submit the appropriate application form, compliance test results, and such additional information as the Department may by law require. The application shall be submitted to the Department's Bureau of Air Regulation, and a copy sent to the Department's Southwest District office. **[Rules 62-4.030, 62-4.050, 62-4.220, and 62-213.420, F.A.C.]**

This permit addresses the following emissions units.

| EU ID No. | EMISSIONS UNIT DESCRIPTION |
|---|---|
| 001 – 020 | 20 GM EMD 20/645/E4B diesel engines and associated electric generators. Each Power Module consists of one General Motors (GM) Electro Motive Division (EMD) 20-cylinder Model 645 E4B, 2-cycle turbocharged internal combustion (IC) engine and one Baylor-Stallion Model G8558RNV electric generator. The GM EMD IC engine has a power rating of 3,600 brake horsepower (bhp) at 100 percent load. The Baylor-Stallion generator has a power output rating of 2,500 kilowatt (continuous rating) and 2,750 kilowatts (kW) under peak load conditions. The IC engines will be fired with low-sulfur (maximum of 0.05 weight percent sulfur) diesel fuel oil and natural gas (with 6 percent diesel fuel for ignition). |

**The following Specific Conditions apply to the new emission units 001-020:**

PERFORMANCE RESTRICTIONS

1. Internal Combustion Engines: The permittee is authorized to install, tune, operate and maintain 20 new internal combustion engines with electrical generator sets (GM EMD 20/645/E4B diesel engines and Baylor-Stallion Model G8558RNV electric generator). The 20 generators are designed to produce a nominal 50 MW (55 MW at peakload) of electrical power. **[Applicant Request]**

2. Future PSD Review: The internal combustion engines shall not exceed the permitted hours of operation, nor the permitted $NO_x$ emission limits allowed by this permit. This restriction is based on the permittee's request, which formed the basis of the PSD non-applicability determination and resulted in the emission standards specified in this permit. For any request to modify this emission unit (whether a physical or operational modification, including a change in the allowable hours of operation or heat input) the permittee shall submit a full PSD permit application, if required under the Department's rules. **[Rules 62-212.400(2)(g) and 62-212.400(6)(b), F.A.C.]**

3. Allowable Fuel: The internal combustion engine shall be fired primarily with No. 2 fuel oil and natural gas (with 6 percent diesel fuel for ignition). The permittee shall demonstrate compliance with the fuel oil sulfur limit by keeping the records specified in this permit. **[Applicant Request, Rule 62-210.200, F.A.C. (Definition - PTE)]**

4. Plant Operation - Problems: If temporarily unable to comply with any of the conditions of the permit due to breakdown of equipment or destruction by fire, wind or other cause, the permittee shall notify the Compliance Authority as soon as possible, but at least within one working day, excluding weekends and holidays. The notification shall include: pertinent information as to the cause of the problem; steps being taken to correct the problem and prevent future recurrence; and, where applicable, the owner's intent toward reconstruction of destroyed facilities. Such notification does not release the permittee from any liability for failure to comply with the conditions of this permit or the regulations. **[Rule 62-4.130, F.A.C.]**

EMISSIONS CONTROLS

5. Unconfined Emissions of Particulate Matter: **[Rule 62-296.320(4)(c), F.A.C.]**

   (a) No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any activity, including vehicular movement; transportation of materials; construction, alteration, demolition or wrecking; or industrially related activities such as loading, unloading, storing or handling; without taking reasonable precautions to prevent such emissions.

(b) Any permit issued to a facility with emissions of unconfined particulate matter shall specify the reasonable precautions to be taken by that facility to control the emissions of unconfined particulate matter.

(c) Reasonable precautions include the following:

- Paving and maintenance of roads, parking areas and yards.
- Application of water or chemicals to control emissions from such activities as demolition of buildings, grading roads, construction, and land clearing.
- Application of asphalt, water, oil, chemicals or other dust suppressants to unpaved roads, yards, open stock piles and similar activities.
- Removal of particulate matter from roads and other paved areas under the control of the owner or operator of the facility to prevent re-entrainment, and from buildings or work areas to prevent particulate from becoming airborne.
- Landscaping or planting of vegetation.
- Use of hoods, fans, filters, and similar equipment to contain, capture and/or vent particulate matter.
- Confining abrasive blasting where possible.
- Enclosure or covering of conveyor systems.

(d) In determining what constitutes reasonable precautions for a particular source, the Department shall consider the cost of the control technique or work practice, the environmental impacts of the technique or practice, and the degree of reduction of emissions expected from a particular technique or practice.

EMISSION STANDARDS

6. Nitrogen Oxides ($NO_X$):

$NO_x$ emissions from each internal combustion engine shall not exceed 13.9 lb/hr while in peakload operation firing distillate oil, 11.6 lb/hr while in baseload operation firing distillate oil and 5.6 lb/hr in baseload operation firing natural gas. Annual emissions of $NO_x$ in tpy from these emission units shall be calculated by using the $NO_x$ emission rate in lb/hr for each mode of operation multiplied by the total operating hours for each mode of operation for the 20 engines divided by 2000. This $NO_x$ emission in tpy shall not exceed 250 TPY, based upon a consecutive 12-month period. This facility-wide annual emissions cap of 250 TPY shall become effective on the first day of the month following the initial compliance test of the first internal combustion engine, and compliance shall begin based upon the first twelve months of operation thereafter.

**[Rule 62-212.400, F.A.C. (PSD avoidance)]**

7. General Visible Emissions Standard:

Except for emissions units that are subject to a particulate matter or opacity limit set forth or established by rule and reflected by conditions in this permit, no person shall cause, let, permit, suffer, or allow to be discharged into the atmosphere the emissions of air pollutants from any activity, the density if which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20% opacity). The test method for visible emissions shall be EPA Method 9, incorporated and adopted by reference in Chapter 62-297, F.A.C. Test procedures shall meet all applicable requirements of Chapter 62-297, F.A.C. **[Rule 62-296.320(4)(b)1, F.A.C.]**

8. Ammonia Emissions:

The concentration of ammonia in the exhaust gas from each internal combustion engine shall not exceed 10 ppmvd @15% $O_2$ while firing natural gas or fuel oil. **[Rule 62-4.070, F.A.C.]**

EXCESS EMISSIONS

9. Excess Emissions Allowed: Excess emissions resulting from startup, shutdown or malfunction of any emissions unit shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration. **[Rule 62-210.700(1), F.A.C.]**

10. Excess Emissions Prohibited: Excess emissions caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure that may reasonably be prevented during startup, shutdown or malfunction, shall be prohibited. **[Rule 62-210.700(4), F.A.C.]**

OPERATIONAL LIMITATIONS

11. Fuel Oil Specification: No. 2 fuel oil and natural gas can be fired in the internal combustion engines. Only No. 2 fuel oil will be fired in the engines for the first two years of operation. The maximum sulfur content of the No. 2 fuel oil shall not exceed 0.05 percent, by weight. **[Rule 62-210.200, F.A.C. (Definitions – PTE)]**

12. Fuel Oil Consumption: The maximum No. 2 fuel oil allowed to be burned in the twenty internal combustion engines combined is 8,184,480 gallons per year, which is equivalent to 43,000 engine-hours per year at 100% load. The maximum natural gas that can be burned in the twenty internal combustion engines combined is 2,240 MMCF per year, which is equivalent to 89,200 engine-hours per year at 100% load. **[Rule 62-210.200, F.A.C. (Definitions – PTE)]**

13. Permitted Capacity: The heat input to each internal combustion engine from firing No. 2 fuel oil shall not exceed 25 MMBtu per hour at 100% load or 28 MMBTU per hour at peak load. The heat input to each internal combustion engine from firing natural gas shall not exceed 29 MMBTU per hour at 100% load. **[Design, Rule 62-210.200, F.A.C. (Definition - PTE)]**

14. Hours of Operation: The twenty internal combustion engines shall operate no more than 43,000 engine-hours when firing fuel oil at 100% load, 17,520 engine-hours at peak load and 89,200 engine-hours when firing natural gas during any consecutive 12-month period. The permittee shall install, calibrate, operate and maintain a monitoring system to measure the hours of operation for each fuel on each internal combustion engine. **[Rule 62-210.200, F.A.C. (Definitions - PTE)]**

EMISSIONS PERFORMANCE TESTING

15. Sampling Facilities: The permittee shall design the internal combustion engine stack to accommodate adequate testing and sampling locations in order to determine compliance with the applicable emission limits specified by this permit. **[Rule 62-297.310(6), F.A.C.]**

16. Performance Test Methods: Initial (I) and Annual (A) compliance tests shall be performed in accordance with the following reference methods as described in 40 CFR 60, Appendix A, and adopted by reference in Chapter 62-204.800, F.A.C.

    (a) EPA Method 7 or 7E – Determination of Nitrogen Oxide Emissions from Stationary Sources (I, A);

    (b) EPA Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources (I, A);

(c) Method CTM-027 or equivalent for ammonia slip (I);

No other test methods may be used for compliance testing unless prior DEP approval is received, in writing, from the DEP Emissions Monitoring Section Administrator.

17. Fuel Monitoring: The fuel oil shall be monitored initially and annually for the sulfur content using ASTM D4294 Method (or equivalent). The permittee shall also maintain daily records of fuel oil and natural gas consumption for the emission units. **[Rules 62-297.440, F.A.C., and 62-210.200, F.A.C.]**

18. Test Notification: The permittee shall notify the Compliance Authority in writing at least 15 days prior to the date on which each formal compliance test is to begin, of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted for the owner or operator. **[Rule 62-297.310(7)(a)9., F.A.C.]**

19. Initial Tests Required: Initial performance tests to demonstrate compliance with the emission standards specified in this permit shall be conducted within 60 days after achieving at least 90% of permitted capacity, but not later than 180 days after initial operation of the emissions unit. Initial performance tests shall be conducted for $NO_X$ and visible emissions on a sample of 5 (five) randomly picked internal combustion engines for the first year. A different set of randomly picked five engines from the remaining internal combustion engines will be tested during subsequent years of operation until all of the engines have completed the initial performance test. Initial performance test while firing natural gas shall be done when the fuel is available to the facility. Initial performance test shall be conducted for ammonia slip for both oil and gas (when available) on only one internal combustion engine. **[Rule 62-297.310(7)(a)1., and 62-297.310(7)(c), F.A.C.]**

20. Annual Performance Tests: To demonstrate compliance with the emission standards specified in this permit, the permittee shall conduct annual performance tests for visible emissions on emissions unit that operated in the preceding 12-month period. Annual performance tests for $NO_x$ shall be conducted on the emission units that emitted more than 100 tons per year of $NO_x$ in the preceding 12-month period. The facility will be required to keep 12-month emission totals of $NO_x$ in tons per year for each internal combustion engine during each federal fiscal year (October 1- September 30). Tests required on an annual basis shall be conducted at least once during each federal fiscal year. **[Rule 62-297.310(7)(a)4., and 62-297.310(7)(c), F.A.C.]**

21. Tests Prior to Permit Renewal: Prior to renewing the air operation permit, the permittee shall conduct performance tests for $NO_X$ and visible emissions on one of the internal combustion engines. These tests shall be conducted within the 12-month period prior to renewing the air operation permit. For pollutants required to be tested annually, the permittee may submit the most recent annual compliance test to satisfy the requirements of this provision. **[Rule 62-297.310(7)(a)3., F.A.C.]**

22. Internal Combustion Engine Testing Capacity: Performance tests for compliance with standards specified in this permit shall be conducted with the emission unit operating at permitted capacity. Permitted capacity is defined as 90-100 percent of the maximum heat input rate allowed by the permit. If it is impracticable to test at permitted capacity, the source may be tested at less than permitted capacity. However, subsequent operation is limited to 110 percent of the value reached during the test until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purposes of additional compliance testing to regain the permitted capacity. Emissions performance tests shall meet all applicable requirements of Chapters 62-204 and 62-297, F.A.C. **[Rule 62-297.310(2), F.A.C.]**

23. Calculation of Emission Rate: For each emissions performance test, the indicated emission rate or concentration shall be the arithmetic average of the emission rate or concentration determined by each of

the three separate test runs unless otherwise specified in a particular test method or applicable rule. **[Rule 62-297.310(3), F.A.C.]**

24. Applicable Test Procedures

(a) Required Sampling Time.

1. Unless otherwise specified in the applicable rule, the required sampling time for each test run shall be no less than one hour and no greater than four hours, and the sampling time at each sampling point shall be of equal intervals of at least two minutes. **[Rule 62-297.310(4)(a)1., F.A.C.]**

2. The minimum observation period for a visible emissions compliance test shall be thirty (30) minutes. The observation period shall include the period during which the highest opacity can reasonably be expected to occur. **[Rule 62-297.310(4)(a)2., F.A.C.]**

(b) Minimum Sample Volume. Unless otherwise specified in the applicable rule or test method, the minimum sample volume per run shall be 25 dry standard cubic feet. **[Rule 62-297.310(4)(b), F.A.C.]**

(c) Calibration of Sampling Equipment. Calibration of the sampling train equipment shall be conducted in accordance with the schedule shown in Table 297.310-1, F.A.C. **[Rule 62-297.310(4)(d), F.A.C.]**

25. Determination of Process Variables

(a) Required Equipment. The owner or operator of an emissions unit for which compliance tests are required shall install, operate, and maintain equipment or instruments necessary to determine process variables, such as process weight input or heat input, when such data are needed in conjunction with emissions data to determine the compliance of the emissions unit with applicable emission limiting standards. **[Rule 62-297.310(5)(a), F.A.C.]**

(b) Accuracy of Equipment. Equipment or instruments used to directly or indirectly determine process variables, including devices such as belt scales, weight hoppers, flow meters, and tank scales, shall be calibrated and adjusted to indicate the true value of the parameter being measured with sufficient accuracy to allow the applicable process variable to be determined within 10% of its true value. **[Rule 62-297.310(5)(b), F.A.C.]**

26. Special Compliance Tests: When the Department, after investigation, has good reason (such as complaints, increased visible emissions or questionable maintenance of control equipment) to believe that any applicable emission standard contained in a Department rule or in a permit issued pursuant to those rules is being violated, it shall require the owner or operator of the emissions unit to conduct compliance tests which identify the nature and quantity of pollutant emissions from the emissions unit and to provide a report on the results of said tests to the Department. **[Rule 62-297.310(7)(b), F.A.C.]**

**RECORDKEEPING AND REPORTING REQUIREMENTS**

27. Records Retention: All measurements, records, and other data required by this permit shall be documented in a permanent, legible format and retained for at least five (5) years following the date on which such measurements, records, or data are recorded. Records shall be made available to the Department upon request. **[Rules 62-4.160(14) and 62-213.440(1)(b)2., F.A.C.]**

28. Emissions Performance Test Reports: A report indicating the results of any required emissions performance test shall be submitted to the Compliance Authority no later than 45 days after completion of the last test run. The test report shall provide sufficient detail on the tested emission unit and the procedures used to allow the Department to determine if the test was properly conducted and if the test

results were properly computed. At a minimum, the test report shall provide the applicable information listed in Rule 62-297.310(8)(c), F.A.C. **[Rule 62-297.310(8), F.A.C.]**

29. Monthly Operations Summary: By the fifth calendar day of each month, the permittee shall record the 12-month hours of operation of the internal combustion engines, 12-month emission totals for $NO_X$ and amount of the No. 2 fuel oil and natural gas fired in the internal combustion engines. The information shall be recorded in a written or electronic log and shall be available for inspection and/or printing within at least one day of a request from the Compliance Authority. **[Rule 62-4.160(15), F.A.C.]**

30. Annual Operating Report: The permittee shall submit an annual report that summarizes the actual operating rates and emissions from this facility. Annual operating reports shall be submitted to the Compliance Authority by March 1st of each year. **[Rule 62-210.370(2), F.A.C.]**

31. NSPS Requirements: The fuel oil storage tank shall comply with the requirements of 40 CFR 60, Subpart Kb.

G.1 The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

G.2 This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings or exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

G.3 As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey and vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

G.4 This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

G.5 This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

G.6 The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

G.7 The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

a) Have access to and copy and records that must be kept under the conditions of the permit;
b) Inspect the facility, equipment, practices, or operations regulated or required under this permit, and,
c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

G.8 If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a) A description of and cause of non-compliance; and
b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages, which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

G.9 In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

G.10 The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

G.11 This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

G.12 This permit or a copy thereof shall be kept at the work site of the permitted activity.

G.13 This permit also constitutes:

a) Determination of Best Available Control Technology ( )
b) Determination of Prevention of Significant Deterioration ( ); and
c) Compliance with New Source Performance Standards (x). Subpart Kb requirements

G.14 The permittee shall comply with the following:

a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application or this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c) Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The person responsible for performing the sampling or measurements;
3. The dates analyses were performed;
4. The person responsible for performing the analyses;
5. The analytical techniques or methods used; and
6. The results of such analyses.

G.15 When requested by the Department, the permittee shall within a reasonable time furnish any information required by law, which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

# ATTACHMENT WP-FI-C14

# COMPLIANCE REPORT AND PLAN

# ATTACHMENT WP-FI-C14

## COMPLIANCE REPORT AND PLAN

Compliance with the conditions set forth in this operation permit will be certified on an annual basis by the submittal of the Statement of Compliance – Title V Source DEP Form No. 62-213.900(7).

# ATTACHMENT WP-FI-C15

# COMPLIANCE CERTIFICATION

**ATTACHMENT WP-FI-C15**

**COMPLIANCE CERTIFICATION**

The facility and emission units identified in this application are in compliance with the Applicable Regulations identified in Section A of the application form and attachments referenced in the section. The compliance statement is as follows:

> I, the undersigned, am the responsible official as defined in Chapter 62-210.200, F.A.C., of the Title V source for which this report is being submitted. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made and data contained in this report are true, accurate, and complete.

[signature]
Signature, Responsible Official

3/29/02
Date

Keith Hulbert, General Manager

# III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

## A. GENERAL EMISSIONS UNIT INFORMATION
## (All Emissions Units)

**Emissions Unit Description and Status**

1. Type of Emissions Unit Addressed in This Section: (Check one)

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ X ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[ X ] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

**20 GM EMD 20/645/E4B Diesel Engines**

4. Emissions Unit Identification Number: [ ] No ID
ID: **001- 020** [ ] ID Unknown

| | | | |
|---|---|---|---|
| 5. Emissions Unit Status Code: **A** | 6. Initial Startup Date: **JANUARY 2002** | 7. Emissions Unit Major Group SIC Code: **49** | 8. Acid Rain Unit? [ ] |

9. Emissions Unit Comment: (Limit to 500 Characters)

**This emission unit consists of 20 GM EMD 20/645/E4B diesel engines operating in simple cycle mode. See Attachment WP-EU1-A9.**

## Emissions Unit Control Equipment

| | |
|---|---|
| 1. Control Equipment/Method Description (Limit to 200 characters per device or method):<br><br>**Selective Catalytic Reduction (SCR) and an Air/Fuel Ratio control.** | |
| 2. Control Device or Method Code(s): | **65** |

## Emissions Unit Details

| | | | |
|---|---|---|---|
| 1. Package Unit:<br>Manufacturer: **Genertek** | | Model Number: **20 GM EMD 20/645/E4B** | |
| 2. Generator Nameplate Rating: | **2.5** | MW | |
| 3. Incinerator Information: | | | |
| Dwell Temperature: | | °F | |
| Dwell Time: | | seconds | |
| Incinerator Afterburner Temperature: | | °F | |

## B. EMISSIONS UNIT CAPACITY INFORMATION
## (Regulated Emissions Units Only)

**Emissions Unit Operating Capacity and Schedule**

| | | | |
|---|---|---|---|
| 1. Maximum Heat Input Rate: | | 29 | mmBtu/hr |
| 2. Maximum Incineration Rate: | lb/hr | | tons/day |
| 3. Maximum Process or Throughput Rate: | | | |
| 4. Maximum Production Rate: | | | |
| 5. Requested Maximum Operating Schedule: | | | |
| | hours/day | | days/week |
| | weeks/year | 8,760 | hours/year |
| 6. Operating Capacity/Schedule Comment (limit to 200 characters): | | | |

Dual fuel is used for this emission unit and 20 engines can operate as a single emission unit or in combination. Maximum heat input rate and operating schedule representative of a single engine. No. 2 fuel oil can be burned in any combination of the 20 engines at a maximum of 43,000 engine-hours per year at 100% load. The engines may also operate a maximum of 17,520 engine-hours at peak load. Natural gas can be burned in any combination of the 20 engines at a maximum of 89,200 engine-hours per year at 100% load.

## C. EMISSIONS UNIT REGULATIONS
## (Regulated Emissions Units Only)

**List of Applicable Regulations**

| | |
|---|---|
| Rule 62-204.800, F.A.C. | Rule 62-297.310(5)(a), F.A.C. |
| Rule 62-210.200, F.A.C. | Rule 62-297.310(5)(b), F.A.C. |
| Rule 62-210.700(1), F.A.C. | Rule 62-297.310(6), F.A.C. |
| Rule 62-210.700(4), F.A.C. | Rule 62-297.310(7)(a)1., F.A.C. |
| Rule 62-210-370(2), F.A.C. | Rule 62-297.310(7)(a)3., F.A.C. |
| Rule 62-212.400(2)(g), F.A.C. | Rule 62-297.310(7)(a)4., F.A.C. |
| Rule 62-212.400, F.A.C. | Rule 62-297.310(7)(a)9., F.A.C. |
| Rule 62-212-400(6)(b), F.A.C. | Rule 62-297.310(7)(c), F.A.C. |
| Rule 62-213.440(1)(b)2., F.A.C. | Rule 62-297.310(7)(c), F.A.C. |
| Rule 62-296.320(4)(b), F.A.C | Rule 62-297.310(8), F.A.C. |
| Rule 62-297.310(2), F.A.C. | Rule 62-297.440, F.A.C. |
| Rule 62-297.310(3), F.A.C. | Rule 62-4.070, F.A.C. |
| Rule 62-297.310(4)(a)1., F.A.C. | Rule 62-4.130, F.A.C. |
| Rule 62-297.310(4)(a)2., F.A.C. | Rule 62-4.160(14), F.A.C. |
| Rule 62-297.310(4)(b), F.A.C. | Rule 62-4.160(15), F.A.C. |
| Rule 62-297.310(4)(d), F.A.C. | |
| | |
| | |
| | |

## D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

**Emission Point Description and Type**

| | |
|---|---|
| 1. Identification of Point on Plot Plan or Flow Diagram? **Twenty Diesel Engines** | 2. Emission Point Type Code: **1** |
| 3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):<br><br>**Each 2.5 MW unit exhausts through a single stack.** | |
| 4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: | |

| | | |
|---|---|---|
| 5. Discharge Type Code: **V** | 6. Stack Height: **34** feet | 7. Exit Diameter: **2.30** feet |
| 8. Exit Temperature:<br>Natural Gas **740** °F<br>Fuel Oil **635** °F | 9. Actual Volumetric Flow Rate: **21,350** acfm | 10. Water Vapor: |

| | |
|---|---|
| 11. Maximum Dry Standard Flow Rate: dscfm | 12. Nonstack Emission Point Height: feet |

13. Emission Point UTM Coordinates:

Zone: **17** East (km): **400.2** North (km): **3100.6**

14. Emission Point Comment (limit to 200 characters):

**Single stacks for each engine unit. See also Attachment WP-EU1-A9.**

## E. SEGMENT (PROCESS/FUEL) INFORMATION
## (All Emissions Units)

**Segment Description and Rate:** Segment 1 of 2

1. Segment Description (Process/Fuel Type) (limit to 500 characters):

**Natural Gas**

| | | |
|---|---|---|
| 2. Source Classification Code (SCC): **2-01-002-01** | 3. SCC Units: **Million Cubic Feet Burned** | |
| 4. Maximum Hourly Rate: **0.502** | 5. Maximum Annual Rate: **2,240** | 6. Estimated Annual Activity Factor: |
| 7. Maximum % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: **1,050** |

10. Segment Comment (limit to 200 characters):

**Natural gas firing requires 6% diesel fuel for ignition. Maximum hourly based on 59°F condition and 1,050 Btu/cf (HHV). Maximum annual based on 89,200 engine-hours at 100% load.**

**Segment Description and Rate:** Segment 2 of 2

1. Segment Description (Process/Fuel Type ) (limit to 500 characters):

**Distillate (No. 2) Fuel Oil**

| | | |
|---|---|---|
| 2. Source Classification Code (SCC): **2-01-001-01** | 3. SCC Units: **1,000 Gallons Burned** | |
| 4. Maximum Hourly Rate: **3.95** | 5. Maximum Annual Rate: **8,184.48** | 6. Estimated Annual Activity Factor: |
| 7. Maximum % Sulfur: **0.05** | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: **132.5** |

10. Segment Comment (limit to 200 characters):

**Million BTU per SCC unit = 132.5; based on 6.83 lb/gal; 19,400 Btu/lb (HHV), ISO conditions, maximum hourly rate based on 59°F conditions at peak load and annual rate based on 43,000 engine-hours per year at 100% load. Engines may also operate a maximum of 17,520 engine-hours per year at peak load.**

## F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| $NO_x$ | 065 | | EL |
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## G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$NO_X$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **278.0** lb/hour **249.1** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **Genertek, 2001** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Air Construction Permit Application - Attachment Part II.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 59°F peaking operation and TPY based on oil firing 43,000 engine-hours/year baseload operation. Actual TPY will be based on heat input to the engines.** | |

**Allowable Emissions** Allowable Emissions 1 of 2

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: | 4. Equivalent Allowable Emissions: **13.9** lb/hour **60.9** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 7E test on a representative engine.** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr and TPY based on a single engine operating at peaking capacity on oil for 8,760 hr/yr.** | |

## G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: $NO_X$ | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: 111.6 lb/hour 248.8 tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: Genertek, 2001 | 7. Emissions Method Code: |
| 8. Calculation of Emissions (limit to 600 characters): See Air Construction Permit Application - Attachment Part II. | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): Lb/hr based on 59°F and TPY based on natural gas firing 89,200 engine-hours/year baseload operation. Actual TPY will be based on heat input to the engines. | |

**Allowable Emissions** Allowable Emissions 2 of 2

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: OTHER | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: | 4. Equivalent Allowable Emissions: 5.6 lb/hour 24.5 tons/year |
| 5. Method of Compliance (limit to 60 characters): EPA Method 7E test on a representative engine. | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Lb/hr and TPY based on a single engine operating at baseload capacity on gas for 8,760 hr/yr. | |

## H. VISIBLE EMISSIONS INFORMATION
## (Only Regulated Emissions Units Subject to a VE Limitation)

**Visible Emissions Limitation:** Visible Emissions Limitation 1 of 2

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE20** | 2. Basis for Allowable Opacity: [ X ] Rule [ ] Other |
| 3. Requested Allowable Opacity: Normal Conditions: **20** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance: **Annual VE Test EPA or DEP Method 9** | |
| 5. Visible Emissions Comment (limit to 200 characters): | |

## I. CONTINUOUS MONITOR INFORMATION
## (Only Regulated Emissions Units Subject to Continuous Monitoring)

**Continuous Monitoring System:** Continuous Monitor 1 of 2

| | |
|---|---|
| 1. Parameter Code: | 2. Pollutant(s): |
| 3. CMS Requirement: | [ ] Rule [ ] Other |
| 4. Monitor Information: Manufacturer: Model Number: | Serial Number: |
| 5. Installation Date: | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): | |

## H. VISIBLE EMISSIONS INFORMATION
## (Only Regulated Emissions Units Subject to a VE Limitation)

**Visible Emissions Limitation:** Visible Emissions Limitation 2 of 2

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE99** | 2. Basis for Allowable Opacity: [ X ] Rule [ ] Other |
| 3. Requested Allowable Opacity:<br>Normal Conditions: % Exceptional Conditions: **100** %<br>Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance:<br>**None** | |
| 5. Visible Emissions Comment (limit to 200 characters):<br>**FDEP Rule 62-210.700(1), Allowed for 2 hours (120 minutes) per 24 hours for start up, shutdown and malfunction.** | |

## I. CONTINUOUS MONITOR INFORMATION
## (Only Regulated Emissions Units Subject to Continuous Monitoring)

**Continuous Monitoring System:** Continuous Monitor 2 of 2

| | |
|---|---|
| 1. Parameter Code: | 2. Pollutant(s): |
| 3. CMS Requirement: | [ ] Rule [ ] Other |
| 4. Monitor Information:<br>Manufacturer:<br>Model Number: Serial Number: | |
| 5. Installation Date: | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): | |

## J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
## (Regulated Emissions Units Only)

**Supplemental Requirements**

| |
|---|
| 1. Process Flow Diagram<br>[ X ] Attached, Document ID: WP-EU1-J1 [ ] Not Applicable [ ] Waiver Requested |
| 2. Fuel Analysis or Specification<br>[ X ] Attached, Document ID: WP-EU1-J2 [ ] Not Applicable [ ] Waiver Requested |
| 3. Detailed Description of Control Equipment<br>[ X ] Attached, Document ID: WP-EU1-J3 [ ] Not Applicable [ ] Waiver Requested |
| 4. Description of Stack Sampling Facilities<br>[ X ] Attached, Document ID: WP-EU1-J4 [ ] Not Applicable [ ] Waiver Requested |
| 5. Compliance Test Report<br>[ X ] Attached, Document ID: WP-EU1-J5<br>[ ] Previously submitted, Date: ______<br>[ ] Not Applicable |
| 6. Procedures for Startup and Shutdown<br>[ X ] Attached, Document ID: WP-EU1-J6 [ ] Not Applicable [ ] Waiver Requested |
| 7. Operation and Maintenance Plan<br>[ X ] Attached, Document ID: WP-EU1-J7 [ ] Not Applicable [ ] Waiver Requested |
| 8. Supplemental Information for Construction Permit Application<br>[ ] Attached, Document ID: ______ [ X ] Not Applicable |
| 9. Other Information Required by Rule or Statute<br>[ ] Attached, Document ID: ______ [ X ] Not Applicable |
| 10. Supplemental Requirements Comment: |

**Additional Supplemental Requirements for Title V Air Operation Permit Applications**

11. Alternative Methods of Operation
    [ ] Attached, Document ID:________ [ X ] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
    [ ] Attached, Document ID:________ [ X ] Not Applicable

13. Identification of Additional Applicable Requirements
    [ ] Attached, Document ID:________ [ X ] Not Applicable

14. Compliance Assurance Monitoring Plan
    [ X ] Attached, Document ID: WP-EU1-J14 [ ] Not Applicable

15. Acid Rain Part Application (Hard-copy Required)

    [ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
    Attached, Document ID:________

    [ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
    Attached, Document ID:________

    [ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
    Attached, Document ID:________

    [ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
    Attached, Document ID:________

    [ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
    Attached, Document ID:________

    [ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
    Attached, Document ID:________

    [ X ] Not Applicable

ATTACHMENT WP-EU1-A9

EMISSIONS UNIT COMMENT

[ATTACHED ARE PHOTOGRAPHS OF ONE OF THE ENGINES AND A DRAWING OF THE STACK FOR EACH UNIT]

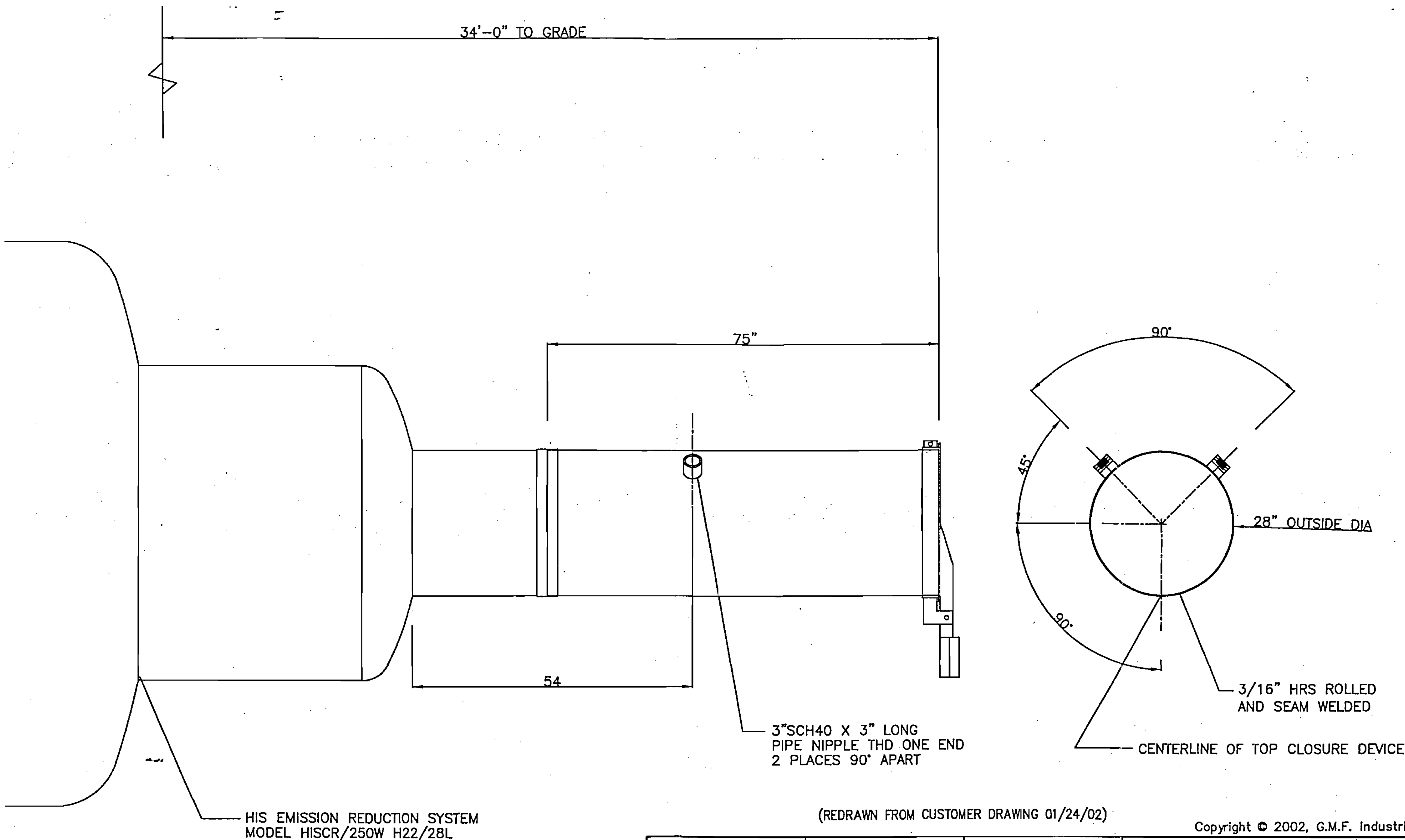
Photo 1. Front View - GM EMD 20/645/E4B Diesel Engine

Photo 2. Side View - GM EMD 20/645/E4B Diesel Engine

Attachment WP-EU1-A9
Winston Peaking Station Photos

Source: Golder, 2001.

Golder Associates




(REDRAWN FROM CUSTOMER DRAWING 01/24/02)

For As Built Dimensions
Only
1/26/02
19727



**PROPRIETARY DATA**



NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES FRACTION
ANGLES
3 PLACE DECIMALS
2 PLACE DECIMALS

DO NOT SCALE THIS DRAWING

MATERIAL

FINISH

CONTRACT No.

| DRAWN JSD | DATE 01/24/02 |
|---|---|
| CHECKED | DATE |

ENGRG APPROVAL

MFG APPROVAL

APPROVED FOR PRD

APPROVED FOR –

GMF (STRUCTURAL DIVISION)
G.M.F. STRUCTURAL DIVISION
Post Office Box 6688
Lakeland, Florida 33807
(863) 646-5081

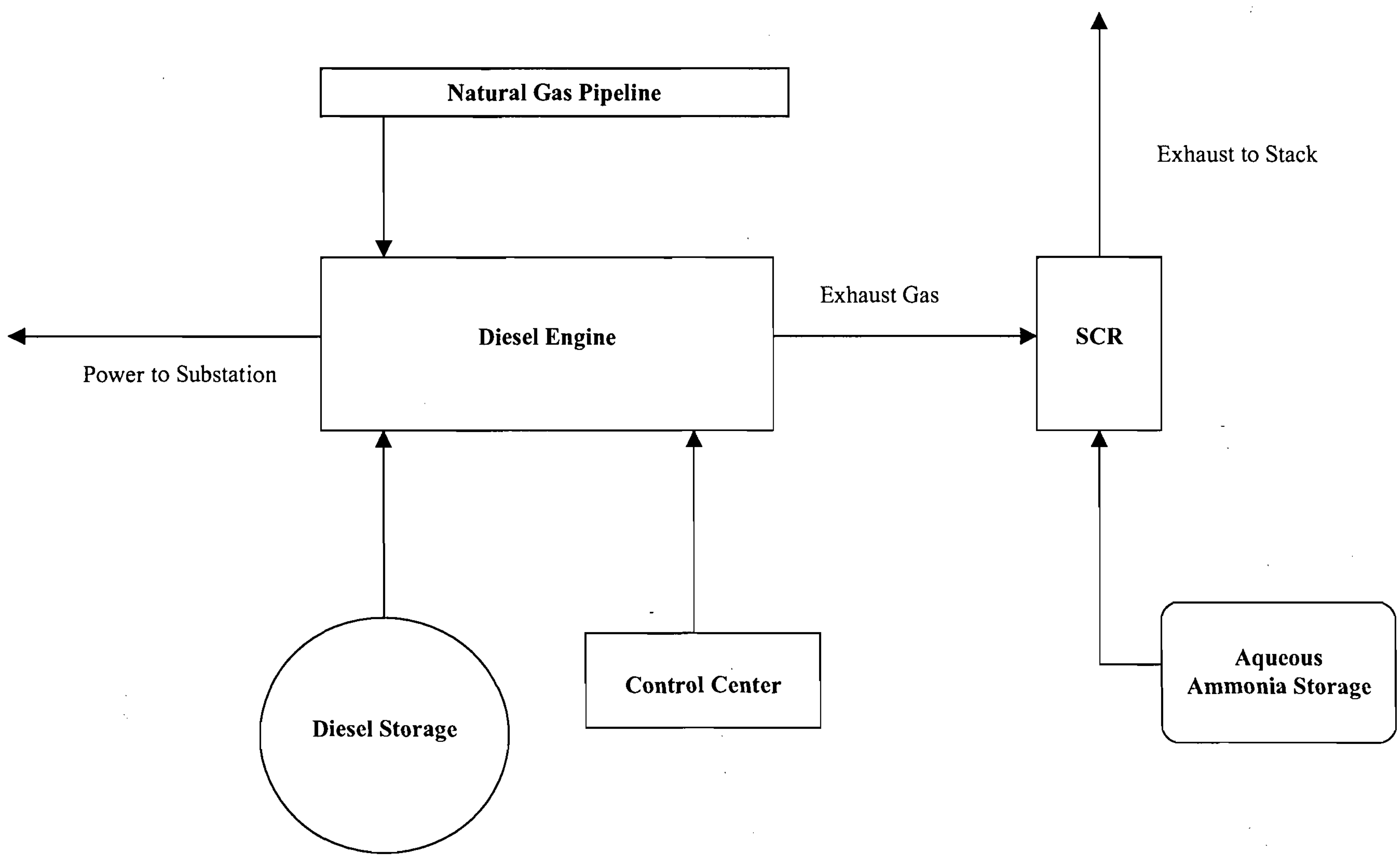
GENERTEK INTERNATIONAL
WINSTON PEAKING STATION
STACK EXTENSION ASSEMBLY

| SIZE | JOB # | DRAWING No. | REV. |
|---|---|---|---|
| B | – | 20 EC0001 | – |

SCALE N.T.S. | SHEET | OF

**ATTACHMENT WP-EU1-J1**

**PROCESS FLOW DIAGRAM**




**Attachment WP-EU1-J1**
**Simplified Flow Diagram of One GM EMD 20/645/E4B, Diesel Engine**

Source: Golder Associates Inc., 2001

Golder Associates

ATTACHMENT WP-EU1-J2

FUEL ANALYSIS

NO. 2 FUEL OIL

**COMMERCIAL TESTING & ENGINEERING CO.**
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 630-953-9300 FAX: 630-953-9306
SINCE 1908®
SGS Member of the SGS Group (Société Générale de Surveillance)
*Committed To Excellence*

ADDRESS ALL CORRESPONDENCE TO:
16130 VAN DRUNEN RD.
SOUTH HOLLAND, IL 60473
TEL: (708) 331-2900
FAX: (708) 333-3060
www.comteco.com

December 19, 2001

CITY OF LAKELAND
3030 E. Lake Parker Dr.
Lakeland, FL 33805
Attn: Steven Parrish

Sample identification by
City of Lakeland

| | |
|---|---|
| Kind of sample reported to us | Fuel Oil |
| Sample taken at | City of Lakeland |
| Sample taken by | City of Lakeland |
| Date sampled | December 3, 2001 |
| Date received | December 12, 2001 |

Sample ID: Winston Station
L/S Diesel
835-01

P.O. No. 15558
ADDED ASH, 12/19/01

Analysis Report No. 71-167170



| | As Received |
|---|---|
| **GRAVITY** | |
| Specific at 60/60°F | 0.8388 |
| Lb/gallon at 60°F | 6.985 |
| °API | 37.2 |
| **HEATING VALUE** | |
| Btu/lb | 19,494 |
| Btu/gal at 60°F | 136,166 |
| Sulfur, % Wt. | 0.04 |
| Ash, % Wt. | <0.001 |

METHODS
Gravity: ASTM D 4052; Heating Value: ASTM D 240; Sulfur: ASTM D 4294; Ash: ASTM D 482

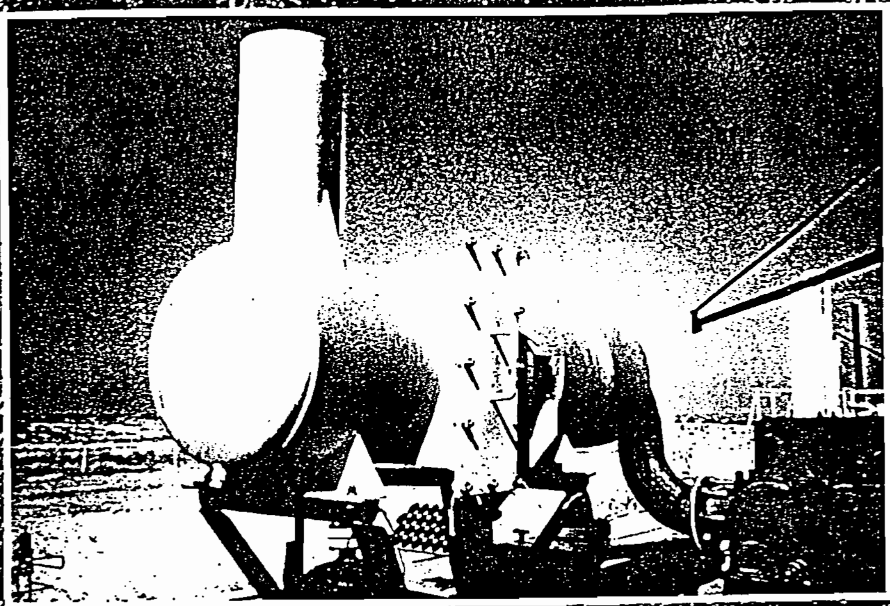
Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

South Holland Laboratory

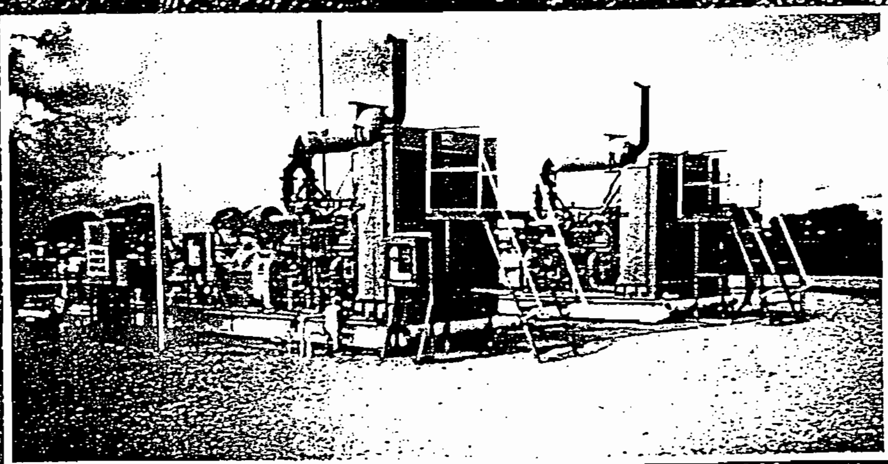
MEMBER ACIL

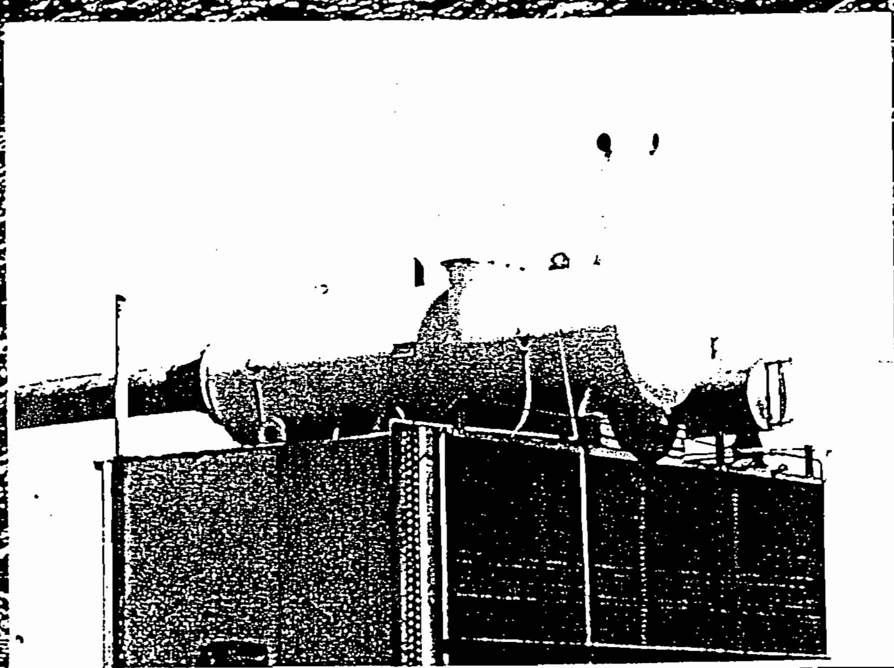
ATTACHMENT WP-EU1-J3

DETAILED DESCRIPTION OF
CONTROL EQUIPMENT



# HIS Emissions Reduction Systems



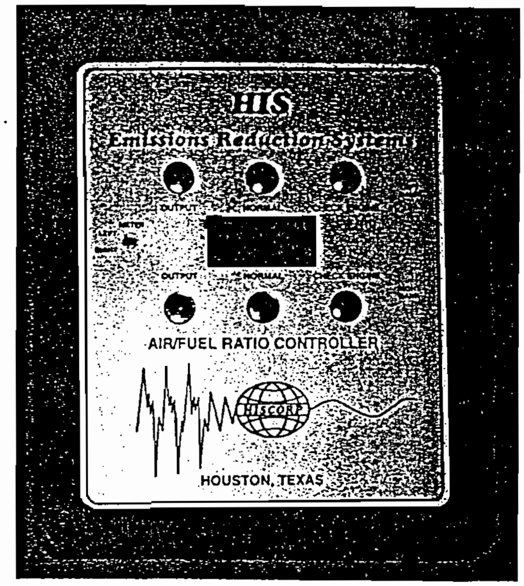


HISCORP

# Sound Engineering

Harris International Sales Corporation was incorporated in 1977 as a manufacturer of engineered products for engines, compressors and turbines serving the natural gas and power generation industries.

In response to legislation and ever-increasing demand to reduce air pollution, the DeNOx Silencer, a combination catalytic converter/silencer, was developed and patented. In April 1985, the first DeNOx Silencer was put into operation under Houston Industrial Silencing *(HIS)*.




*The HIS 88EM Automatic Air Fuel Ratio Controller is microprocessor-based and programmed to govern (fuel to air) system balance within the catalyst window and track load change automatically and efficiently.*

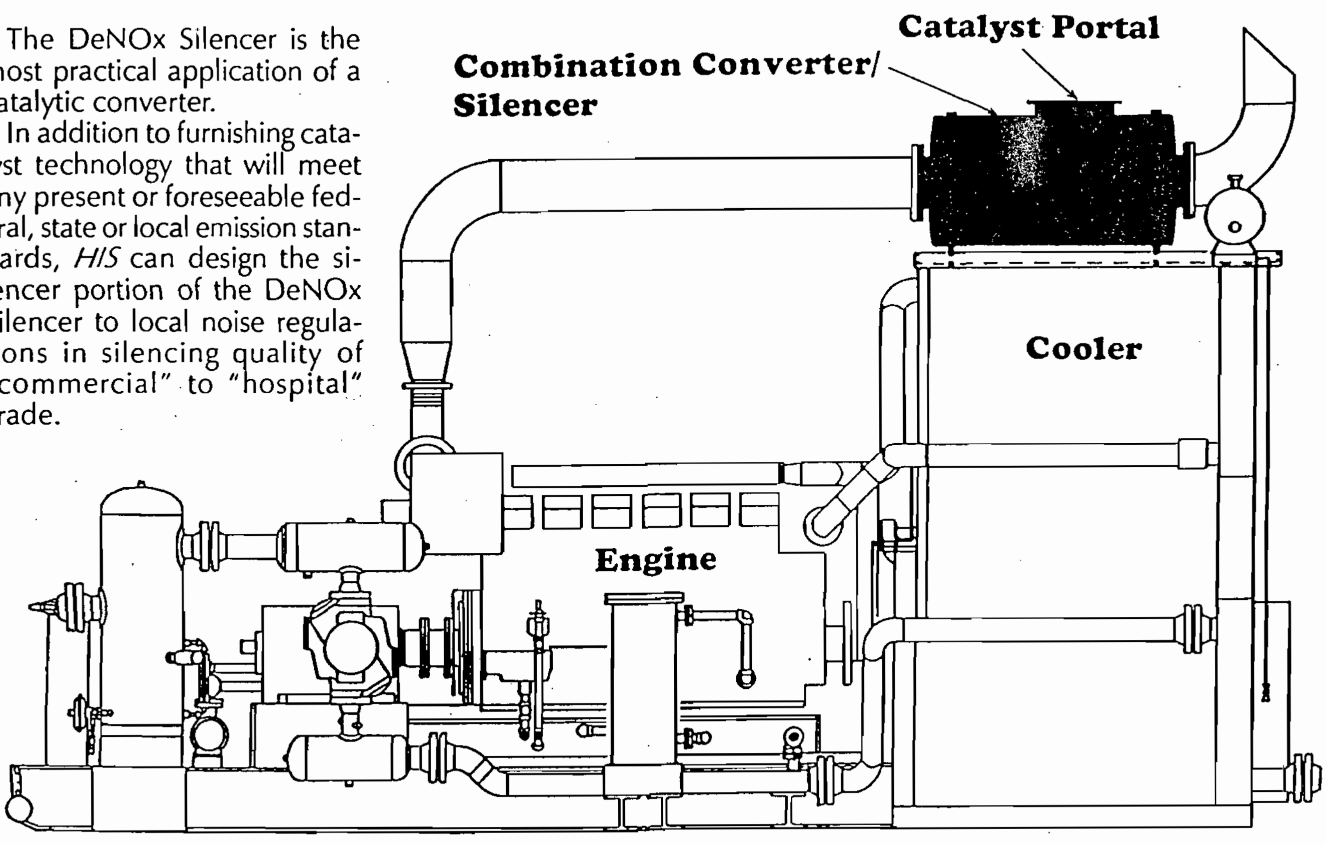
## The Most Advanced Design Technology in Catalytic Converter Design.

*HIS* has taken the DeNOx Silencer technology to higher levels of performance and reliability with concentrated research and field experience. The combining of the catalytic converter and exhaust silencer has several advantages beyond the obvious economy of a single vessel.

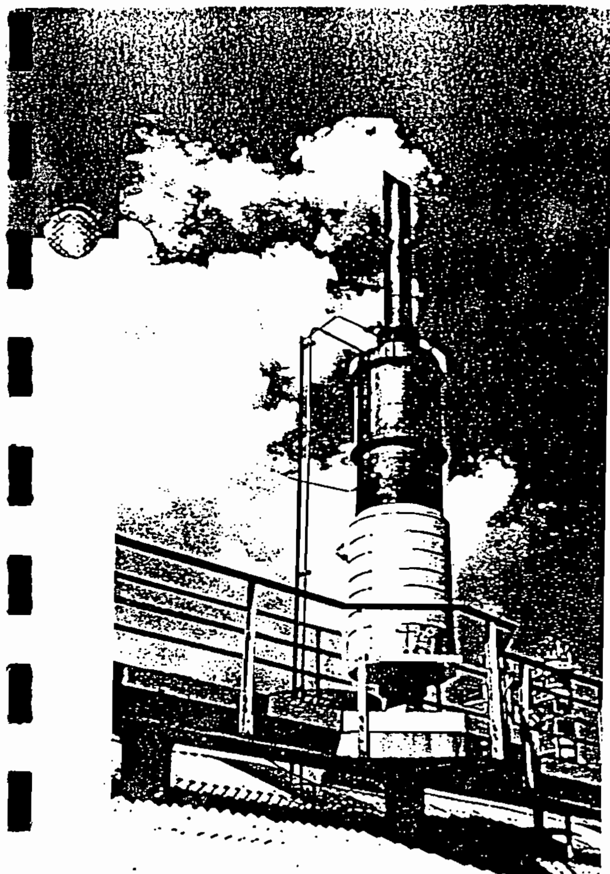
- More Catalyst Contact Surface - than common catalytic converters.
- Velocity Reduction - for more efficient emission conversion and longer cleaning intervals.
- Pulsation Reduction - for longer catalyst life.
- Emissions Reduction - for EPA and other air quality district compliance.
- Noise Reduction - for OSHA compliance.

The DeNOx Silencer is the most practical application of a catalytic converter.

In addition to furnishing catalyst technology that will meet any present or foreseeable federal, state or local emission standards, *HIS* can design the silencer portion of the DeNOx Silencer to local noise regulations in silencing quality of "commercial" to "hospital" grade.



# Supreme Chemistry



*HIS developed the DeNOx Silencer for Selective Catalytic Reduction (SCR) service which employs ammonia injection with a catalyst, formulated specifically for reduction of NOx and CO to required levels.*

## Selective Catalytic Reduction - SCR

The DeNOx silencer was originally designed to achieve specific emissions reduction, with stoichiometric or "rich-burn" gas engines. Since 1984, the DeNOx silencer system has evolved to also provide emissions reduction with oxygen-rich exhausts such as lean-burn, clean burn fuel injected two-cycle and four-cycle gas engines, diesel engines and gas turbines.

In areas of severe pollution, federal, state or local agencies may have more stringent control requirements. In these instances, *HIS* can design a DeNOx Silencer for maximum emissions reduction. The DeNOx Silencer employs Selective Catalytic Reduction (SCR) technology for two-cycle and four-cycle lean burn engines in which ammonia is injected ahead of the catalyst. Ammonia slip is controlled to barely detectable levels.

## DSOPH - Destroy Smoke, Odor, Particulates, and Hydrocarbons

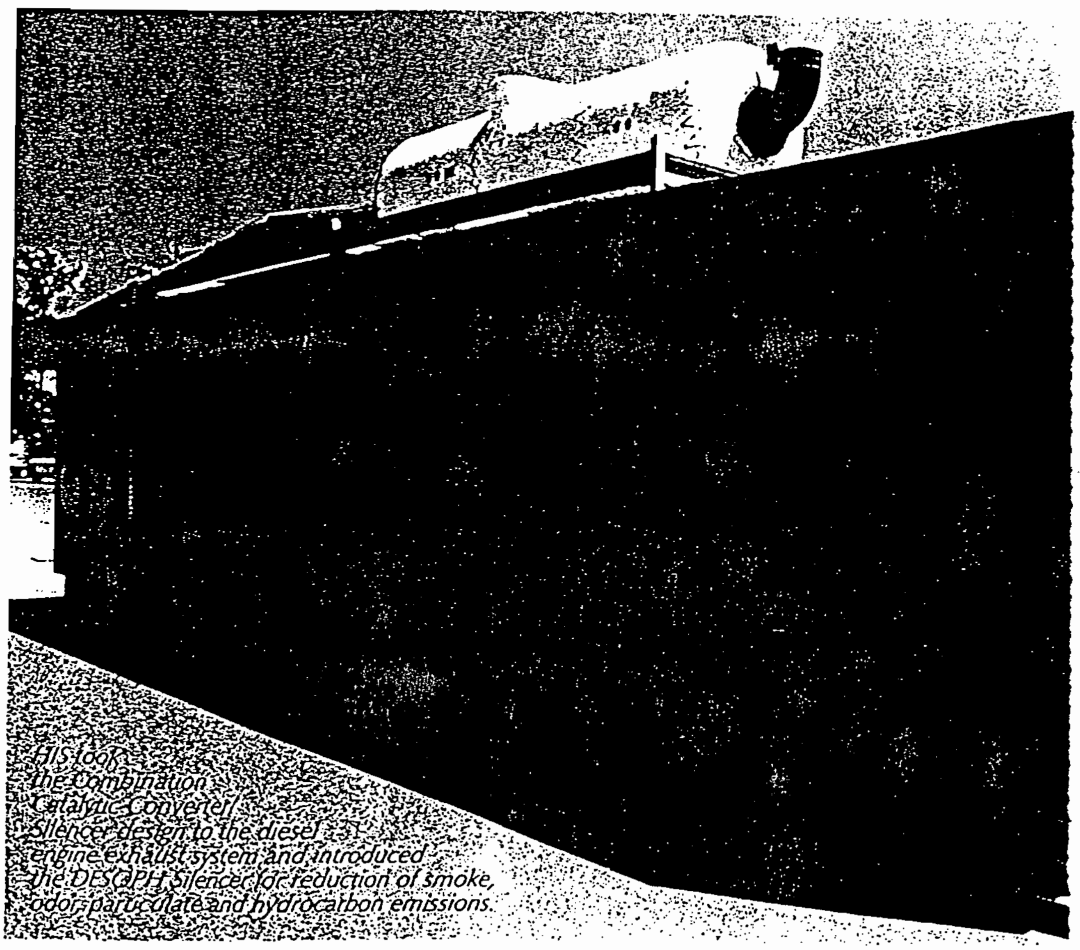
The 1990 Clean Air Act mandated a reduction in sulphur content. The sulphur contributes to acid rain and the black exhaust plume injects larger volumes of particulate into the atmosphere.

The DeNOx Silencer equipped with a cyclonic oxidizing particulate control system can eliminate odor, carbon monoxide and reduce the exhaust plume to a colorless exhaust vapor.

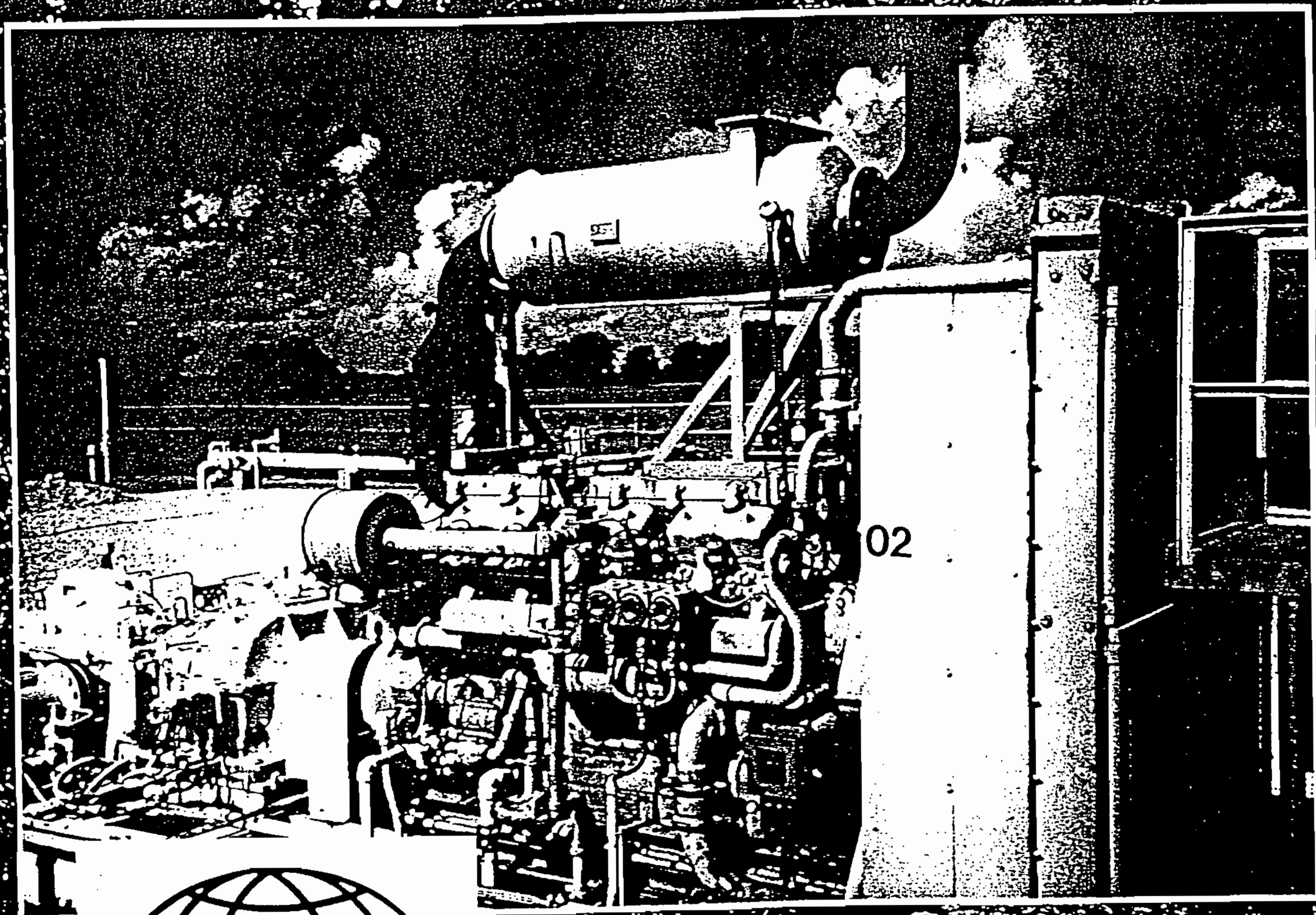
## Air Fuel Ratio Controller

For maximum effectiveness, a three-way catalyst must operate in a very narrow "window" that is slightly rich of stoichiometry. An engine can be manually tuned to this condition at a steady load, speed, and ambient temperature, however, if one or more of these parameters varies significantly, as is almost always the case, an automatic air/fuel ratio controller is required.

*HIS* offers a microprocessor-based air/fuel ratio controller that operates in conjunction with an oxygen sensor (per bank of cylinders) in the engine exhaust to maintain proper exhaust gas composition even under varying load conditions. Lights display "normal" operation, computer activity, and a "check engine" light that warns that the engine is badly out of tune.



*HIS took the Combination Catalytic Converter/Silencer design to the diesel engine exhaust system and introduced the DSOPH Silencer for reduction of smoke, odor, particulate and hydrocarbon emissions.*

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# HIS Emissions Reduction Systems

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281-463-8883
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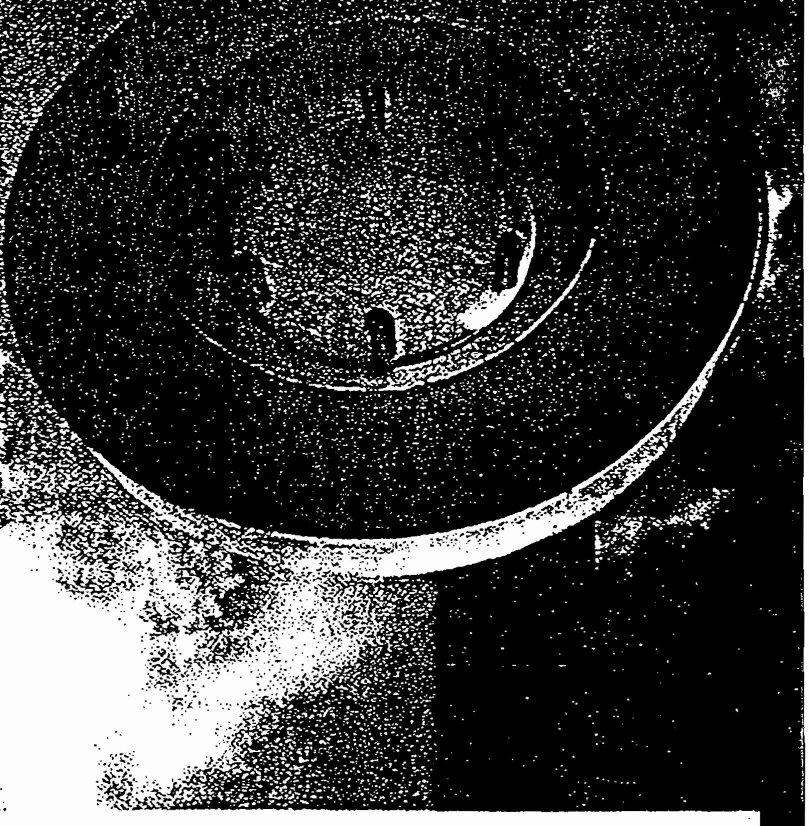
# New, State-Of-The-Art DeNO$_x$ Silencer With Integral Backfire Port



- **Improved flow characteristics — Provide even distribution of exhaust gasses across catalyst face.**
- **Integral backfire port — protects catalyst from backfire damage.**
- **"Synergy" of disciplines of fluid flow dynamics, chemistry and acoustics — accounts for high conversion efficiency and better noise environment.**
- **Catalyst module designed to full diameter of DeNO$_x$ Silencer housing — no catalyst volume lost; maintains maximum conversion efficiency.**
- **Three-year guarantee — provides assurance of quality, efficient and long-life product.**

High velocity exhaust gasses cause maldistribution of flow at the catalyst face leading to frequent cleaning of the catalyst module and ultimately reduces conversion efficiency. ***HIS*** has improved the flow characteristics within the DeNO$_X$ Silencer to provide an even distribution of exhaust gasses across the catalyst face.

In addition to improving flow dynamics within the DeNO$_X$ Silencer, the catalyst module has been designed to incorporate an "*integral backfire port.*" The "*integral backfire port*" is installed in the center of the catalyst module in the direct path of the pressure wave resulting from the backfire explosion. Improving exhaust flow characteristics within the DeNO$_X$ Silencer resulted in a larger diameter. Design harmony calls for the catalyst module to be the full diameter of the DeNO$_X$ Silencer housing. With the catalyst module at full diameter, no catalyst volume is lost to the "*integral backfire port.*" The "*integral backfire port*" is Intellectual Property and protected by Patent No. 5,921,079.

Managing the disciplines of fluid flow dynamics, chemistry and acoustics in the new generation DeNO$_X$ Silencer is the "*synergy*" that sustains high conversion efficiency and a better noise environment.

Successful adoption of the "*Absolute Standards*" policy has propelled ***HIS*** to the forefront in the leadership of the catalytic converter industry with technology, performance — and still keeping the "Three Year Guarantee."

Emissions Reduction Systems
9837 W [illegible] VE • [illegible] 77095 [illegible] • FAX: 281 [illegible]
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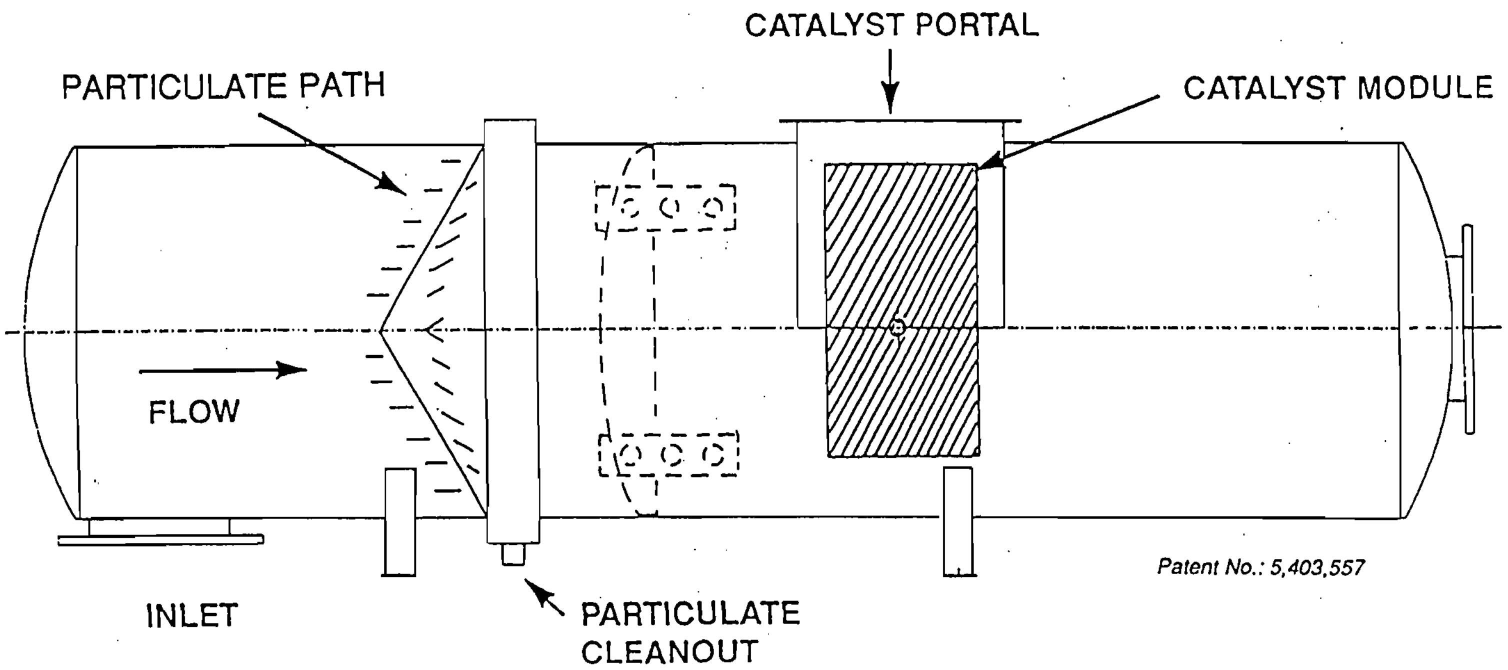
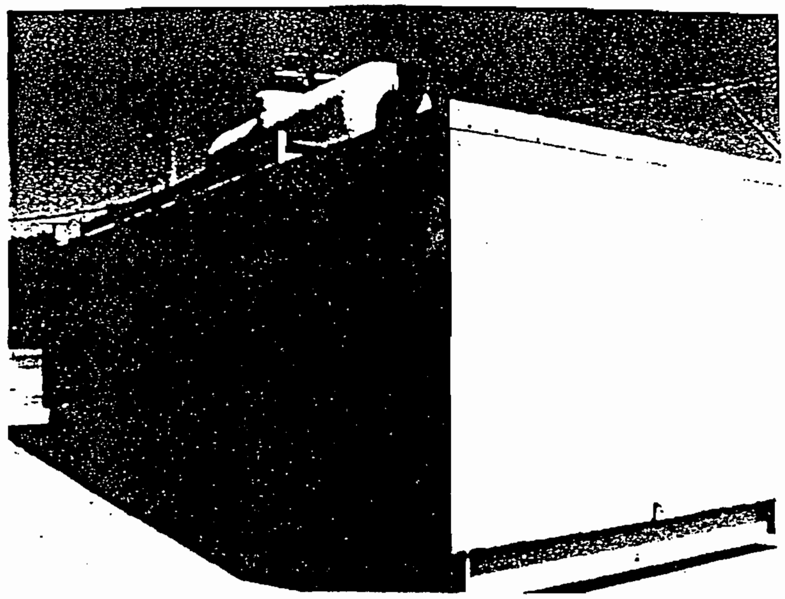
# The HIS DeSOPH Silencer




*A schematic diagram of the **HIS DeSOPH** silencer. This silencer is a combination silencer and exhaust emissions catalytic control device. It also serves to control smoke, odor and particulates, allowing diesel driven equipment to be environmentally compatible with the surrounding neighborhood.*

# *HIS* Emissions Reduction Systems

Introduces the
DeSOPH Silencer



Destroy
Smoke
Odor
Particulate
Hydrocarbons

*"Quietly Cleaning the Air"*

*HIS* takes the combination catalytic converter/silencer design to the diesel engine exhaust system for reduction of smoke, odor, particulate and hydrocarbons emissions.

The product is named the **DeSOPH** Silencer and is of the reactive (multi-chamber) silencer design with "pressure vessel like" construction which incorporates a cyclonic oxidizing particulate control system.

The patented **DeSOPH** Silencer is of low pressure drop design, however the cyclonic oxidizing control system adds pressure drop but stays well with in the engine manufacturers specified limit. Besides, there is no need to impose more back pressure than a well-designed silencer alone.

Catalyst design is directed to the oxygen rich exhaust stream of the diesel engine. The platinum rich or other noble metal formulation is deposited on a stainless steel substrate with vast contact surface and low light off temperature which minimizes visible start up smoke.

The **DeSOPH** Silencer is ideal for original installation as it is a single vessel which minimizes piping fitting and welding time. Where NOx reduction is also required, a Selective Catalytic Reduction system can be added for overall emissions reduction.

Retrofit with the **DeSOPH** Silencer is minimized by direct replacement of the existing muffler and usually provides a no cost upgrade in silencing quality. Silencing quality is tailored to the surrounding environmental requirements. Flexibility in design allows freedom to fit most any piping configuration.

The **DeSOPH** Silencer can be custom designed for specific installations which call for ultimate and immediate performance on start-up. A preheater control is available to keep the catalyst temperature above catalyst light off temperature for instant-on performance.

**Exceptional Features:**

-Platinum group metals catalysts
-Design to noise specifications
-Long life catalyst
-Three Year Guarantee

-Retrofit construction minimized
-Pressure vessel like construction
-Metallized finish or stainless steel construction
-Install vertical or horizontal

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# HIS Emissions Reduction Systems

Air Fuel Ratio Control:

*HIS* 88EM Automatic Air Fuel Ratio Controller is microprocessor-based and programmed to govern system balance within the catalyst window and follows load change quickly and efficiently to assure continuous high conversion rate. The controller utilizes advanced design, high technology circuitry and processing, built around an Intel 8088 16 byte processor. The *HIS* 88EM has memory storage over 168 operating hours as a diagnostic assist for compliance assurance monitoring.

The *HIS* 88EM Controller is available for single and dual carburetor engines, and can be 12/24 VDC or 110/120 VAC power. The enclosure is weatherproof, NEMA 4, explosion-proof enclosure optional.

Design Flexibility:

Catalyst portal orientation can be positioned, ergonomically, to reduce effort in removing and installing the catalyst module. Inlet and outlet nozzles can be oriented to reduce the need for pipe fittings and welding time. Flow orientation can be vertical or horizontal.

As a result of backfire or other damage, the *HIS* catalytic converter is the only catalyst module which can be repaired, at a fraction of replacement cost. Other catalytic converters have the potential to expose uncoated, catalyst surfaces or have loss of catalyst from internal rods.

Standard:

Gas sampling couplings
Temperature sensor coupling
Inlet and outlet nozzle size, orientation and location at no cost.
Metallized, flame sprayed aluminum finish.

Optional:

Exhaust stack with appropriate couplings for compliance test.
Support brackets, cradle or Turnnion pins.
Noise control for "HOSPITAL" quality silencing or other specific noise level

Other specific applications:

The DeNOx Silencer is easily adapted to "Clean Burn", "GL" and "Low Emissions" gas engines for oxidation of carbon monoxide and NMHC, aldehydes and HAP.

For lean burn two cycle and four cycle gas engines, the DeNOx Silencer in Selective Catalytic Reduction (SCR) service has exceptionally high performance levels for NOx and CO, in addition to practically no ammonia slip and low pressure drop design.

For a free quotation and evaluation, call us to discuss specific applications at anytime.

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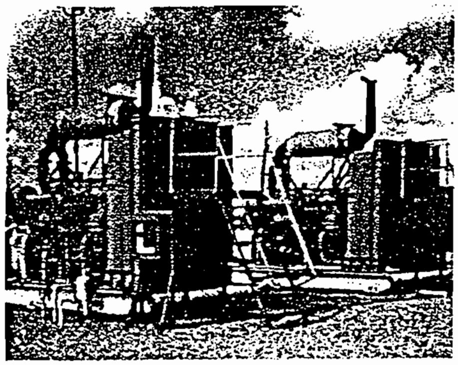
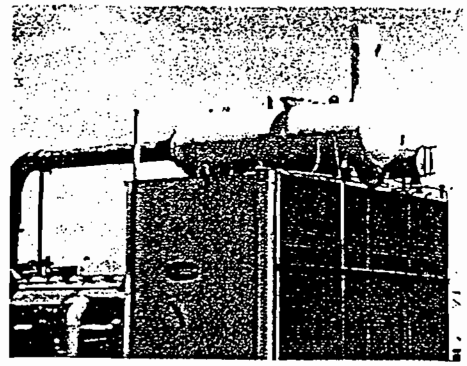
# *HIS* Emissions Reduction Systems

## DeNOx Silencer - *The Combination Catalytic Converter/Silencer*





## *Three Year Performance Guarantee*

The DeNOx Silencer, the combined catalytic converter/silencer, as the name implies, is a system, not a commodity. Lower pressure drop, lower velocity, and lower pulsation are the synergy for simultaneous reduction of exhaust emissions and exhaust noise. Engine piping coupled with the companion nozzles from the DeNOx Silencer completes the exhaust system in a "CRAFTED, NOT COBBLED" design.

The velocity control and pulsation reduction ahead of the catalyst assures equal distribution of exhaust gasses across the catalyst face; no channeling, or cold spots.

The stainless steel substrate design gives the catalyst module more contact surface per unit of measure than common catalytic converters. Catalyst design and selection is by precise mass flow calculations and emissions reduction requirements.

The DeNOx Silencer is ideal for original installation, and minimizes pipe fitting and welding time in retrofit installation. Design flexibility allows design freedom to fit most any piping configuration. Use of the DeNOx Silencer in retrofit applications provides a free upgrade to the exhaust system for lower back pressure and more noise reduction.

The DeNOx Silencer provides "Residential" quality silencing as a standard for most engines. While there may be no need for silencing, it is desirable to have the benefits of the "reactive" design of the DeNOx Silencer. The "reactive" design of the DeNOx Silencer defines the dimensions for larger diameter and length based on fluid flow dynamics and acoustics technology. The "reactive" design of the DeNOx Silencer provides the dynamic platform for control of the velocity and exhaust gas pulsation and most importantly, flow distribution, evenly, across the catalyst face.

*HIS* has adopted the principle of "Absolute Standards" as a commitment to provide the internal combustion engine industry with the highest quality product and the highest catalytic performance at a value added price. *HIS* will not compromise the DeNOx Silencer design with undersized catalysts.

*Sound Engineering/Supreme Chemistry*

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monitoring are not necessary.

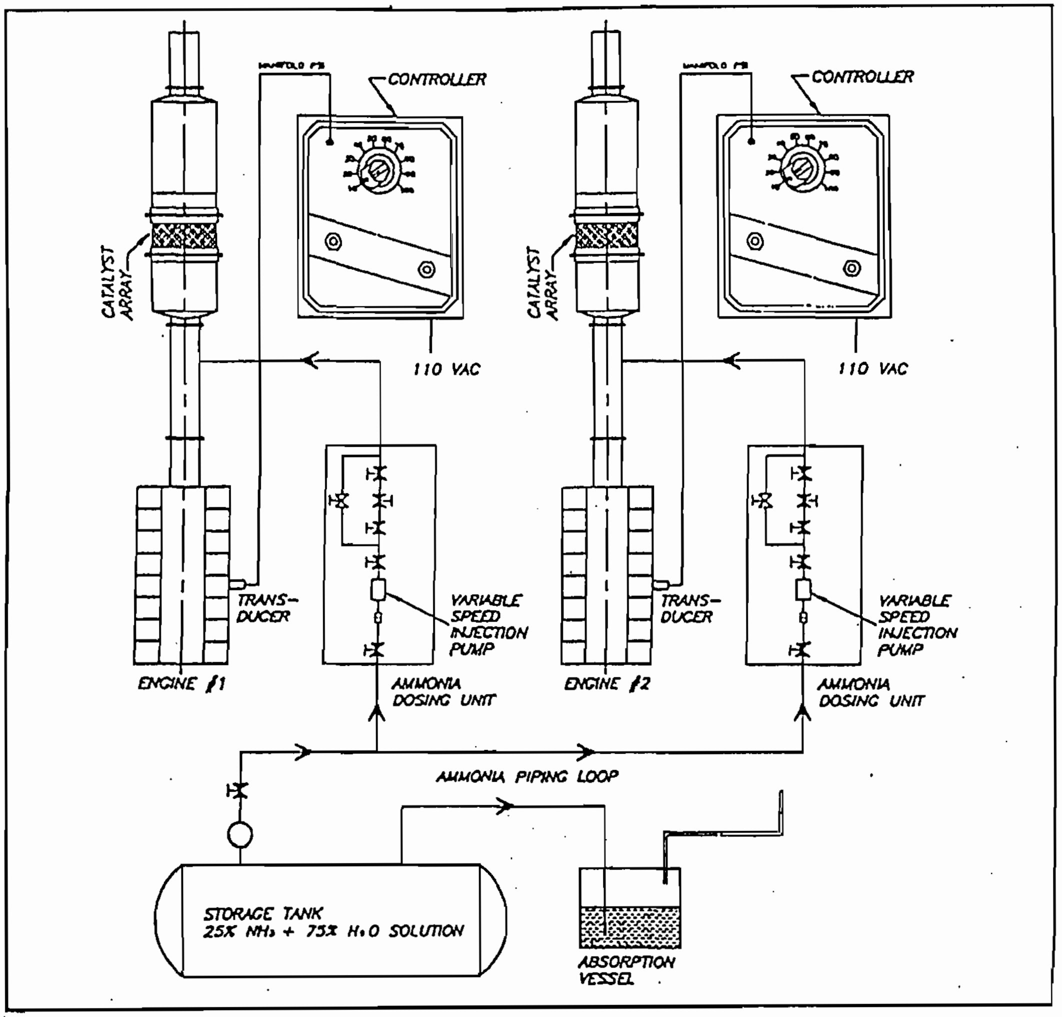
Ammonia slip to atmosphere is limited to three to five ppm. The proper reaction between the injected ammonia and the exhaust gases will only produce high conversion rates if the reaction components make direct contact with the vast catalyst surface area. Catalyst substrate is a honeycomb structure, coated with the base vanadia and other reactive elements which are used in order to provide the most active surface areas, and ensure a low pressure drop and lowest possible operating costs. The active catalyst elements are fitted to a stainless steel support by means of a fusion bonded method in the manufacturing process.

To achieve the best reduction of emissions, it is extremely important that a uniform reaction temperature, and a constant residence time of the exhaust on the catalyst, be maintained. The pulsation damping effect of the DeNOx Silencer provides this stable condition.

Ammonia, in either aqueous or anhydrous form, may be used in the injection process. Aqueous ammonia must be injected in a distilled water stream. Anhydrous ammonia can be mixed with air or stream to reach the exhaust flow or vaporized directly in the exhaust stream. The aqua ammonia solution of 75% deionized water to 25% ammonia keeps the solution from hazardous materials handling requirements.

$NO_X$ reduction by more than 80% has been experienced over a two year period of continuous maintenance-free operation on a natural gas-fueled, spark-ignited, two-cycle engine. Carbon monoxide reduction is greater than 80% and ammonia slip to atmosphere has never exceeded 10 ppm when $NO_X$ reduction is at the level of 75 ppm. This performance can be duplicated for virtually all emissions reduction requirements. ■






■ Schematic diagram of the HISCR Series DeNOx Silencer selective catalytic reduction system.

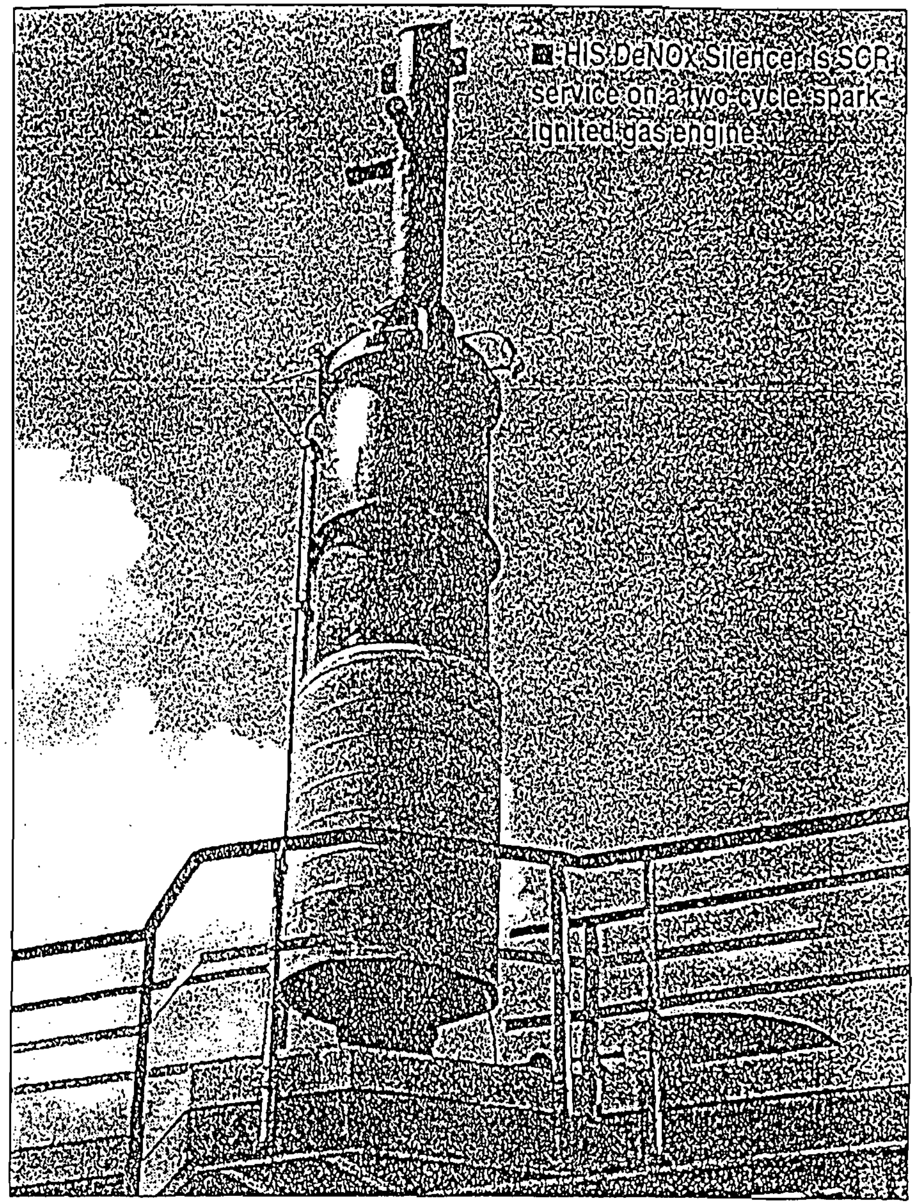
# Selective Catalytic Reduction System

## System Exhibits High Efficiency $No_x$ Conversion, Low Ammonia Slip, Extremely Low Maintenance

Clean Burn two-cycle and four-cycle natural gas-fueled engines and liquid-fueled diesel engines operate with exhaust oxygen greater than eight percent by volume. Because these engines often need additional exhaust treatment to bring them into compliance with environmental regulations, Houston Industrial Silencing (HIS) of Houston, Texas, has developed the DeNOx Silencer for Selective Catalytic Reduction (SCR) service. This SCR process employs ammonia injection with a catalytic formulated specifically for reduction of $NO_x$ and CO to required levels.

The selection of catalyst is determined by operating exhaust gas mass flow, temperature and exhaust composition. Each engine is evaluated for untreated emissions levels, and the usage of each engine is considered in the design of the entire SCR System. Heat recovery and steam production are also available as optional equipment. The HIS DeNOx Silencer design meets all installation requirements. Direct replacement of the existing silencer minimizes retrofit costs and simplifies piping in new engine installations.

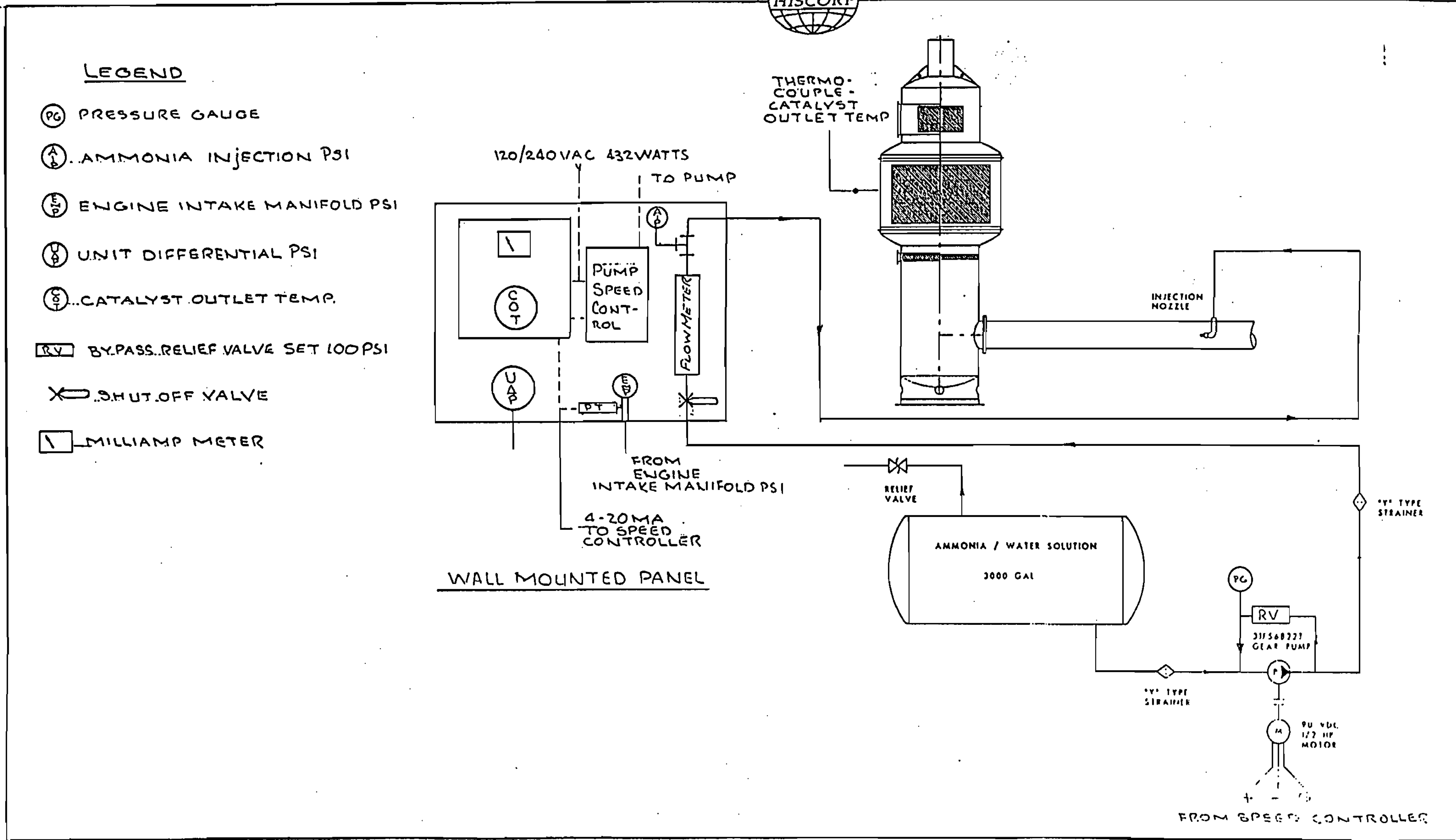
The outstanding feature of this catalyst application (and the others mentioned here), is that there is virtually no slip of ammonia to atmosphere. At operating conditions (temperature), the ammonia will be consumed in the catalyst. Hence elaborate ammonia control and


HIS DeNOx Silencer is SCR service on a two-cycle spark ignited gas engine.

# AMMONIA CONTROL SYSTEM FOR DeNOx SILENCER MODEL HISCR-17.6C18PRL

REFERENCE

PREPARED BY



# ***HIS*** **Emissions Reduction Systems**

Selective Catalytic Reduction System

High Efficiency NOx Conversion
Low Ammonia Slip
Extremely Low Maintenance

"Lean Burn" two-cycle and four-cycle natural gas fueled engines and liquid fueled diesel engines operate with exhaust oxygen greater than 8% by volume. *HIS* has developed the DeNOx Silencer for Selective Catalytic Reduction (*SCR*) service. This *SCR* process employs ammonia injection with a catalyst formulated specifically for reduction of NOx and CO to required levels.

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Ammonia slip to atmosphere is limited to 3ppm to 5ppm. The proper reaction between the injected ammonia and the exhaust gases will only produce high conversion rates if the reaction components make direct contact with the vast catalyst surface area. Catalyst substrate is of a honeycomb structure, coated with the base vanadium and other reactive elements which are used in order to provide the most active surface areas, and ensure a low pressure drop and lowest possible operating costs. The active catalyst elements are fitted to a stainless steel support by means of a fusion bonded method in the manufacturing process.

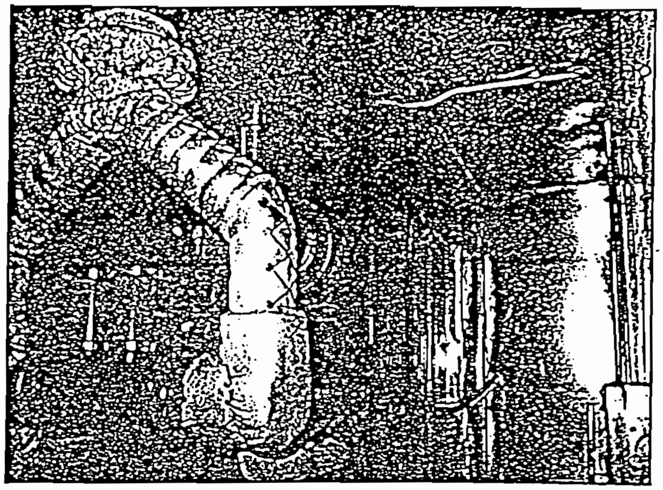
To achieve the best possible reduction of emissions, it is extremely important that a uniform reaction temperature, and a constant residence time of the exhaust on the catalyst, be maintained. The pulsation damping effect of the DeNOx Silencer provides this stable atmosphere.

Ammonia, in either aqueous or anhydrous form, may be used in the injection process. Aqueous ammonia must be injected in a distilled water stream. Anhydrous ammonia can be mixed with air or stream to reach exhaust flow or vaporized directly in the exhaust stream. The aqua ammonia solution of 75% deionized water to 25% ammonia keeps the solution from the hazardous material handling requirements.

NOx reduction by more than 80% has been experienced over a two year period of continuous maintenance free operation on a natural gas fuel spark ignited two-cycle engine. Carbon monoxide reduction is greater that 80% and ammonia slip to atmosphere has never exceeded 10ppm when $NO_x$ reduction is at the level of 75ppm. This outstanding performance can be duplicated for your emissions reduction requirements.

We would be happy to discuss this equipment with you at any time.

# POWER GENERATION



*A look inside the enclosure where a Detroit Diesel 8V-92TA engine drives a Marathon generator.*

steel I-beam base houses an integral 500 gal. double wall fuel tank that provides an eight hour fuel supply.

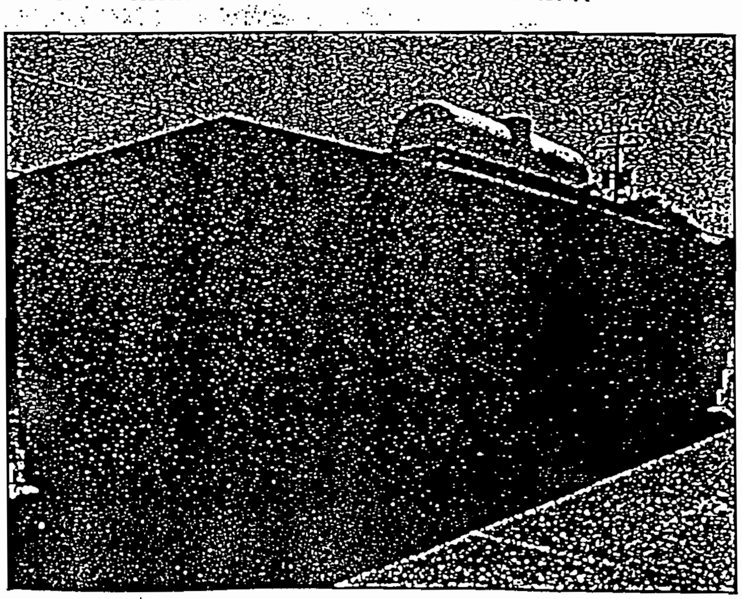
For further sound attenuation and exhaust emissions treatment, the installation was equipped with a DeSOP oxidation silencer from Houston Industrial Silencer Corp. With a sound attenuation rating of 53 dB(A), the silencer incorporates a catalytic converter designed to reduce CO, VOC, $SO_2$ and particulates in the 80 to 90 percent range, according to Mann. "What results is an exhaust plume that is an opaque, almost transparent white color and odor is virtually eliminated," he said.

Because of the silencer's size — 3 ft. wide x 12 ft. long — special supports were fabricated by Floyd for mounting the unit on the enclosure's roof. A 2 in. thick insulation blanket covers the silencer to retain the heat necessary for catalytic functions.

The final dimensions of the enclosure were 14 ft. high (with silencer), 35.5 ft. long and 10 ft. wide.

Bill Mercer, Atlantic DDA's vice president of engineering, commented, "The typical sound attenuated unit is 80 to 85 dB(A) at 3 to 10 ft. To bring the sound down at least an extra 20 dB(A), you've really gotten into some serious attenuation engineering. And these requirements were especially difficult in terms of the space limitations and the project's overall schedule."

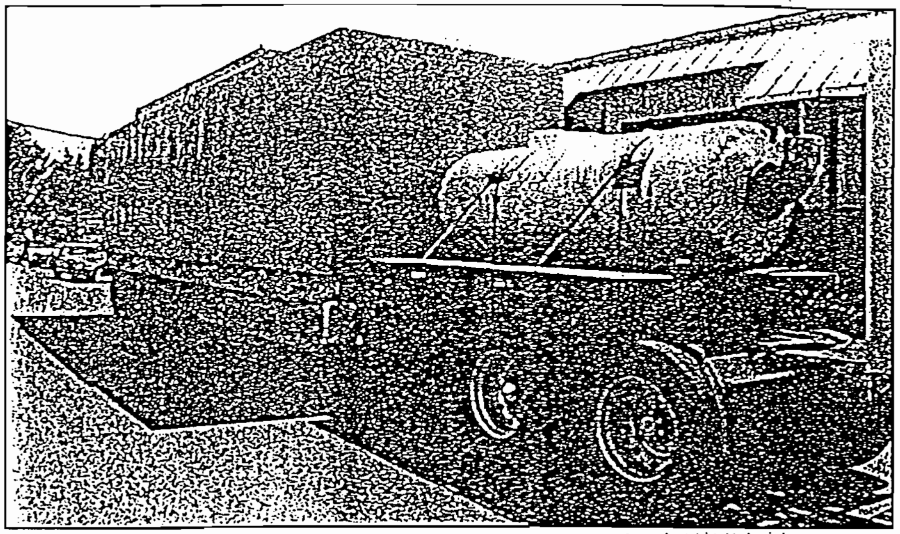
In addition to this unit, Atlantic DDA previously installed a 1000 kW backup power unit, using a Detroit Diesel 12V-149, inside another building at the same site. The complex of office buildings also utilizes Cooper-Superior and EMD generator sets. ★



*The gen-set package as installed at a communications complex in New York. The unit was designed for low noise and exhaust emissions because of its proximity to pedestrian traffic.*

# Standby Gen-Set Meets Increased Noise, Exhaust Emissions Standards

By Mark McNeely



*The 35 ft. long, sound attenuated gen-set enclosure, manufactured for Atlantic Detroit Diesel-Allison by Floyd Manufacturing, is readied for transport. The package also included a Houston Industrial Silencer DeSOP catalytic converter/silencer.*

In congested city centers and other urban settings, standby generator sets designed to provide power for emergency building services are often installed on rooftops. In such locations, the impact of noise and exhaust emissions on the general population can be limited and it can be conveniently packaged with other building support systems such as HVAC equipment.

At times, however, back-up gen-sets must be placed at street level. In these situations, sound attenuation and exhaust treatment strategies become a primary concern because of pedestrian traffic. A case in point is a recent 400 kW standby generator installation by Atlantic Detroit Diesel-Allison, Lodi, N.J., for a communications business complex in White Plains, N.Y.

The gen-set consists of a Detroit Diesel 8V-92TA diesel engine rated 643 hp at 1800 rpm driving a 400 kW Marathon 433RSL7021 synchronous generator with a Marathon DVR 2000 voltage regulator. The unit includes an NFPA 110, level one control panel featuring Frank W. Murphy Mfr. controls. Other components include a Bearward radiator, Nife-Pak 2000 battery charger with Nife SPH 45 NiCad starting batteries and ACE 122G spring vibration isolators.

What began as a fairly standard gen-set installation, changed quickly when local officials required higher sound attenuation and abatement of smoke and odors from the engine. The generator is located in a parking lot area adjacent to office buildings, and public walkways are also within a few feet of the enclosure, according to Trux Mann, vice president of sales for Atlantic DDA.

"We were halfway through with the project when city officials stepped in with some environmental concerns — both with noise and emissions — that were not part of the original specification." said Mann. "The primary concern was with diesel odor, because the exhaust is in close proximity to people and office buildings. This application brings environmental issues to a much higher level for this category of power generation."

To meet the revised requirements, Atlantic worked with Floyd Manufacturing, Norfolk, Va., to develop an enclosure that would address the noise requirements. The new specifications called for an enclosure length not to exceed 35 ft. and an increased sound reduction to 55 dB(A) at 15 ft. from the enclosure. The original untreated sound level for the unit was 112 dB(A).

"The entire enclosure is sound attenuated, but this also incorporated a special baffle design for the air intake and radiator exhaust areas," said Joe Floyd III, sales manager of Floyd Manufacturing. "In addition, we had to ensure that there would be no airflow restriction once the unit was at full load."

Using a computer-aided design program to create a mock-up of the air flow patterns inside the enclosure, Floyd designed sound baffles with specially engineered angles to knock down the sound in the critical areas. The baffles are constructed of an 8 lb. density attenuating material within a perforated aluminum framework. The aluminum acts to limit heat absorption or retention.

The enclosure also features an architectural sound insulated wall surrounding the gen-set to further isolate noise. The exterior was made of thicker than normal steel for its rigidity and resistance to "drumming" created by sound waves. The composite

*continued on page 40*

# *HIS* Emissions Reduction Systems

## The *HIS* Model 88EM Automatic Air/Fuel Ratio Controller

The *HIS* 88EM Automatic Air Fuel Ratio Controller is microprocessor-based and programmed to govern (fuel to air) system balance within the catalyst window and track load change automatically and efficiently. Efficient tracking of the 88EM Controller assures continuous high catalytic conversion rate for NOx, CO and NMHC, to meet the most stringent emissions requirements. This Controller is available for single and dual carburetor engines and can be powered with either 12/24 VDC or 120 VAC power. A number of interface options are available.

All air/fuel ratio controllers used with stoichiometric SI natural gas engines, normally or TC aspirated are oxygen sensor driven in closed loop sampling circuitry. With the *HIS* 88EM Controller oxygen sensor voltage is sampled many times per second to assure fast response to speed and load change which keeps exhaust emissions in compliance. All modern day air fuel controllers respond automatically to engine speed and load change.

The *HIS* 88EM Controller with the total fuel control method is the most recognized style of air fuel ratio control. The *HIS* total fuel control method utilizes a heavy duty modulating valve (Model FMV-15) with wide range resolution to control fuel flow to the engine and provide precise combustion control.

The *HIS* 88EM Controller can be used with either the supplemental "trim-in" fuel method or the total fuel flow control method. The "trim-in" fuel method utilizes a rotary metering valve to introduce the supplemental fuel to the air horn or intake manifold or ahead of the mixing valve, as in the low fuel pressure systems used on many late model engines.

With either method, "trim-in" or total fuel control, the controller can handle a load swing between forty (40) percent to one hundred (100) percent with corresponding engine torque. The fuel flow to combustion air flow is a delicate balance totally dependent on controller response when tracking engine load change.

*HIS* has had memory storage available for diagnostic and trending since 1983, and now that emissions regulations are more strict and leaning toward compliance assurance monitoring, this feature will prove invaluable. Sensor voltage, over time when analyzed after downloading, will indicate controller response to load change, ambient temperature change, intermittent and consistent misfire and ultimately sensor aging. This memory bank is collected from a precatalyst location. Controller response to load change and ambient temperature change including variations in fuel quality is absolutely essential to precise combustion control for engine produced exhaust gas composition compatible with optimum catalyst conversion rate. Outlet oxygen level should be zero (0) or maximum one one hundredth to two one hundredths volume percent with normal engine operation.

We would be happy to discuss the equipment with you at any time.

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# HIS 88EM SERIES AIR/FUEL RATIO CONTROLLER

## SYSTEM DESCRIPTION

The HIS 88EM Automatic Air/Fuel Ratio Controller is microprocessor based, utilizing advanced design, high technology circuitry and processing, built around an Intel 8088 16 byte processor.

The controller continuously monitors exhaust oxygen content and automatically activates the butterfly valve(s), adjusting the fuel flow to the carburetor(s) to maintain air/fuel ratio that will maximize converter performance and track engine load change quickly and efficiently. The HIS 88EM is unique in its simplicity. It requires no maintenance and, after calibration and set up, there are no internal field adjustments required.

The HIS 88EM Series Automatic Air/Fuel Ratio Controller is available in the following power supplies:

Model 88EM-A1-M - 110/120 VAC - Single Carburetor Engine or Inline Cylinders
Model 88EM-A2-M - 110/120VAC - Dual Carburetor Engines or V-Type Engines
Model 88EM-A1-M - 12/24VDC - Single Carburetor Engines or Inline Cylinders
Model 88EM-A2-M - 12/24VDC - Dual Carburetor Engines or V-Type Engines

## SYSTEM COMPONENTS

Enclosure - Nema 4
Butterfly Valve - Single (1), Dual (2)
$O_2$ Sensor - Single (1), Dual (2)
Sensor Cable w/conn. - Single (25'), Dual (50')

## SPECIFICATIONS

*Enclosures:*

-Nema 4, weatherproof enclosure with hinged door
-Class 1, Group D, Div. 2 - Electrical

*Control Electronics:*

- All solid state low power microprocessor. 24K Byte RAM, 8K Byte EPROM, 8 Byte resolution A/D converter input, 8 Byte D/A converter output.

*Utility Requirements:*

-110/120 VAC or 12/24 VDC

*Inputs:*

-Analog to digital 0-5VDC, 4-20 Special ma DC. normal 2 inputs max.

*Outputs:*

-0-5 VDC.

*Options:*

-Serial communication, advanced operator interface, data logging capabilities, customized software. Explosion-proof enclosures. Added A/D inputs, D/A outputs available.

# *HIS* Emissions Reduction Systems

## *Prospectus for the DeNOx Silencer Operating with The Natural Gas, Spark Ignited Engine*

In 1980, *HIS* began the design and development of a combination catalytic converter silencer for use with gas engines and called it "The DeNOx Silencer." The silencer is a reactive design with multiple chambers. It was obvious that the catalyst module should be located in a second quiescent chamber removed from intense pulsation and where lower velocity exhaust gasses are evenly distributed across the catalyst face. The DeNOx Silencer design was awarded Patent No. 4,601,168 in 1986, and was the first catalytic converter/silencer combination with a metallic converter module. The DeNOx Silencer was the first technological design breakthrough in catalytic converter application since the late 1960's.

The catalytic converter, in a simple housing, was first used in the mid 1960's, in California on automobile engines. The present day automotive catalytic converter has a short conical inlet and short conical outlet. That same short entrance and exit configuration exists today in the catalytic converter housings manufactured by competitive brands.

The first catalytic converter was used on a natural gas engine/compressor package around 1976. As mentioned, the catalytic converter and housing configuration has not changed much since 1976, except to go from a square/rectangular shape to a round shape.

With the 1970 Clean Air Act and local regulation of exhaust emissions, the use of a catalytic converter meant another piece was added to the engine exhaust in company with the muffler. Some people claimed that no muffler was needed when a catalytic converter was used. Those early converters were square or rectangular and the catalyst substrate was ceramic. The short conical entrance and exit configuration has not changed. One can recognize what exhaust gas pulsation and engine backfire did to ceramic, reduce it to gravel.

There has been a great deal of research and technology applied to the carrier (substrate) of the catalyst formulation beginning with the original pellet type and the present day metallic honeycomb. Laboratory and field research continues in the effort to improve conversion efficiency and reduce costs outside of the (commodity) market swings for platinum, palladium and rhodium. There has been no technological breakthrough in three-way catalyst formulation since the early 1960's or even earlier. So where is improvement coming from except in the catalyst module design and it's placement in the silencer housing.


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HISCORP

Research has centered on two areas relating to engine exhaust dynamics, gas distribution at the catalyst face and exhaust gas pulsation. Distribution of exhaust gasses at the catalyst face has gathered more attention in the effect to improve performance because of the more strict regulations to reduce emissions from automobiles.

In the industrial engine, cylinder bore and stroke are larger and RPM slower (than automotive engines) contributing to higher levels of exhaust gas pulsation particularly in higher horsepower engines. The pulsation dynamic alone calls for a larger diameter housing to control pulsation intensity.

The industrial catalytic converter module suffers the same mal-distribution of gasses across the face as the automotive converter. Because of the larger cross-sectional area of the industrial converter module, exhaust gas pulsation can be damaging to the module. Exhaust gas pulsation has the energy to move the catalyst module against opposing support members, thus breaking the sealing surfaces to cause bypass.

The natural progress of product development produced the latest technological design breakthrough in the new and larger DeNOx Silencer (for the New Millennium) which incorporates the "Integral Backfire Port" built into the catalyst module. The "Integral Backfire Port" in the center of the catalyst module is a spring-loaded port or rupture disc designed to reduce backfire damage to the catalyst module.

No catalyst volume is lost to the "Integral Backfire Port". The larger diameter housing benefits both exhaust gas pulsation and velocity reduction for uniform distribution of exhaust gasses to the catalyst face. Additionally, the larger diameter of the silencer housing provides better silencing qualities for the DeNOx Silencer even at the

commercial level. This new *HIS* DeNOx Silencer design innovation and the "Integral Backfire Port" is Intellectual Property and is a patented product. The cost of the increased diameter of the DeNOx Silencer housing to accommodate the full (shell) diameter of the catalyst module is small considering the added benefit.

Engine backfire severely damages or destroys catalytic converter modules. Until recently, backfire ports were external to the converter module and located in the exhaust pipe or in the converter housing. When engine backfire occurs, the peak explosion reaches 100 psi, is less than two tenths of a second and the pressure wave travels at sonic velocity to atmosphere. With the pressure wave at sonic velocity, an external backfire port cannot react quickly enough to relieve the pressure before

reaching the catalyst module. At peak explosive pressure of 100 psi, a 24 inch diameter catalyst module is subjected to a force of over 45,000 pounds impact at sonic velocity. It is doubtful that a converter module can withstand that impact pressure without damage or destruction.

It is evident, recognizing exhaust flow dynamics, the effects of exhaust gas pulsation and mal-distributed flow to the catalyst module, that the catalytic converter can not be a commodity product. There is no advantage at this point in time to use a simple catalytic converter in a simple housing plus a typical exhaust silencer considering the advantages of the combination catalytic converter silencer.

*HIS* experience is derived from over thirty years in the silencing industry with engine exhaust and compressor pulsation equipment. The distinction between engine exhaust and compressor pulsation is that exhaust gas pulsation results in audible noise while compressor piping results in suction and discharge piping vibration.

The engine exhaust with the flow dynamics of exhaust gas pulsation, velocity and temperature are essentials which must be recognized to build an efficient exhaust system. The engine builder designs the exhaust manifold to collect the exhaust gasses and allow passage to atmosphere at low pressure loss for proper engine scavenging. The Emissions reduction system must be compatible with the specific engine character.

The wide range of engine horsepower, RPM and the number of engine families call for custom engineered emissions reduction systems. The standard "off the shelf products", the pre-selected sizes of catalyst modules and commodity standardization of catalyst modules and housings, leave room for undersize or marginal sizing of the catalytic system. The *HIS* DeNOx Silencer customized for the specific engine operation and emissions requirements and the *HIS "Absolute Standards"* policy leaves no room for undersize or even marginal size.

*HIS* began in-house manufacture of catalyst modules over five years ago in order to provide infinite sizes of catalyst modules to fit the exacting requirements of emissions reduction, exhaust mass flow and temperature specific to each engine.

The DeNOx Silencer has been adapted to oxidation service and called the DeCOHx Silencer for operation with lean/clean burn gas engines where CO, VOC and aldehydes are effectively reduced.

For diesel engines, the DeNOx Silencer utilizes the Selective Catalytic Reduction process for NOx, CO and VOC reduction. Where NOx reduction is not required, the DeSOPH Silencer is used for reduction of Soot, Odor, Particulates and Hydrocarbons.

The point to be made is the highly favorable cost benefit ratio of the DeNOx Silencer designed to the specific engine character to the "commodity-ized" catalytic converter module installed in a "commodity-ized" exhaust silencer.

The advantages described here are those that set *HIS* apart from competition and have contributed to the success of *HIS* emissions reduction products.

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# CONTROL OF INDUSTRIAL ENGINE AND GAS TURBINE EXHAUST EMISSIONS TO MEET PRESENT AND FUTURE CLEAN AIR REGULATIONS

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## ABSTRACT

Increasingly stringent regulations by the EPA and state air quality agencies in the U.S., as well as new regulations by Environment Canada, are making the reduction of exhaust emissions from industrial engines and gas turbines ever more important for their operators. Not only are these regulations getting increasingly strict with time, but there will be both substantial fines and possible criminal penalties for non-compliance in the future.

This presentation describes how harmful exhaust emissions are formed during the combustion process, what the current regulations are in various areas of North America and where they are probably headed in the foreseeable future. It then discusses possible emission reduction strategies in two broad categories, combustion modification and post-combustion treatment, using catalytic converters.

The three types of catalyst substrates are discussed, with the advantages and disadvantages of each, as well as the relative advantages and disadvantages of the four possible catalyst locations.

## HOW ENGINE EXHAUST EMISSIONS ARE FORMED

When combustion takes place in a confined space under pressure, such as in the combustion chamber of a reciprocating engine or gas turbine, the resulting pressure and temperature cause some reactions which create compounds that have been judged to be harmful to the environment. Under high temperature, high pressure combustion (Fig.1) some of the nitrogen in the air combines with oxygen and creates oxides of nitrogen, principally NO and $NO_2$, which are commonly referred to as $NO_x$. Also, some of the carbon in the hydrocarbons does not completely oxidize and forms carbon monoxide (CO). In addition, some of the fuel does not completely oxidize and carries through in an unburned state. These unburned hydrocarbons are sometimes referred to as volatile organic compounds (VOC), reactive organic gasses (ROG), or non-methane hydrocarbons (NMHC) by various regulatory agencies. They all mean essentially the same thing and, for simplicity, will be referred to in this presentation as $C_xH_y$.

It has been determined that $NO_x$ assists in the formation of ozone, which is toxic, as is CO, and $C_xH_y$ is a factor in the creation of smog. As a result, the Environmental Protection Agency (EPA) and Environment Canada have mandated that all three of these exhaust emissions must be reduced if we are to enjoy an improved environment.

## EMISSIONS REGULATIONS

In the Clean Air Act Amendments of 1990, the United States was divided into attainment areas and non-attainment areas by the EPA. The emission requirements are stricter in the the non-attainment areas. These regulations are rather complicated and vary from state to state, but, in general, in the attainment areas exhaust emissions are required to meet the following values for engines of 500 horsepower and above:

| | | |
|---|---|---|
| above: | $NO_x$ | 2.0 gms/bhp/hr |
| | CO | 3.0 gms/bhp/hr |
| | $C_xH_y$ | 1.0 gms/bhp/hr |

In the non-attainment areas, the levels are the same except that they apply to engines of 150 horsepower and above.

In the South Coast Air Quality Management District (SCAQMD) of southern California, the requirements are somewhat stricter, and apply to engines of 50 horsepower and above, as follows:

| | 1994 | 1995 |
|---|---|---|
| $NO_x$ | 0.30 gms/bhp/hr | 0.15 gms/bhp/hr |
| CO | 0.50 gms/bhp/hr | 0.50 gms/bhp/hr |
| $C_xH_y$ | 0.60 gms/bhp/hr | 0.30 gms/bhp/hr |

In 1995 the SCAQMD reduced the allowable NOx and $C_xH_y$ values to half those previously allowed.

Some jurisdictions limit tons per year, rather than grams per horsepower hour. There has been a trend in the heavily populated northeastern portion of the United States to tighten the restrictions to somewhat more stringent than the rest of the country.

Environment Canada issued a guideline in 1994 calling for the following exhaust emissions for gas engines of 600kW or greater:

| | |
|---|---|
| $NO_x$ | 6.0 gms/kW/hr |
| CO | 3.5 gms/kW/hr |
| $C_xH_y$ | 2.0 gms/kW/hr |

The regulations for gas turbines are a moving target at present, due to the rapid advances being made in NOx control by the turbine manufacturers. These technologies will be covered later in this presentation. Environment Canada has an innovative approach in this area in that they have a higher allowance for turbines that have waste heat recovery, to account for the fact that this saves the pollution from additional fuel being burned elsewhere.

It is evident that as various governmental bodies become more environmentally aware, there are going to be increasing restrictions on exhaust emissions. It is important for an engine or turbine operator to look ahead and select a reduction scheme that not only meets present requirements, but is capable of being upgraded to meet more stringent future regulations.

## EMISSIONS REDUCTION STRATEGIES

Reduction of exhaust emissions falls into one of two basic categories, the first being internal modifications to reduce the formation of emissions during the combustion process and the second is post-combustion treatment, which involves the use of catalytic converters in the exhaust. Following is a listing of the various types of gas and diesel engines, as well as gas turbines, and the applicable reduction strategies for each.

## RICH BURN (STOICHIOMETRIC) GAS ENGINES

### Non Selective (Three Way) Catalytic Converters.

The basic and most widely used catalytic converter technology is the three way catalytic converter, which simultaneously reduces $NO_x$, CO, and $C_xH_y$. A three way catalytic converter requires that the air/fuel ratio be slightly rich of stoichiometric, where the quantity of CO and $NO_x$ are equal, (Fig.1). The CO acts as a reducing agent for the $NO_x$ in the following reaction:

$$NO_x + CO \text{ -------> } N_2 + CO_2$$

The small amount of oxygen remaining in the exhaust oxidizes the $C_xH_y$ in the following reaction:

$$C_xH_y + O_2 \text{ ------> } CO_2 + H_2O$$

$N_2$, $CO_2$ and $H_2O$ are all non-toxic. This is a very simple and cost effective emission reduction strategy and is used on all automotive gasoline, propane and CNG fueled engines being built today.

### Two Stage Catalytic Converters

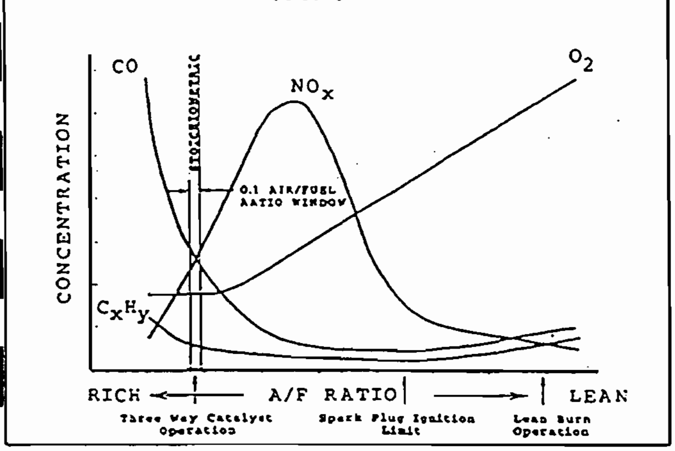
In southern California, and other critical areas, the emission reduction requirements are somewhat more stringent than can be met with a standard three way catalytic converter. In these instances a two stage catalytic converter is employed, in which a larger first catalyst is used, for a more thorough conversion of the $NO_x$, producing the following reaction:

$$NO_x + CO \text{ ----> } N_2 + CO_2 + CO \text{ (excess)}$$

Air is sometimes introduced down stream of this catalyst to provide a leaner mixture going into a second oxidation catalyst producing the following reaction:

$$CO + C_xH_y + O_2 \text{ ----> } CO_2 + H_2O$$

Because of the two catalysts required, this is more expensive than a three way catalytic converter, but will produce emissions reductions that meet all current and foreseeable future requirements. Also, it's possible to design a catalytic converter to initially employ a three way catalyst, with space available for the later addition of a second catalyst, should it be necessary to meet a somewhat stricter emission requirement in the future.



EMISSIONS VS. AIR/FUEL RATIO
FIG. 1

## Air/Fuel Ratio Controller

Exhaust emission control of rich burn gas engines is dependent on an engine air/fuel ratio that maintains equal quantities of $NO_x$ and CO (Fig.1). Under steady state operating conditions the engine can be adjusted to the proper air/fuel ratio manually, however as conditions change the air/fuel ratio deviates from the manual set point. This can be caused by a change in the fuel composition, engine load, speed or ambient air temperature. A normal carburetor cannot hold a constant air/fuel ratio under these changing conditions. For this reason, best conversion efficiency can only be achieved with an automatic air/fuel ratio controller.

Air/fuel ratio controllers are driven by an oxygen sensor installed in the exhaust stream of the engine, upstream of the catalyst. This sensor sends an electrical signal to a computer in the controller. This signal varies from 0 millivolts at full lean to 1,000 millivolts at full rich, with the ideal set point for a three way catalytic converter being somewhere in the neighborhood of 700 to 800 millivolts, as determined by exhaust gas analysis. The computer then either varies the fuel flow or pressure to the carburetor, or adds trim fuel, to maintain the proper air/fuel ratio.

## TWO-CYCLE AND LEAN BURN FOUR-CYCLE GAS ENGINES

In general, gas engines that run with an extremely lean air/fuel ratio produce lower emissions than engines that run at a stoichiometric mixture, in which the fuel and air are theoretically correct for complete combustion (Fig.1). This is true for both lean burn four-cycle gas engines and two-cycle gas engines, which cannot be run stoichiometrically and always have some excess oxygen in the exhaust due to the scavenging air required. The additional air in lean operation causes more thorough combustion of the fuel, thereby reducing the levels of CO and $C_xH_y$ in the exhaust, up to a point. The cooler combustion also reduces the formation of $NO_x$ as well, but as the mixture becomes very lean, the CO and $C_xH_y$ begin to increase again, due to the cooler combustion. In order to reach the low emissions produced by these engines, the excess air causes the air/fuel ratio to exceed the lean ignition limit by a normal spark plug and it has to be ignited by some other means. There are several strategies for doing this, as follows:

1. The cylinder head can be manufactured with a pre-chamber combustor, which contains the spark plug. Additional fuel is introduced into this chamber to enrich the mixture to near stoichiometric. The spark plug then ignites this richer mixture, sending a flame into the combustion chamber to ignite the lean mixture there.

2. There are after market pre-chambers available that are designed to screw into the existing spark plug hole, to save the expense of purchasing new heads when converting an older engine to lean burn.

3. Ignition systems have recently been introduced which produce multiple sparks over several degrees of crank angle to improve the ignition of lean mixtures.

4. "Plasma" ignition systems have recently come on the market which produce a hot, long duration, arc at the electrodes for improved ignition of lean mixtures.

## Excess Air for Lean Burn Engines

In addition to more reliable ignition for lean mixtures, lean burn engines also require substantially more air than rich burn (stoichiometric) engines. There are several strategies for providing this additional air, as follows:

1. <u>New Engines</u> - All new lean burn engines are turbocharged and are designed with high capacity turbochargers which provide excess air over and above normal requirements. In addition, these engines are generally built with the pre-chamber ignition system described above, as well as more sophisticated engine controls to maintain the air/fuel ratio and ignition timing at optimum for lowest emission levels. For this reason, lean burn engines are generally somewhat more expensive than their rich burn counterparts of the same horsepower.

2. Retrofit of Turbocharged Engines - When an older turbocharged rich burn engine is converted to lean burn operation it occasionally is possible to modify the existing turbocharger for higher capacity, but in most cases it is necessary to replace the existing turbocharger with a new higher efficiency, higher capacity unit. In addition the turbocharger after cooler must be replaced with a higher capacity unit and additional cooling water flow has to be provided to adequately cool the higher volume of air. Also it is imperative that the ignition system be improved by one of the methods described above. Of course the engine must still have very sophisticated engine controls. These retrofits can be very expensive.

3. Retrofit of Naturally Aspirated Engines - In an effort to retrofit naturally aspirated gas engines to some form of lean burn operation, a number of different schemes have been tried with varying degrees of success, as follows:

a. Deration - In cases where the full original design power of the engine is not required, it is sometimes possible to lean the air/fuel ratio by readjusting the carburetor, or inducting air downstream of the throttle valve, so that the engine burns less fuel with the same amount of air it was originally designed for. This can derate the engine 35% or more. It is generally necessary to improve the ignition somewhat to prevent misfiring at this lighter load, which can be expensive.

b. Turbocharging - the deration described above can sometimes be avoided by turbocharging a naturally aspirated engine during the conversion to lean burn operation. Not only is the new turbocharger rather expensive, but it generally is necessary to cool the air between the turbocharger and the engine, which involves not only the additional expense of an after cooler but the additional cooling water capacity involved. In some cases it also is necessary to replace the existing water cooled exhaust manifold with an insulated exhaust manifold, to provide more heat energy to the turbocharger, in addition to the added expense of more powerful ignition and better engine controls.

Many of the above lean burn combustion schemes will reduce $NO_x$ emissions to the 2.0 gms/hp/hr required in most of the United States and Canada and some will even go lower than that, however none of them will come anywhere close to meeting either the 0.15 gms/hp/hr required currently in Southern California or the stricter standards being proposed for the northeastern United States. Since requirements are beginning to tighten up, anyone contemplating new lean burn engines or a lean burn conversion on their existing engines needs to seriously consider whether the results achieved will meet the probable stricter future requirements in their area.

## Oxidation Catalysts

As was noted earlier, the reduction of $NO_x$ emissions during lean burn combustion is often accompanied by increases in the formulation of CO and $C_xH_y$ due to the cooler combustion (Fig.1). The levels of the CO and $C_xH_y$ can be reduced by the installation of an oxidation catalyst in the exhaust to oxidize these pollutants into carbon dioxide and water. This reaction is the same as was explained above in the two stage catalytic reduction for rich burn engines.

## Selective Catalytic Reduction (SCR)

In an oxygen rich exhaust, such as is produced by a lean burn four cycle engine or two cycle engine, it is not currently possible to significantly reduce $NO_x$ with a catalyst alone. In this situation the $NO_x$ can be reduced by introducing ammonia ($NH_3$) in some form into the exhaust upstream of an SCR catalyst. A reaction between the $NO_x$ and $NH_3$ takes place in the catalyst producing the following reaction:

$$NO_x + NH_3 \text{ -----> } N_2 + H_2O$$

In a premium SCR system, the addition of an oxidation catalyst downstream will cause the CO and $C_xH_y$ to react with the excess oxygen to produce the following reaction:

$$C_xH_y + CO + O_2 \text{ -----> } CO_2 + H_2O$$

This currently is the only effective way to reduce these three emissions in an oxygen rich exhaust. At present three different methods are being used to introduce ammonia into the exhaust stream:

1. The most cost effective way to provide ammonia in the exhaust is by the injection of anhydrous ammonia. Even though farmers have been handling anydrous ammónia and injecting it directly into their fields as fertilizer for many years, with a good safety record, many engine operators feel that there is a potential for problems should this pressurized gas escape into the atmosphere and are reluctant to use it. It has been classified as a toxic gas by OSHA and there might be some potential liability problems in this area.

2. Most of the problems associated with anhydrous ammonia can be overcome by the use of aqueous ammo-

nia, which is a solution of 25%-30% anhydrous ammonia into mineral free water. This water needs to be of very good quality to avoid depositing mineral scale on the catalyst when the water evaporates in the exhaust. This aqueous ammonia, also called ammonium hydroxide, can be purchased premixed from several suppliers in North America and is available delivered from their tank trucks. This solution can be stored at atmospheric pressure in closed tanks, which are arranged to prevent escape of any fumes into the atmosphere. This arrangement is being successfully employed at a number of installations in North America. The net ammonia delivered to the engine exhaust with this scheme is more expensive than with anhydrous ammonia, due to the expense of mixing and transporting the ammonia water solution.

3. The safest, and many people feel the most satisfactory, system is the injection of a solution of urea and water into the exhaust. Urea (ammonium nitrate) is a commonly and widely used fertilizer readily available all over the world. It is crystalline in form and granular, similar to rock salt. It is available in plastic or paper bags sized for handling by one person. It is non-toxic and is even used as a feed supplement for cattle and other livestock. It can be either purchased in its granular form and mixed by the user at the jobsite with demineralized water, or is available from several suppliers around North America as a premixed solution delivered in liquid form to the users storage tank. In either case, there is no vapor pressure problem or irritating fumes associated with the solution. Depending on the concentration, there can be some crystallization problems at very low temperatures, which can be solved either by heating the storage tank during these low temperature periods or using some additives that are available to retard this crystallization.

When the aqueous urea solution is injected into the engine exhaust the water is vaporized and the urea is transformed into ammonia by the exhaust heat. The resulting ammonia then reacts with the NOx as described previously. The net ammonia delivered to the exhaust is more expensive than with either aqueous ammonia or anhydrous ammonia, but most operators feel that the added safety is worth the additional cost.

In all of the above schemes, either a variable speed pump or a fixed volume pump with a variable bypass valve can be used to regulate the flow to the exhaust system according to the engine load, so that adequate, but not excessive, ammonia is injected into the system. Excessive flow not only wastes ammonia but causes "ammonia slip" thereby introducing another toxic substance into the atmosphere. This can be prevented with proper controls.

## DIESEL ENGINES

Unlike four cycle gas engines, diesel engines operate with an open throttle and, in the case of a naturally aspirated diesel, the air flow is strictly a function of the speed of the engine. In turbocharged diesels there is additional air that is a function of the exhaust energy available to the turbocharger. The power output of the engine is controlled by the amount of diesel fuel injected on each power stroke. Because of this, the exhaust of a diesel is always oxygen rich, even at full load, and it is impossible to operate a diesel at the stoichiometric point. For this reason a three way catalytic converter will not work on a diesel engine and the methods employed to reduce exhaust emissions are similar to those used on a lean burn four cycle or two cycle gas engine, both of which also have an oxygen rich exhaust. Some of the techniques for doing this are as follows.

### Combustion Modification

In modern diesels the formation of $NO_x$ during the combustion process can be reduced by varying the fuel injection timing, injection pressure and injection duration to lower the combustion temperature and minimize the combining of nitrogen and oxygen in the air to form $NO_x$. In some instances exhaust gas recirculation is also employed to reduce $NO_x$ formation. This reduced combustion temperature also increases the level of CO and $C_xH_y$ in the exhaust.

### Oxidation Catalysts

As is the case with lean burn gas engines, the CO and $C_xH_y$ in diesel exhaust can be significantly reduced by employing an oxidation catalyst to complete the combustion process of these two emissions, using the excess air already present in the exhaust. Depending on the exhaust temperature available, it is not uncommon to get a 95 to 99 percent reduction in CO and 80 to 85 percent reduction in $C_xH_y$ with an oxidation catalyst.

Another benefit of an oxidation catalyst in diesel exhaust is that both the diesel odor and visible smoke are significantly reduced to make the diesel engine more acceptable to the nearby community. The odor normally associated with diesel engines comes from the $C_xH_y$ in the exhaust and, by significantly reducing these elements, the diesel odor that many people find objectionable is significantly reduced as well. Also the reaction between CO and $C_xH_y$ in the catalyst is exothermic. This high temperature causes the black soot particles in the exhaust to either completely incinerate or further oxidize into white particles, causing the exhaust to become very translucent, in fact essentially transparent.

The initial puff of smoke at start-up only lasts for a few seconds with an oxidation catalyst in place, and even this brief time can be reduced by electrically pre-heating the catalyst prior to start-up.

The use of an oxidation catalyst in conjunction with residential or hospital grade silencing has made many diesel engines much more acceptable in densely populated areas.

Selective Catalytic Reduction (SCR)

In cases where the $NO_x$ reduction by combustion modification is not adequate for the local air quality agency, the $NO_x$ can be further reduced by SCR, employing the use of ammonia injection, as described in the section on lean burn gas engines.

## CATALYST SUBSTRATES

The catalyst in a catalytic converter consists of precious metals coated onto a substrate, which supports the catalyst and provides a flow path for the exhaust gas. These precious metals cause the necessary catalytic reactions. Several different substrates have evolved over the years.

In early converters the catalyst was in the form of ceramic beads containing the precious metals, which were then packed into a basket through which the exhaust gas flowed and contacted the catalyst. The disadvantage of this scheme was that pulsation in the exhaust caused the beads to rub against each other, reducing the volume of catalyst by abrasion.

This problem was solved by substituting a ceramic honeycomb structure for the beads. The catalyst was then coated onto the surface of this honeycomb. The disadvantage of using this substrate on industrial engines is that the pulsating flow in the exhaust causes fatigue cracking in the catalyst module. Also, ceramic substrates are very vulnerable to destruction by engine backfire.

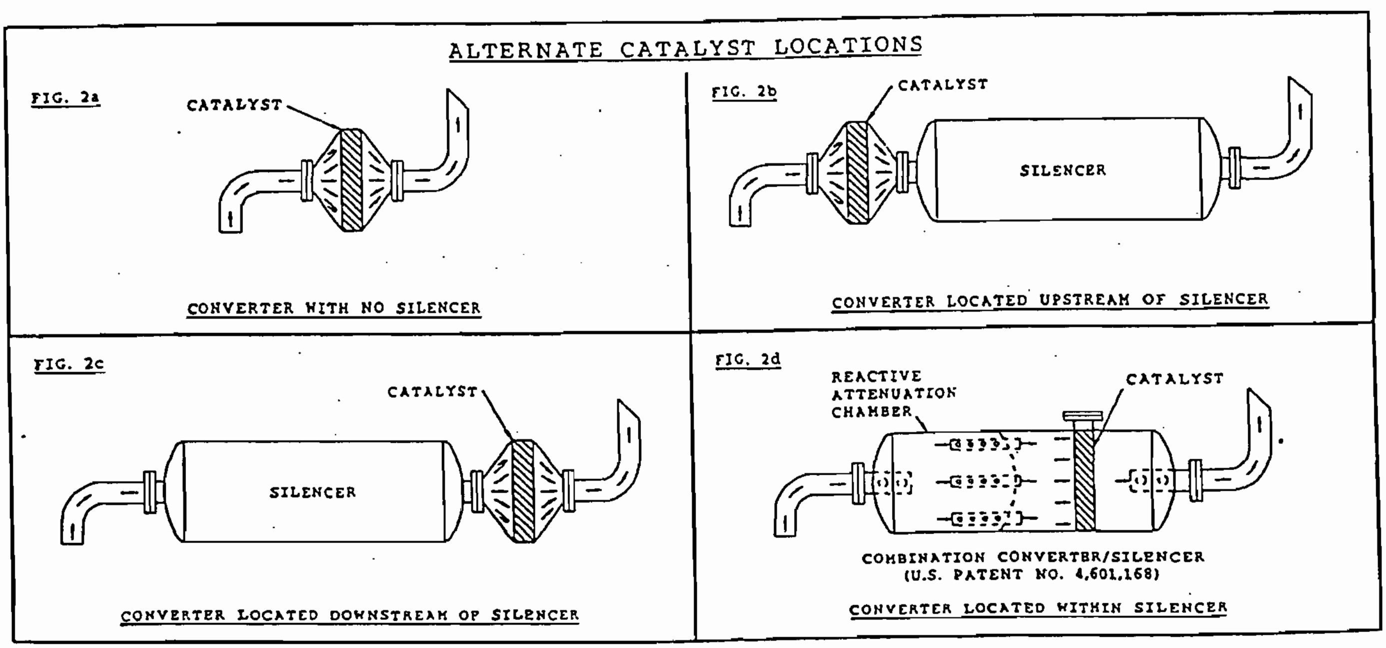
To overcome this problem, some catalytic converter manufacturers are now using metal substrates. In a metallic substrate a foil of stainless steel is crimped to prevent its nesting, then either wound into a roll, or folded back and forth, to form a catalyst module which allows axial flow of the exhaust gas. The catalyst is coated onto the metal foil. These metallic substrates have proven to be more durable in operation on industrial engines, due to their better resilience and greater strength.

## LOCATION OF CATALYST

There are four possible locations for the catalyst in a reciprocating engine exhaust (Fig.2). The advantages and disadvantages of each are as follows:

1. Catalytic Converters With No Exhaust Silencer - (Fig. 2a) This arrangement has the advantage of minimal exhaust back pressure to the engine, but the sound attenuation within the catalytic converter is also minimal and not adequate for most applications. The catalyst is also subject to damage by exhaust pulsation or backfires.

2. Catalytic Converter Located Upstream of the Exhaust Silencer - (Fig. 2b) This arrangement has the advantage of providing maximum exhaust temperature at the catalyst, which provides good catalytic conversion. In



general, the higher the temperature, the better the catalyst operates, up to a point. The disadvantage of this arrangement is that it subjects the catalyst to full pulsation of the engine exhaust, which can cause fatigue damage and eventual deterioration of the catalyst module, as well as possible backfire damage.

3. Catalytic Converter Located Downstream of the Exhaust Silencer - (Fig. 2c) This arrangement has the advantage of protecting the catalyst module from exhaust pulsation and backfire damage. It has the disadvantage that a lot of heat is radiated from the exhaust silencer, resulting in the exhaust temperature being reduced to a point where the catalyst is less effective.

4. Catalyst Located Within the Exhaust Silencer - (Fig. 2d) This is the optimum location. The first reactive chamber of the silencer greatly reduces the exhaust pulsation, for minimal fatigue damage to the catalyst module, and provides good backfire protection, yet the exhaust is still very hot at this point and will give a good catalytic reaction. This has the further advantage that the exhaust gas is flow conditioned by the first chamber so that not only is there less pulsation in the exhaust, but the exhaust is distributed more evenly across the entire face of the catalyst for maximum catalytic reduction. This arrangement can be designed for a lower total pressure drop than a separate converter and silencer in series, resulting in less exhaust back pressure to the engine for cooler, more economical engine operation.

## GAS TURBINES

All gas turbines have an oxygen rich exhaust, due to the large quantities of dilution air that must flow through the turbine in order to keep the temperature to the first stage turbine blades at a low enough level to prevent failure of the blades. For this reason, the exhaust emission reduction schemes are similar to those used in lean burn gas engines and diesel engines. Some of these techniques are as follows:

### Combustion Modification

The preferred and most cost effective way to reduce $NO_x$ in gas turbine exhaust is to reduce its formation in the first place. In the earlier days of gas turbines, combustion in the burner cans, or combustors, took place as a near stoichiometric combustion in the center of the can, which gave very good flame stability, with the necessary dilution air being added after the combustion took place. This gave a very hot flame in the center of the can, which generated large amounts of $NO_x$ due to the high temperature. The key to lowering the formation of $NO_x$ was to lower this temperature of combustion. The combustion modification schemes fall into one of two categories, as follows:

1. **Water or Steam Injection** - The earliest attempts to accomplish this was to add either high quality deionized water or steam to the combustion air as it entered the combustor. The presence of this water or steam lowered the combustion temperature and reduced the formation of $NO_x$. This scheme was satisfactory in combined cycle plants where the exhaust heat was being used to generate steam for a steam turbine, as the high quality injection water had to be produced for the steam boiler anyway and it was not that difficult or expensive to produce additional deionized water for the gas turbine as well. This was not as satisfactory in pure mechanical drive turbines, as the deionized water or steam had to be made from scratch at a significant expense. Also water is scarce and expensive in many parts of the world. The quality of this water is critical because the presence of any minerals in the water will result in deposits in the combustors and on the turbine blades.

2. **Dry Low $NO_x$ Combustors** - Because of the problems above, most gas turbine manufactures are now concentrating their development efforts on the design of dry low $NO_x$ combustors, which do not require water or steam. In a dry low $NO_x$ combustor the fuel and most of the air are premixed as they enter the combustor to provide a very lean homogeneous mixture. The flame stability of such a lean mixture would normally be very poor, however this is overcome by a very small, near stoichiometric, pilot flame in the center of the combustor to maintain flame stability. Of course some $NO_x$ is formed in this pilot flame but this pilot fuel is held to the bare minimum, generally somewhat less than 5% of the total, so that the overall mixture generates very low $NO_x$. Additional dilution air is added near the exit of the combustor to reduce the exit temperature to the necessary level for the first stage turbine blades. The key to making this scheme work is very careful control of the air/fuel ratio and mixing under a wide range of operating conditions to prevent flame out.

Dry low $NO_x$ combustors generally have been able to obtain lower $NO_x$ levels with gaseous fuel than with liquid fuel, due to the fact that it is easier to get a homogeneous mixture between gas and air than with liquids. Even sub micron size liquid particles have a high combustion temperature in the vicinity of the particle, which encourages $NO_x$ formation. Most base load turbines run on gaseous fuels anyway, with liquid fueling available as a standby in case of interruption of the gas supply.

## Oxidation Catalysts

In some cases the combustion modification used to control $NO_x$ formation does not adequately control the formation of CO and $C_xH_y$ due to the lower combustion temperature. In this instance an oxidation catalyst can be added to the exhaust system to reduce these emissions as well, similar to the technology used on lean burn gas engines and diesel engines. These oxidation catalysts will also reduce the exhaust odor in the case of liquid fueled turbines.

## Selective Catalytic Reduction (SCR)

In instances where combustion modification will not adequately reduce the $NO_x$ emissions in a gas turbine, SCR can be used to further reduce $NO_x$ levels, as described previously.

## CONCLUSION

Hopefully this information will assist engine and turbine operators in choosing the exhaust emissions scheme best suited for their particular situation. It is important to keep in mind that the historic trend of emissions regulations have been for them to get increasingly strict as time goes by. Because of this, it is important that the operator select an emission control system that will not only meet the current requirements, but also have the capability of being upgraded to meet stricter requirements which seem to be inevitable in the future.

# *HIS* Emissions Reduction Systems

*Thanks*, MIRATECH

*Thanks*, JOHNSON-MATTHEY

*Thank*, WPI

*Thanks*, MECHANICAL EQUIPMENT

**Thanks for recognizing that the *HIS* DeNOx Silencer has set the industry standard for engine exhaust emissions with the combination catalytic converter/silencer.**

**Thanks again for the compliments, imitation is the most genuine form of flattery.**

**Sincerely,**

*HIS* Emissions Reduction Systems

**Harold L. Harris**
**President**

9837 Whithorn Drive • Houston, Texas 77095 • 281-463-8883
P.O. Box 1639 • Cypress, Texas 77410 • Fax 281-463-8951
HISCORP

Photo 1. Front View - Selective Catalytic Reduction Control System

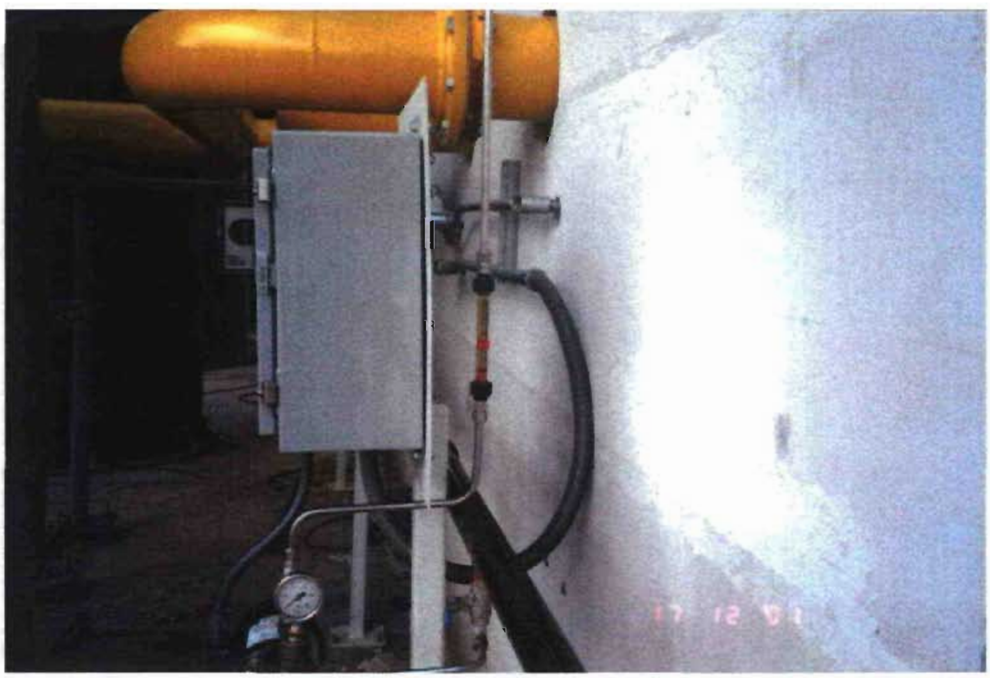


Photo 2. Side View - Selective Catalytic Reduction Control System

Attachment WP-EU1-J3
Winston Peaking Station Photos

Source: Golder, 2001.

Golder Associates

ATTACHMENT WP-EU1-J4

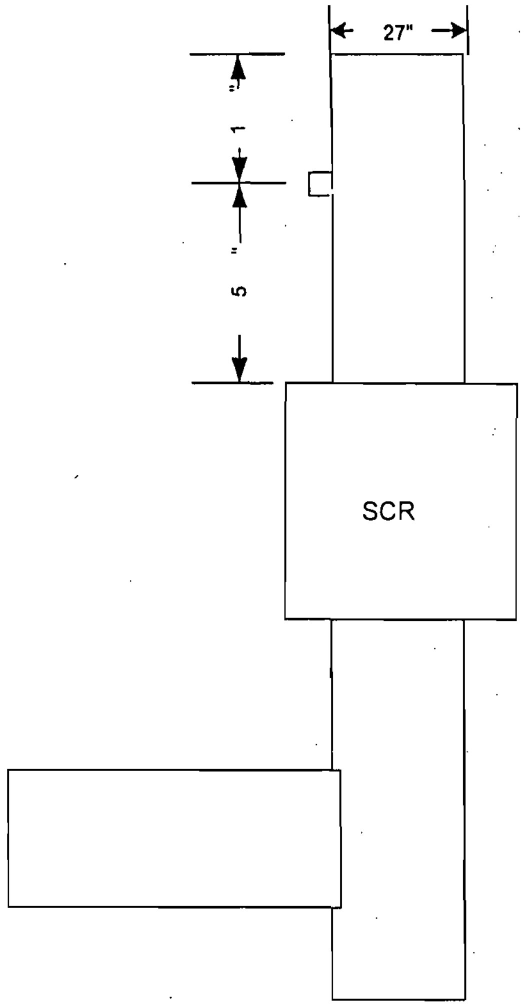
DESCRIPTION OF STACK SAMPLING FACILITIES

CATALYST AIR MANAGEMENT, INC.

## Sample Ports Traverse

Typical 2 Ports

| | |
|---|---|
| 1. | 0.6" |
| 2. | 1.8" |
| 3. | 3.1" |
| 4. | 4.8" |
| 5. | 6.8" |
| 6. | 9.6" |
| 7 | 17.4" |
| 8. | 20.25" |
| 9. | 22.2" |
| 10. | 23.8" |
| 11. | 25.2" |
| 12. | 26.4" |




| TITLE | | |
|---|---|---|
| CITY of LAKELAND - WINSTON PEAKING STATION | | |
| DESCRIPTION: UNITS 1-20 STACK DIAGRAM | | DATE: 01-22-02 |
| SCALE: NONE | DRAWN BY: MJ Taylor | REVISED: |

# ATTACHMENT WP-EU1-J5

# COMPLIANCE TEST REPORT

CATALYST

AIR MANAGEMENT, INC.

# AIR QUALITY TESTING SERVICES

## CITY OF LAKELAND
## WINSTON PEAKING STATION
## UNITS 11-15

## EMISSIONS TEST REPORT

CATALYST AIR MANAGEMENT, INC.
REPORT NUMBER 138-046

FEBRUARY 1, 2002

2505 Byington-Solway Road
Knoxville, Tennessee 37931
(865) 531-0075 • Fax (865) 531-0750

1531 Wyngate Drive
DeLand, Florida 32724
(904) 943-9241 • Fax (904) 943-9212

171 Worman Road
Douglassville, Pennsylvania 19518
(610) 689-8927 • Fax (610) 689-8938

## STATEMENT OF VALIDITY

**City of Lakeland – Winston Peaking Station**
**Catalyst Report 138-046**
**February 1, 2002**

To the extent practical, information and data provided in this test report has been verified as true and correct.

Michael J. Taylor
President

## 1.0 Introduction

Catalyst Air management, Inc. (Catalyst) was contracted by the City of Lakeland to perform the initial NOx, Ammonia slip compliance and visual emissions testing for the Winston Peaking Station in Lakeland, FL. Units 11 through 15 were tested.

The sampling program was conducted January 14 through 16, 2002. The testing was performed by Messers. Mike Taylor, Rick Derrera and Shawn O'Neal of Catalyst. with the assistance of personnel assigned by the City of Lakeland. Mr. Jim Bibby coordinated plant operation during the testing. Mr. Bob Soich of the Florida Department of Environmental Protection (FDEP) was present to observe a portion of the testing.

## 2.0 Summary of Test Results

A summary of test results developed by this source sampling program are presented in Tables 1 through 7. The summary tables are presented as follows:



## 3.0 Results of Testing

The results of the individual test runs are tabulated in Appendices 1 through 5.

**TABLE 1**
Summary of Emissions - Oil
Winston Peaking Station

| Unit | NOx lb/hr | Permit NOx lb/hr | Opacity % | Permit Opacity % | Ammonia ppm @15% | Permit Ammonia |
|---|---|---|---|---|---|---|
| 11 | 8.1 | 11.6 | 0 | 20 | | 10 |
| 12 | 8.5 | 11.6 | 0 | 20 | | 10 |
| 13 | 8.2 | 11.6 | 0 | 20 | 0.50 | 10 |
| 14 | 8.2 | 11.6 | 0 | 20 | | 10 |
| 15 | 8.1 | 11.6 | 0 | 20 | | 10 |

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# TABLE 2

NOx Emissions summary
EPA Methods 3A and 7E
Unit 11

Client: City of Lakeland
Plant: Winston
Location: 11

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date | 1/16/01 | 1/16/01 | 1/16/01 |
| Load (KW) | 2544 | 2550 | 2551 |
| Heat Input (mmBtu/hr) | 24.3 | 24.5 | 24.4 |
| Start Time | 14:40 | 15:50 | 17:00 |
| End Time | 15:40 | 16:50 | 18:00 |
| Measured NOx Concentration (ppm) | 109.9 | 104.5 | 107.9 |
| Avg Zero Bias Check (ppm) | 0.94 | 1.06 | 0.83 |
| Upscale Calibration Gas (ppm) | 225.4 | 225.4 | 225.4 |
| Avg Upscale Bias Check (ppm) | 227.1 | 226.05 | 225.4 |
| Corrected NOx Concentration (ppm) | 225.15 | 224.7 | 223.65 |
| Average Flow (DSCFM) | 10,499 | 10,499 | 10,499 |
| NOx Emissions (lb/Hr) | 0.279 | 0.266 | 0.279 |
| NOx Emissions (lb/hr) | 8.24 | 7.85 | 8.15 |
| Average NOx (lb/mmBtu) | | 0.27 | |
| Average NOx (lb/hr) | | 8.1 | |

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# TABLE 3

## NOx Emissions summary
## EPA Methods 3A and 7E
## Unit 12

Client: City of Lakeland
Plant: Winston
Location: 12

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date | 1/16/01 | 1/16/01 | [illegible] |
| Load (KW) | 2554 | 2555 | [illegible] |
| Heat Input (mmBtu/hr) | 22.0 | 22.2 | [illegible] |
| Start Time | 8:45 | 10:00 | [illegible] |
| End Time | 9:45 | 11:00 | [illegible] |
| Measured NOx Concentration (ppm) | 107.5 | 109.3 | [illegible] |
| Avg Zero Bias Check (ppm) | 0.695 | 0.42 | [illegible] |
| Upscale Calibration Gas (ppm) | 225.4 | 225.4 | [illegible] |
| Avg Upscale Bias Check (ppm) | 221.65 | 222.15 | [illegible] |
| Corrected NOx Concentration (ppm) | 109.0 | 110.7 | [illegible] |
| Average Flow (DSCFM) | 10,950 | 10,950 | [illegible] |
| NOx Emissions (lb/mmBtu) | 0.312 | 0.317 | [illegible] |
| NOx Emissions (lb/hr) | 8.55 | 8.68 | [illegible] |

| | |
|---|---|
| **Average NOx (lb/mmBtu)** | **0.31** |
| **Average NOx (lb/hr)** | **8.5** |

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# TABLE 4

NOx Emissions summary
EPA Methods 3A and 7E
Unit 13

Client: City of Lakeland
Plant: Winston
Location: 13

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date | 1/15/01 | 1/15/01 | 1/15/01 |
| Load (KW) | 2540 | 2535 | 2538 |
| Heat Input (mmBtu/hr) | 22.3 | 22.1 | 22.4 |
| Start Time | 12:10 | 13:40 | 15:00 |
| End Time | 13:10 | 14:40 | 16:00 |
| Measured NOx Concentration (ppm) | 110.7 | 117.0 | 112.4 |
| Avg Zero Bias Check (ppm) | 0.85 | 1.02 | 1.98 |
| Upscale Calibration Gas (ppm) | 124.4 | 124.4 | 124.4 |
| Avg Upscale Bias Check (ppm) | 125.2 | 125.3 | 126.3 |
| Corrected NOx Concentration (ppm) | 109.9 | 116.1 | 110.5 |
| Average Flow (DSCFM) | 10,241 | 10,241 | 10,241 |
| NOx Emissions (lb/mmBtu) | 0.300 | 0.321 | 0.298 |
| NOx Emissions (lb/hr) | 8.06 | 8.52 | 7.90 |

| | |
|---|---|
| **Average NOx (lb/Hr)** | **0.31** |
| **Average NOx (lb/hr)** | **8.2** |

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# TABLE 5

NOx Emissions summary
EPA Methods 3A and 7E
Unit 14

Client: City of Lakeland
Plant: Winston
Location: 14

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date | 1/15/01 | 1/15/01 | 1/15/01 |
| Load (KW) | 2500 | 2502 | 2502 |
| Heat Input (mmBtu/hr) | 23.7 | 23.7 | 23.3 |
| Start Time | 8:04 | 9:10 | 10:19 |
| End Time | 9:04 | 10:10 | 11:19 |
| Measured NOx Concentration (ppm) | 108.1 | 115.0 | 113.7 |
| Avg Zero Bias Check (ppm) | 0.805 | 0.805 | 0.72 |
| Upscale Calibration Gas (ppm) | 124.4 | 124.4 | 124.4 |
| Avg Upscale Bias Check (ppm) | 127.25 | 127.05 | 124.7 |
| Corrected NOx Concentration (ppm) | 105.6 | 112.5 | 113.4 |
| Average Flow (DSCFM) | 10,355 | 10,355 | 10,355 |
| NOx Emissions (lb/mmBtu) | 0.307 | 0.327 | 0.321 |
| NOx Emissions (lb/hr) | 7.83 | 8.35 | 8.41 |
| Average NOx (lb/mmBtu) | | 0.32 | |
| Average NOx (lb/hr) | | 8.2 | |

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# TABLE 6

NOx Emissions summary
EPA Methods 3A and 7E
Unit 15

Client: City of Lakeland
Plant: Winston
Location: 15

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date | 1/14/01 | 1/14/01 | 1/14/01 |
| Load (KW) | 2502 | 2497 | 2495 |
| Heat Input (mmBtu/hr) | 23.4 | 23.4 | 23.1 |
| Start Time | 13:47 | 14:53 | 16:03 |
| End Time | 14:47 | 15:53 | 17:03 |
| Measured NOx Concentration (ppm) | 106.4 | 108.5 | 109.1 |
| Avg Zero Bias Check (ppm) | 0.44 | 0.63 | 0.68 |
| Upscale Calibration Gas (ppm) | 124.4 | 124.4 | 124.4 |
| Avg Upscale Bias Check (ppm) | 227.1 | 226.05 | 225.4 |
| Corrected NOx Concentration (ppm) | 107.6 | 109.9 | 110.2 |
| Average Flow (DSCFM) | 10.333 | 10.333 | 10.333 |
| NOx Emissions (lb/mmBtu) | 0.268 | 0.277 | 0.278 |
| NOx Emissions (lb/hr) | 7.97 | 8.14 | 8.16 |
| **Average NOx (lb/mmBtu)** | | **0.27** | |
| **Average NOx (lb/hr)** | | **8.1** | |

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TABLE 7
ISOKINETIC SAMPLING SUMMARY
EPA Method 027 - Ammonia
Unit 13

Client: **City of Lakeland**
Plant: **Winston Unit 13**
Location: **Stack**

| | | | | |
|---|---|---|---|---|
| Run Number: | | **R1-NH3** | **R2-NH3** | **R3-NH3** |
| Date: | | 1/15/02 | 1/15/02 | 1/15/02 |
| Load (KW): | | 2540 | 2535 | 2538 |
| Run Time: | Start | 12:10 | 13:44 | 15:04 |
| | End | 13:21 | 14:55 | 16:16 |
| DN - Nozzle Diameter: | | 0.220 | 0.220 | 0.220 |
| Pbar - Barometric Pressure: | | 30.16 | 30.15 | 30.16 |
| TT - Sampling Time: | | 60 | 60 | 60 |
| VM - Meter Volume: | | 37.88 | 38.202 | 37.149 |
| TM - Avg. Meter Temp (F): | | 70 | 73 | 74 |
| PM - Avg. Delta H (in. of H2O): | | 1.375 | 1.383 | 1.308 |
| Y - Meter Calibration Factor: | | 0.99 | 0.99 | 0.99 |
| VMSTD - Std. Gas Volume (SCF): | | 37.79 | 37.87 | 36.75 |
| Vlc - Volume Water Collected: | | 62 | 55 | 47 |
| %M - Percent Moisture: | | 7.2 | 6.4 | 5.7 |
| Bws - Mole Fraction. Dry: | | 0.07 | 0.06 | 0.06 |
| %CO2 - Carbon Dioxide. Dry: | | 6.0 | 5.8 | 6.0 |
| %O2 - Oxygen. Dry: | | 12.5 | 12.6 | 12.4 |
| MD - Dry Molecular Weight: | | 29.46 | 29.43 | 29.46 |
| MS - Wet Molecular Weight: | | 28.64 | 28.70 | 28.81 |
| A - Stack Area, SQ.FT: | | 3.98 | 3.98 | 3.98 |
| PS - Static Press. (in. of Hg): | | 30.23 | 30.22 | 30.23 |
| TS - Stack Temp. (F): | | 546 | 570 | 569 |
| CP - Pitot Coefficient: | | 0.84 | 0.84 | 0.84 |
| VS - Stack Gas Velocity (AFPS): | | 87.2 | 88.7 | 85.6 |
| QS - Stack Gas Volume (DSCFM): | | 10,241 | 10,247 | 9,985 |
| QA - Stack Gas Volume (ACFM): | | 20,814 | 21,151 | 20,410 |
| %I - Isokinetic Ratio: | | 92.7 | 92.8 | 92.5 |
| L - Volume (NH3): | | 8.43E-04 | 9.43E-04 | 4.76E-04 |
| PPM - Concentration (NH3): | | 0.79 | 0.88 | 0.46 |
| PPM - @ 15% O2 (NH3): | | 0.55 | 0.63 | 0.32 |

| | |
|---|---|
| Average L | 7.54E-04 |
| Average PPM | **0.71** |
| Average PPM @15% O2 | **0.50** |

## 4.0 Source Description

The Winston Peaking Station consists of twenty(20) internal combustion engines with electric generator sets. The engine generator sets are rated at 2.5 MW with a total plant output of 50 MW nominal and 55 MW peakload. The units burn distillate fuel oil. The engines are equipped with selective catalytic reduction (SCR) for control of NOx emissions.

## 5.0 Testing and Analytical Procedures

The following test methods were utilized during the test program:

| | |
|---|---|
| EPA Method 3A | Gas Analysis for $CO_2$, $O_2$, Excess Air and Dry Molecular Weight (Instrumental Analyzer Method) |
| EPA Method 7E | Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Method) |
| EPA Method 9 | Visual Determination of the Opacity of Emissions from Stationary Sources |
| EPA Method 027 | Procedure for Collection of Ammonia in Stationary Sources |

### 5.1 NOx and $O_2$ - EPA Methods 3A and 7E

Catalyst conducted three (3), one hour, NOx test runs on each unit. A sample was continuously extracted and introduced into a Thermo Environmental Model 10. Chemiluminescent NOx analyzer and Servomex 1400 $O_2/CO_2$ analyzer for determination of gas concentrations. The sample was extracted through a heated stainless steel probe, heated sample line and sample conditioner to dry the sample before it enters the analyzers. A sample flow control system was used to control the flow into the analyzers. The analyzers were calibrated prior to starting the testing with EPA Protocol 1. calibration gases. A system bias check was performed before each run by introducing the zero and upscale gas at the back end of the sample probe. The system bias check was repeated at the end of each test run to determine the analyzer zero and calibration drift.

The NOx analyzer span was 0-250 ppm. The calibration gases that were utilized were zero, 40-60% ( 124.4 ppm) and 80-100% ( 225.4 ppm)of span. The $O_2/CO_2$ analyzer spans were 0-25 % and 0-20 %, respectively. The $O_2/CO_2$ analyzer spans were 0-25% and 0-20%, respectively. The $O_2$ calibration gases utilized were 10.01% and 22.40%. The $CO_2$ calibration gases were 10.09% and 17.84%.

**Reference Method Analyzers:**

| Manufacturer | Model | Pollutant | Span |
|---|---|---|---|
| TECO | 10A | NOx | 0-250 ppm |
| Servomex | 1400B | $CO_2/O_2$ | 0-20%/0-25% |

5.2 Ammonia - EPA Conditional Method 027

Catalyst conducted three (3), one hour. Ammonia test runs. The sampling was performed utilizing procedures outlined in Proposed EPA Method 027. The flue gas sample was extracted isokinetically from the gas stream and the ammonia emissions were determined by ion chromatography. The probe and filter were both maintained at stack conditions. The sampling train consists of the following equipment connected in series:

Glass nozzle and glass fiber filter within a glass filter holder

Glass lined probe

A modified Greenburg-Smith impinger containing 100 ml of 0.1N sulfuric acid

A Greenburg-Smith impinger containing 100 ml of 0.1 N sulfuric acid

A modified Greenburg-Smith impinger, empty

A modified Greenburg-Smith impinger containing 250g of silica gel

The sample volume was measured by passing it through a calibrated dry gas meter. An S-type pitot tube was attached to the probe to measure stack gas velocity and to maintain isokinetic sampling. A K-type thermocouple was also attached to the probe to measure the gas temperature.

After each run, the filter was removed and placed in a labeled container. The contents of impingers 1, 2 and 3 were measured for increase in volume. Impingers 2 and 3 were combined and retained in a separate container. Each impinger and graduated cylinder is rinsed with distilled water, the rinses are added to the individual impinger samples. Next, the probe is rinsed with distilled water. The probe rinse is retained in a separate container. The silica gel was returned to the original tared container and weighed to determine moisture gain. The samples are placed in plastic bags and stored in a cooler.

5.3 Opacity - EPA 9

Catalyst conducted three (3), one hour, visible emission evaluations (VE) on each unit. The VEs were performed by a certified visible emissions evaluator according to procedures outlined in EPA Method 9.

All the sampling procedures, quality assurance, analysis and calculations utilized for the program were performed in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A.

## 6.0 Operating Conditions

City of Lakeland personnel monitored operating conditions throughout the duration of the sampling program. The plant data was provided by Jim Bibby of Lakeland Electric. The testing was performed while the plant was operating at the following conditions:

| Unit | Fuel Flow gph | Heat Value Btu/gal | Heat Input mmBtu/hr | Load KW |
|---|---|---|---|---|
| 11 | 179 | 136.166 | 24.4 | 2548 |
| 12 | 162 | 136.166 | 22.1 | 2555 |
| 13 | 163 | 136.166 | 22.2 | 2538 |
| 14 | 173 | 136.166 | 23.6 | 2501 |
| 15 | 171 | 136.166 | 23.3 | 2498 |

## 7.0 Quality Assurance Procedures

The quality assurance procedures followed during the testing activities followed guidelines set forth by the previous mentioned methods and the EPA Quality Assurance Handbook for Source Sampling. The specific procedures for this test program are listed below.

### 7.1 Isokinetic Equipment

The sample nozzles were visually inspected and measured across three different diameters to determine the appropriate nozzle diameter.

The S-type pitot tubes were visually inspected and measured to meet the design specifications of EPA Method 2 for a 0.84 pitot coefficient.

Both legs of the pitot tube were leaked checked before and after each sample run.

The stack thermocouples were calibrated prior to the testing and a post-test check was performed after the testing project.

The manometer was leveled and zeroed before each sample run.

The dry gas meter is fully calibrated annually using an EPA intermediate standard. Post -test dry gas meter checks were completed to verify the accuracy of the meter Yi.

Pre-test and post-test leak checks were completed and were less than 0.02 cfm at the highest sampling vacuum.

### 7.2 Instrumental Methods

Analyzer calibrations. system bias check and drift checks were completed before and after each sample run utilizing EPA Protocol 1 calibration gases.

The analyzer interference responses were determined in accordance with Section 5.4 of Method 20 and Section 7.2 through 7.6 of Method 6C.

The NOx analyzer $NO_2$ to NO converter efficiency is determined in accordance with Section 5.6 of Method 20.

## 8.0 Discussion

### 8.1 Sampling Conditions and Conclusions

Units 11 through 15 were tested for NOx and opacity. Unit 13 was tested for ammonia slip.

During the execution of the testing no interruptions or delays occurred.

ATTACHMENT WP-EU1-J6

PROCEDURES FOR STARTUP/SHUTDOWN

# ATTACHMENT WP-EU1-J6
# PROCEDURES FOR STARTUP/SHUTDOWN

The Winston Peaking Station can be operated locally or remotely. The engines can be started individually at the plant or in blocks of 5, 10, or all 20 engines either locally at the plant or remotely from McIntosh Power Plant control room. Once the command is given for the engines to start, the system begins to start units at 25-second intervals. The actual automatic sequencing of each individual unit begins with a 15-second warning alarm consisting of a pulsing alarm light and horn. Once the 15 seconds expire, the engine is started utilizing a turbo air starter located on the unit. Once the unit reaches idle speed (450 RPM) the PLC looks at engine oil temperature. If the engine oil temperature is greater than 110 degrees F, the PLC gives the unit the rated speed (900 RPM) command. When the unit has reached rated speed the PLC gives the Digital Synchronizer and Load Control (DSLC) module the synchronize and load command. Utilizing the speed control and voltage regulator via the voltage bias inputs, the DSLC synchronizes the incoming unit matching frequency and voltage. After the unit is synchronized within specified parameters the DSLC issues the breaker close command using an interposing relay. The DSLC and PLC then receive the breaker close input via a breaker "a" contact and the DSLC receives a base load command from the PLC which allows the DSLC to load the unit up to the specified base load setting. After a five-minute timer from breaker closure, the PLC then energizes the ammonia solenoid, which allows the aqueous ammonia to be injected into the catalytic converter. The flow of the ammonia is regulated according to specifications in order to bring the $NO_x$ emissions below predetermined values set forth in the preliminary testing phase. There is also a flow switch installed on each unit in order to ensure proper ammonia flow. If the ammonia flow drops below the preset value programmed into the flow switch the PLC will alarm. The unit thus is at base load until the unload command is given.

When the unload command is given, the DSLC unloads the unit and opens the breaker via an interposing relay. When the PLC receives the breaker open command via the breaker "a" contact, it shuts the solenoid, cutting off ammonia flow to the unit. The PLC continues to monitor the engine operating parameters until all temperatures and pressures are within safe operating limits and the engines are shut down.

# ATTACHMENT WP-EU1-J14

# COMPLIANCE ASSURANCE MONITORING PLAN

# ATTACHMENT WP-EU1-J14

# COMPLIANCE ASSURANCE MONITORING PLAN

Selective Catalytic Reduction for $NO_x$ Control: Winston Peaking Station

## I. Background

### A. Emissions Unit

| | |
|---|---|
| Description: | 20 GM EMD 20/645/E4B Diesel Engines |
| Identification: | Emission Unit ID Nos. 001-020 |
| Stack designation: | EU001 – EU020 |
| Facility ID No. | 1050352 |
| Facility: | Winston Peaking Station<br>Lakeland, Florida |

### B. Applicable Regulation, Emission Limit, and Monitoring Requirements

| | |
|---|---|
| Regulation No.: | Permit No. 1050352-001-AV (proposed) |
| Regulated pollutant: | Nitrogen Oxides ($NO_x$) |
| Emission limit ($NO_x$): | 13.9 lb/hr – peakload operation firing distillate oil<br>11.6 lb/hr – baseload operation firing distillate oil<br>5.6 lb/hr – baseload operation firing natural gas |

| | |
|---|---|
| C. Control Technology: | Selective Catalytic Reduction |
| D. Other Indicators: | Fuel Monitoring – Sulfur Content<br>Fuel Monitoring – Daily Consumption<br>Ammonia Slip |

## II. Monitoring Approach

The key elements of the monitoring approach, including the indicators to be monitored, indicator ranges, and performance criteria are presented in Table 1.

## III. Monitoring Approach Justification

### A. Background

This facility consists of 20 nominal 2.5-MW GM EMD 20/645/E4B diesel engines, associated generators and a 294,000-gallon fuel oil storage tank. Each engine uses SCR and air/fuel ratio regulators for emission control. The units provide a nominal 50 MW of electrical power collectively. The fuel for the engines is distillate fuel oil with a maximum sulfur content of 0.05 % and natural gas. The facility can operate one single emission unit or all twenty emission units or in combination of.

### B. Rationale for Selection of Performance Indicators

The fuel sulfur content and ammonia slip were selected because the limiting of these parameters prevents fouling of the catalyst, which is caused by ammonium sulfate salts. The formation of these salts is avoided based on limiting the ammonia slip and limiting fuel sulfur content.

Initial performance tests to demonstrate compliance with the emissions standards specified above ($NO_x$, opacity, and ammonia) have begun. Five units (EU011-EU015) were tested on January 14-16, 2002 for compliance with the $NO_x$ and visible emissions limits. These units were certified to be in compliance and therefore do not need to be tested unless required by other conditions in this plan. Five different units will be selected each year to be initially compliance tested until all 20 units have satisfied this condition. Ammonia slip compliance test will only be performed both on oil and gas (when available) on one engine. EU013 was tested for compliance also on January 14-16, 2002.

To demonstrate compliance with the emission standards described above, the facility will conduct annual performance tests for visible emissions on emissions units that operated in the preceding 12-month period. Annual performance tests for $NO_x$ will be conducted on the emission units that emitted more than 100 tons per year of $NO_x$ in the preceding 12-month period. The facility will keep 12-month emission totals of $NO_x$ in tons per year for each internal combustion engine during each federal fiscal year (October 1 – September 30).

The fuel oil will be monitored annually for the sulfur content using ASTM D4294 Method (or equivalent). The facility will maintain daily records of fuel oil and natural gas consumption for the emission units.

See Attachment WP-EU1-J5 for compliance test results on EU's 011-015.

TABLE 1. MONITORING APPROACH, WINSTON PEAKING STATION

| | Indicator No. 1 | Indicator No. 2 |
|---|---|---|
| I. Indicator | Fuel sulfur content | Ammonia slip |
| Measurement Approach | Tested annually using ASTM D4294 Method (or equivalent) | One engine tested annually using Method CTM-027 or equivalent until all units have been initially compliance tested. Annual testing is then based on NOx emissions (> 100 TPY per unit). |
| II. Indicator Range | The maximum sulfur content of the No. 2 fuel oil cannot exceed 0.05 percent, by weight. | The concentration of ammonia in the exhaust gas from each internal combustion engine is 10 ppmvd @15% $O_2$ or less while firing natural gas or fuel oil. |
| III. Performance Criteria<br>A. Data Representativeness | Not applicable | The flue gas sample will be extracted isokinetically from the gas stream and ammonia emissions will be determined by ion chromatography (or other EPA approved method). |
| B. Verification of Operational Status | Not applicable | Not applicable |
| C. QA/QC Practices and Criteria | Not applicable | The QA/QC procedures followed during testing activities will follow guidelines set forth by the previous mentioned methods and the EPA Quality Assurance Handbook for Source Sampling. See Attachment WP-EU1-J5 for a more detailed description of quality assurance procedures. |
| D. Monitoring Frequency | Sulfur content measured annually / Fuel consumption measured continuously. | Ammonia slip measured annually on a random EU. |
| Data Collection Procedure | Sulfur content recorded manually / Fuel consumption recorded electronically | Method CTM-027. |
| Averaging Period | No average is taken. | No average is taken. |

## III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

### A. GENERAL EMISSIONS UNIT INFORMATION
### (All Emissions Units)

**Emissions Unit Description and Status**

1. Type of Emissions Unit Addressed in This Section: (Check one)

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ X ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Regulated or Unregulated Emissions Unit? (Check one)

[ ] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ X ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

**294,000-gallon fuel oil storage tank and a 4,000-gallon lube oil storage tank**

4. Emissions Unit Identification Number: [ X ] No ID
ID: [ ] ID Unknown

| 5. Emissions Unit Status Code: | 6. Initial Startup Date: | 7. Emissions Unit Major Group SIC Code: | 8. Acid Rain Unit? |
|---|---|---|---|
| **A** | **JANUARY 2002** | **49** | [ ] |

9. Emissions Unit Comment: (Limit to 500 Characters)

**See Attachment WP-EU2-A9.**

## Emissions Unit Control Equipment

| |
|---|
| 1. Control Equipment/Method Description (Limit to 200 characters per device or method): |
| 2. Control Device or Method Code(s): |

## Emissions Unit Details

| | |
|---|---|
| 1. Package Unit:<br>Manufacturer: | Model Number: |
| 2. Generator Nameplate Rating: | MW |
| 3. Incinerator Information:<br>Dwell Temperature:<br>Dwell Time:<br>Incinerator Afterburner Temperature: | <br>°F<br>seconds<br>°F |

## B. EMISSIONS UNIT CAPACITY INFORMATION
## (Regulated Emissions Units Only)

**Emissions Unit Operating Capacity and Schedule**

| | | | |
|---|---|---|---|
| 1. Maximum Heat Input Rate: | | | mmBtu/hr |
| 2. Maximum Incineration Rate: | lb/hr | | tons/day |
| 3. Maximum Process or Throughput Rate: | | | |
| 4. Maximum Production Rate: | | | |
| 5. Requested Maximum Operating Schedule: | | | |
| | 24 hours/day | 7 | days/week |
| | 52 weeks/year | 8,760 | hours/year |
| 6. Operating Capacity/Schedule Comment (limit to 200 characters):<br><br>**The 294,000-gallon tank holds No. 2 fuel oil.**<br>**The 4,000-gallon tank holds lube oil.** | | | |

## C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

| | |
|---|---|
| 40 CFR 60, Subpart Kb | |
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## D. EMISSION POINT (STACK/VENT) INFORMATION
## (Regulated Emissions Units Only)

**Emission Point Description and Type**

| | |
|---|---|
| 1. Identification of Point on Plot Plan or Flow Diagram? | 2. Emission Point Type Code: **4** |
| 3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): **Fugitive emissions associated with fuel oil storage.** | |
| 4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: | |

| | | |
|---|---|---|
| 5. Discharge Type Code: **F** | 6. Stack Height: feet | 7. Exit Diameter: feet |
| 8. Exit Temperature: °F | 9. Actual Volumetric Flow Rate: acfm | 10. Water Vapor: |

| | |
|---|---|
| 11. Maximum Dry Standard Flow Rate: dscfm | 12. Nonstack Emission Point Height: feet |
| 13. Emission Point UTM Coordinates: Zone: **17** East (km): **400.2** North (km): **3100.6** | |
| 14. Emission Point Comment (limit to 200 characters): | |

## E. SEGMENT (PROCESS/FUEL) INFORMATION
### (All Emissions Units)

**Segment Description and Rate:** Segment 1 of 2

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type) (limit to 500 characters):<br><br>**Petroleum and Solvent Evaporation – Petroleum Product Storage – Fugitive Emissions – Distillate Fuel Oil #2 (Storage)** | | |
| 2. Source Classification Code (SCC):<br>**4-03-888-01** | | 3. SCC Units:<br>**Thousand Gallons Stored** |
| 4. Maximum Hourly Rate: | 5. Maximum Annual Rate: | 6. Estimated Annual Activity Factor: **298** |
| 7. Maximum % Sulfur:<br>**0.05** | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: |
| 10. Segment Comment (limit to 200 characters):<br><br>**Segment refers to combined storage capacity of the two petroleum product storage tanks contained in the emission unit. See Attachment WP-EU2-A9 for list.** | | |

**Segment Description and Rate:** Segment 2 of 2

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type ) (limit to 500 characters):<br><br>**Petroleum and Solvent Evaporation – Petroleum Product Storage – Fugitive Emissions – Distillate Fuel Oil #2 (Throughput)** | | |
| 2. Source Classification Code (SCC):<br>**4-03-999-99** | | 3. SCC Units:<br>**Thousand Gallons Throughput** |
| 4. Maximum Hourly Rate: | 5. Maximum Annual Rate: | 6. Estimated Annual Activity Factor: **7,721** |
| 7. Maximum % Sulfur:<br>**0.05** | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: |
| 10. Segment Comment (limit to 200 characters):<br><br>**Segment refers to combined throughput of the two petroleum product storage tanks contained in the emission unit. See Attachment WP-EU2-A9 for list.** | | |

## F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| VOC | | | EL |
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## G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: VOC | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: 324.5 lb/hour 0.16 tons/year | 4. Synthetically Limited? [ ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: EPA Tanks 4.0 | 7. Emissions Method Code: 2 |
| 8. Calculation of Emissions (limit to 600 characters): | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: OTHER | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: | 4. Equivalent Allowable Emissions: 324.5 lb/hour 0.16 tons/year |
| 5. Method of Compliance (limit to 60 characters): | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): | |

## H. VISIBLE EMISSIONS INFORMATION
**(Only Regulated Emissions Units Subject to a VE Limitation)**

**Visible Emissions Limitation:** Visible Emissions Limitation ____ of ____

| | |
|---|---|
| 1. Visible Emissions Subtype: | 2. Basis for Allowable Opacity:<br>[ ] Rule [ ] Other |
| 3. Requested Allowable Opacity:<br>Normal Conditions: % Exceptional Conditions: %<br>Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance: | |
| 5. Visible Emissions Comment (limit to 200 characters): | |

## I. CONTINUOUS MONITOR INFORMATION
**(Only Regulated Emissions Units Subject to Continuous Monitoring)**

**Continuous Monitoring System:** Continuous Monitor ____ of ____

| | |
|---|---|
| 1. Parameter Code: | 2. Pollutant(s): |
| 3. CMS Requirement: | [ ] Rule [ ] Other |
| 4. Monitor Information:<br>Manufacturer:<br>Model Number: | Serial Number: |
| 5. Installation Date: | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): | |

## J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
## (Regulated Emissions Units Only)

**Supplemental Requirements**

| |
|---|
| 1. Process Flow Diagram<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable [ ] Waiver Requested |
| 2. Fuel Analysis or Specification<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable [ ] Waiver Requested |
| 3. Detailed Description of Control Equipment<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable [ ] Waiver Requested |
| 4. Description of Stack Sampling Facilities<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable [ ] Waiver Requested |
| 5. Compliance Test Report<br>[ ] Attached, Document ID:________<br>[ ] Previously submitted, Date:________________<br>[ X ] Not Applicable |
| 6. Procedures for Startup and Shutdown<br>[ ] Attached, Document ID:________ [ X ] Not Applicable [ ] Waiver Requested |
| 7. Operation and Maintenance Plan<br>[ ] Attached, Document ID:________ [ X ] Not Applicable [ ] Waiver Requested |
| 8. Supplemental Information for Construction Permit Application<br>[ ] Attached, Document ID: ________ [ X ] Not Applicable |
| 9. Other Information Required by Rule or Statute<br>[ ] Attached, Document ID:________ [ X ] Not Applicable |
| 10. Supplemental Requirements Comment: |

## Additional Supplemental Requirements for Title V Air Operation Permit Applications

| |
|---|
| 11. Alternative Methods of Operation<br>[ ] Attached, Document ID:________ [ X ] Not Applicable |
| 12. Alternative Modes of Operation (Emissions Trading)<br>[ ] Attached, Document ID:________ [ X ] Not Applicable |
| 13. Identification of Additional Applicable Requirements<br>[ ] Attached, Document ID:________ [ X ] Not Applicable |
| 14. Compliance Assurance Monitoring Plan<br>[ ] Attached, Document ID:__________ [ X ] Not Applicable |
| 15. Acid Rain Part Application (Hard-copy Required)<br>[ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))<br>Attached, Document ID:________<br>[ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)<br>Attached, Document ID:________<br>[ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)<br>Attached, Document ID:________<br>[ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)<br>Attached, Document ID:________<br>[ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)<br>Attached, Document ID:________<br>[ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)<br>Attached, Document ID:________<br>[ X ] Not Applicable |

# ATTACHMENT WP-EU2-A9

# GENERAL EMISSIONS UNIT INFORMATION

**Attachment WP-EU2-A9**
**General Emissions Unit Information**

Winston Peaking Station, Petroleum Product Storage and Throughput Operations

| Tank No. | Storage Product | Storage Tank Size (gallons) | Potential Annual Throughput (gallons) |
|---|---|---|---|
| A-2 (R) | Fuel oil (No. 2) | 294,000 | 7,721,000 |
| A-3 (R) | Fuel oil (No. 2) | 4,000 | - |
| | TOTAL | 294,000 | 7,721,000 |