**Golder Associates Inc.**

6241 NW 23rd Street, Suite 500
Gainesville, FL 32653-1500
Telephone (352) 336-5600
Fax (352) 336-6603

Golder Associates

April 30, 1999

9651116-0300

Division of Air Resource Management
Florida department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301

Attention: Mr. Howard Rhodes, P.E., Division Director

RE: Destin Dome Area – Chevron U.S.A Production Area
Outer Continental Shelf Air Permit Application

Dear Howard:

At the request of EPA Region IV, I am transmitting 2 copies of an application for an Outer Continental Shelf Permit for the Destin Dome Area located about 25 miles off of Florida's coastline south of Escambia and Santa Rosa Counties. On April 29, 1999 the application was submitted to EPA Region IV as the environmental agency with the current authority to issue OCS permits in the eastern Gulf of Mexico. An overview of the project was also presented to EPA Region IV representatives on April 29th. Mr. Scott Davis of Region IV's Air Radiation Technology Branch is coordinating the review and preparation of the OCS permit. Questions concerning the information in the application should be directed to Mr. Davis. However, in order to expedite preparation of any requested information, I would respectfully request that copy of the information request be sent to Ms. Sandi Fury of Chevron and myself. Ms. Fury's address is in the application and her e-mail address is sfur@chevron.com. My e-mail address is ken_kosky@golder.com.

Because of the complexity of the development, Chevron representatives and I are available to meet with and your staff. I will call you next week. If there are any technical questions (emission factors, assumptions, etc.) you or your staff believe can be handled via phone, please do not hesitate to call me at any time.

Sincerely,

GOLDER ASSOCIATES INC.

Ken

Kennard F. Kosky, P.E.
Principal

RECEIVED
MAY 03 1999
DIVISION OF AIR
RESOURCES MANAGEMENT

KFK/tla
Enclosures

cc: Scott Davis, EPA Region IV
Sandi Fury, Chevron

G:\DATA\DP\PROJECTS\96\9651\9651116A\04\04.ltr.doc

# APPLICATION FORM AND TECHNICAL SUPPORT DOCUMENT FOR OUTER CONTINENTAL SHELF AIR PERMIT DESTIN DOME AREA

**Prepared For:**

Chevron

Chevron U.S.A. Production Company
935 Gravier Street
New Orleans, Louisiana 70112

**Prepared By:**

Golder Associates

6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

April 1999
9651116Y/F21

## TABLE OF CONTENTS
(Page 1 of 4)

## TABLE OF CONTENTS
(Page 2 of 4)

## TABLE OF CONTENTS
(Page 3 of 4)

# TABLE OF CONTENTS
(Page 4 of 4)

# LIST OF TABLES
(Page 1 of 2)

# LIST OF TABLES
(Page 2 of 2)

# LIST OF FIGURES

# PART 1

# APPLICATION

# Department of
# Environmental Protection

## DIVISION OF AIR RESOURCES MANAGEMENT

## APPLICATION FOR AIR PERMIT - LONG FORM

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

## I. APPLICATION INFORMATION

This section of the Application for Air Permit form identifies the facility and provides general information on the scope and purpose of this application. This section also includes information on the owner or authorized representative of the facility (or the responsible official in the case of a Title V source) and the necessary statements for the applicant and professional engineer, where required, to sign and date for formal submittal of the Application for Air Permit to the Department. If the application form is submitted to the Department using ELSA, this section of the Application for Air Permit must also be submitted in hard-copy.

### Identification of Facility Addressed in This Application

Enter the name of the corporation, business, governmental entity, or individual that has ownership or control of the facility; the facility site name, if any; and the facility's physical location. If known, also enter the facility identification number.

1. Facility Owner/Company Name: **Chevron USA Inc.**

2. Site Name: **Destin Dome Area**

3. Facility Identification Number: [ ] Unknown

4. Facility Location Information:
Street Address or Other Locator: **25 miles offshore Pensacola**
City: County: Zip Code:

5. Relocatable Facility?
[x ] Yes [ ] No

6. Existing Permitted Facility?
[ ] Yes [x ] No

### Application Processing Information (DEP Use)

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

## Owner/Authorized Representative or Responsible Official

1. Name and Title of Owner/Authorized Representative or Responsible Official:

**Sandi M. Fury, ESF&H Representative**

2. Owner/Authorized Representative or Responsible Official Mailing Address:

Organization/Firm: **Chevron U.S. A. Inc.**
Street Address: **935 Gravier Street**
City: **New Orleans** State: **LA** Zip Code: **70112**

3. Owner/Authorized Representative or Responsible Official Telephone Numbers:

Telephone: **(504) 592-6095** Fax: **(504) 592-6223**

4. Owner/Authorized Representative or Responsible Official Statement:

*I, the undersigned, am the owner or authorized representative* of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., 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.*

Signature Date

* Attach letter of authorization if not currently on file.

## Scope of Application

This Application for Air Permit addresses the following emissions unit(s) at the facility. An Emissions Unit Information Section (a Section III of the form) must be included for each emissions unit listed.

| Emissions Unit ID | | Description of Emissions Unit | Permit Type |
|---|---|---|---|
| Unit # | Unit ID | | |
| 1R | --- | Drill Rig #1 | AO2C |
| 2R | --- | Drill Rig #2 | AO2C |
| 3R | --- | Central Processing Facility | AO2C |
| 4R | --- | Satellite Platforms | AO2C |

**See individual Emissions Unit (EU) sections for more detailed descriptions.**
**Multiple EU IDs indicated with an asterisk (*). Regulated EU indicated with an "R".**

## Purpose of Application and Category

Check one (except as otherwise indicated):

### Category I: All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.

This Application for Air Permit is submitted to obtain:

[ ] Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.

[ ] Initial air operation permit under Chapter 62-213, F.A.C., 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: ______

[ ] Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed: ______

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

Current construction permit number: ______

Operation permit to be renewed: ______

[ ] Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. Also check Category III.

Operation permit to be revised/corrected: ______

______

[ ] Air operation permit revision for a Title V source 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 to be revised: ______

Reason for revision: ______

______

**Category II: All Air Construction Permit Applications Subject to Processing Under Rule 62-210.300(2)(b),F.A.C.**

This Application for Air Permit is submitted to obtain:

[ ] Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s): ____________________

____________________

[ ] Renewal air operation permit under Rule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed: ____________________

[ ] Air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g.; to address one or more newly constructed or modified emissions units.

Operation permit to be revised: ____________________

Reason for revision: ____________________

____________________

**Category III: All Air Construction Permit Applications for All Facilities and Emissions Units.**

This Application for Air Permit is submitted to obtain:

[x] Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any: ____________________

____________________

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

Current operation permit number(s): ____________________

____________________

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

## Application Processing Fee

Check one:

[ ] Attached - Amount: ________________ [x ] Not Applicable.

## Construction/Modification Information

1. Description of Proposed Project or Alterations:

**The forms being completed as a part of a permit application for an Outer Continental Shelf (OCS) air permit associated with developing natural gas reserves in the Destin Dome Area. The sources include Two (2) Drilling Rigs, A central Production Facility (CPF) and Satillite Platform Facilities.**

2. Projected or Actual Date of Commencement of Construction :

**1 Jan 2000**

3. Projected Date of Completion of Construction :

## 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's 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 [ ] 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 [X ] 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 [ ] 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
(seal)

Date

* Attach any exception to certification statement.

## Application Contact

1. Name and Title of Application Contact:
**Sandi M. Fury, ESF&H Represententiative**

2. Application Contact Mailing Address:

Organization/Firm: **Chevron U.S. A. Inc.**
Street Address: **935 Gravier Street**
City: **New Orleans** State: **LA** Zip Code: **70112**

3. Application Contact Telephone Numbers:

Telephone: **(504) 592-6095** Fax: **(504) 592-6223**

## Application Comment

**Chevron U.S.A. is proposing to develop natural gas reserves in the Destin Dome Outer Continental Shelf (OCS) Area in Blocks 12, 13, 14, 15, 16, 54, 55, 56, 57, 99 and 100.**

# II. FACILITY INFORMATION

## A. GENERAL FACILITY INFORMATION

**Facility Location and Type**

1. Facility UTM Coordinates:
Zone: 16 East (km): 482.5 North (km): 3312.8

2. Facility Latitude/Longitude:
Latitude (DD/MM/SS): / / Longitude: (DD/MM/SS): / /

| | | | |
|---|---|---|---|
| 3. Governmental Facility Code: 0 | 4. Facility Status Code: C | 5. Facility Major Group SIC Code: 13 | 6. Facility SIC(s): 1389 |

7. Facility Comment (limit to 500 characters):
Refer to Part II for detailed discussion

**Facility Contact**

1. Name and Title of Facility Contact:
Sandi M. Fury, ESF&H Representative

2. Facility Contact Mailing Address:
Organization/Firm: Chevron U.S.A. Inc.
Street Address: 935 Gravier Street
City: New Orleans State: LA Zip Code: 70112

3. Facility Contact Telephone Numbers:
Telephone: (504) 592-6095 Fax: (504) 592-6223

## Facility Regulatory Classifications

1. Small Business Stationary Source?
[ ] Yes [x] No [ ] Unknown

2. Title V Source?
[x] Yes [ ] No

3. Synthetic Non-Title V Source?
[ ] Yes [x] No

4. Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)?
[x] Yes [ ] No

5. Synthetic Minor Source of Pollutants Other than HAPs?
[ ] Yes [x] No

6. Major Source of Hazardous Air Pollutants (HAPs)?
[ ] Yes [x] No

7. Synthetic Minor Source of HAPs?
[ ] Yes [x] No

8. One or More Emissions Units Subject to NSPS?
[x] Yes [ ] No

9. One or More Emissions Units Subject to NESHAP?
[ ] Yes [x] No

10. Title V Source by EPA Designation?
[ ] Yes [x] No

11. Facility Regulatory Classifications Comment (limit to 200 characters):

**The new combustion turbines located on the CPF will be subject to NSPS Subpart GG.**

## B. FACILITY REGULATIONS

**Rule Applicability Analysis** (Required for Category II applications and Category III applications involving non Title-V sources. See Instructions.)

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

**See Technical Support Document (TSD)**

## C. FACILITY POLLUTANTS

**Facility Pollutant Information**

| 1. Pollutant Emitted | 2. Pollutant Classification |
|---|---|
| | |

## D. FACILITY POLLUTANT DETAIL INFORMATION

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:
2. Requested Emissions Cap: (lb/hr) (tons/yr)
3. Basis for Emissions Cap Code:
4. Facility Pollutant Comment (limit to 400 characters):

**Facility Pollutant Detail Information:**

1. Pollutant Emitted:
2. Requested Emissions Cap: (lb/hr) (tons/yr)
3. Basis for Emissions Cap Code:
4. Facility Pollutant Comment (limit to 400 characters):

## E. FACILITY SUPPLEMENTAL INFORMATION

**Supplemental Requirements for All Applications**

1. Area Map Showing Facility Location:
[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

2. Facility Plot Plan:
[ ] Attached, Document ID: ______
[ x ] Not Applicable [ ] Waiver Requested

3. Process Flow Diagram(s):
[ x ] Attached, Document ID(s): TSD
[ ] Not Applicable [ ] Waiver Requested

4. Precautions to Prevent Emissions of Unconfined Particulate Matter:
[ ] Attached, Document ID: ______
[ x ] Not Applicable [ ] Waiver Requested

5. Fugitive Emissions Identification:
[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

6. Supplemental Information for Construction Permit Application:
[ x ] Attached, Document ID: TSD
[ ] Not Applicable

**Additional Supplemental Requirements for Category I Applications Only**

7. List of Proposed Exempt Activities:
[ ] Attached, Document ID: ______
[ ] Not Applicable

8. List of Equipment/Activities Regulated under Title VI:
[ ] Attached, Document ID: ______
[ ] Equipment/Activities On site but Not Required to be Individually Listed
[ ] Not Applicable

9. Alternative Methods of Operation:
[ ] Attached, Document ID: ______
[ ] Not Applicable

10. Alternative Modes of Operation (Emissions Trading):
[ ] Attached, Document ID: ______
[ ] Not Applicable

11. Identification of Additional Applicable Requirements:
[ ] Attached, Document ID: ____________________
[ ] Not Applicable

12. Compliance Assurance Monitoring Plan:
[ ] Attached, Document ID: ____________________
[ ] Not Applicable

13. Risk Management Plan Verification:

[ ] Plan Submitted to Implementing Agency - Verification Attached
Document ID: ____________________

[ ] Plan to be Submitted to Implementing Agency by Required Date

[ ] Not Applicable

14. Compliance Report and Plan
[ ] Attached, Document ID: ____________________
[ ] Not Applicable

15. Compliance Statement (Hard-copy Required)
[ ] Attached, Document ID: ____________________
[ ] Not Applicable

# III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through L 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. Some of the subsections comprising the Emissions Unit Information Section of the form are intended for regulated emissions units only. Others are intended for both regulated and unregulated emissions units. Each subsection is appropriately marked.

## A. TYPE OF EMISSIONS UNIT
## (Regulated and Unregulated Emissions Units)

### Type of Emissions Unit Addressed in This Section

1. 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.

2. Single Process, Group of Processes, or Fugitive Only? 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.

## B. GENERAL EMISSIONS UNIT INFORMATION
## (Regulated and Unregulated Emissions Units)

### Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Drill Rig #1-Main & Aux. Eng, Vessels, & Well Testing Flare**

2. Emissions Unit Identification Number: [ x ] No Corresponding ID [ ] Unknown

3. Emissions Unit Status Code: A

4. Acid Rain Unit? [ ] Yes [ x ] No

5. Emissions Unit Major Group SIC Code: 13

6. Emissions Unit Comment (limit to 500 characters):
**The emission unit consists of the following sources: Main Diesel Turbine Power Engines, Emergency Generators, Cranes, Compressors, Mud and Logging Diesel Engines, and Exploratory Well Testing Flare.**

## Emissions Unit Control Equipment Information

A.

1. Description (limit to 200 characters):

**Well Testing Flare**

2. Control Device or Method Code: **23**

B.

1. Description (limit to 200 characters):

2. Control Device or Method Code:

C.

1. Description (limit to 200 characters):

2. Control Device or Method Code:

## C. EMISSIONS UNIT DETAIL INFORMATION
(Regulated Emissions Units Only)

### Emissions Unit Details

1. Initial Startup Date:

2. Long-term Reserve Shutdown Date:

3. Package Unit:
Manufacturer: Model Number:

4. Generator Nameplate Rating: MW

5. Incinerator Information:
Dwell Temperature: °F
Dwell Time: seconds
Incinerator Afterburner Temperature: °F

### Emissions Unit Operating Capacity

1. Maximum Heat Input Rate: mmBtu/hr

2. Maximum Incineration Rate: lbs/hr tons/day

3. Maximum Process or Throughput Rate:

4. Maximum Production Rate:

5. Operating Capacity Comment (limit to 200 characters):

**See Technical Support Document. Operating Capacity varies based on drilling activities.**

### Emissions Unit Operating Schedule

1. Requested Maximum Operating Schedule:

**24** hours/day **7** days/week

**52** weeks/yr **8,760** hours/yr

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

**Rule Applicability Analysis** (Required for Category II Applications and Category III applications involving non Title-V sources. See Instructions.)

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

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

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram:
See TSD

2. Emission Point Type Code:
[ ] 1 [ ] 2 [x] 3 [ ] 4

3. Descriptions of Emissions Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):
Three Gen., One Emergency Gen., Misc. Diesel Gen., One Flare

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code:
[ ] D [ ] F [x] H [ ] P
[ ] R [ ] V [ ] W

6. Stack Height: 153 feet

7. Exit Diameter: 1.5 feet

8. Exit Temperature: 800 °F

**Source Information Section** 1 **of** 4 **Drill Rig #1**

9. Actual Volumetric Flow Rate: **11,420** acfm

10. Percent Water Vapor: %

11. Maximum Dry Standard Flow Rate: dscfm

12. Nonstack Emission Point Height: feet

13. Emission Point UTM Coordinates:

Zone: East (km): North (km):

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

**Emission point information provided typical of main electric power generators located in Drill Rig. Refer to Technical Support Document, Table 6-1.**

## F. SEGMENT (PROCESS/FUEL) INFORMATION
## (Regulated and Unregulated Emissions Units)

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

   **Diesel Fuel Combustion - Large Bore Engine**

2. Source Classification Code (SCC): **2-02-004-01**

3. SCC Units: **1,000 Gallons Burned**

4. Maximum Hourly Rate:

5. Maximum Annual Rate: **870**

6. Estimated Annual Activity Factor:

7. Maximum Percent Sulfur: **0.5**

8. Maximum Percent Ash:

9. Million Btu per SCC Unit: **138**

10. Segment Comment (limit to 200 characters):

    **Segment ton main electric power engines associated with the Drill Rig emission unit. See Table A-1 in Technical Support Document.**

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):
**Diesel Fuel Consumption**

2. Source Classification Code (SCC): **2-02-001-02**

3. SCC Units: **1,000 Gallons Burned**

4. Maximum Hourly Rate: **0.02**

5. Maximum Annual Rate: **22**

6. Estimated Annual Activity Factor:

7. Maximum Percent Sulfur: **0.5**

8. Maximum Percent Ash:

9. Million Btu per SCC Unit: **138**

10. Segment Comment (limit to 200 characters):
**Max Annual Rate = 21.6 (rounded to 22). Segment for crane and auxiliary diesel engine. See Table A-1 in Technical Support Document.**

## G. EMISSIONS UNIT POLLUTANTS
## (Regulated and Unregulated Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | NS |
| SO2 | | | NS |
| NOx | | | NS |
| CO | | | NS |
| VOC | | | NS |

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **PM**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **11.55** lb/hour **3.22** tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:
[ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/yr

6. Emission Factor:
Reference:

7. Emissions Method Code:
[ ] 0 [ ] 1 [ ] 2 [X] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 1 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **SO2**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **64.7** lb/hour **32.72** tons/year

4. Synthetically Limited? [ ] Yes [ X ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor: **0.5 % Sulfur**

Reference: **Fuel Analysis**

7. Emissions Method Code:

[ ] 0 [ ] 1 [ X ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 1 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

**0.5 %Sulfur Diesel**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

**Fuel Analysis**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **NOx**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **214.7** lb/hour **218.39** tons/year

4. Synthetically Limited? [ ] Yes [ **X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ___________ to ___________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ **x** ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 1 **of** 4
**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:
**Ignition Retard**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):
**Vendor Certification**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information:**

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **405** lb/hour **90.27** tons/year

4. Synthetically Limited? [ ] Yes [**x**] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [**x**] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: VOC

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **138.82** lb/hour **12.36** tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [x] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [x] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 1 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

## I. VISIBLE EMISSIONS INFORMATION
## (Regulated Emissions Units Only)

**Visible Emissions Limitations**: 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:

5. Visible Emissions Comment (limit to 200 characters):
**Rule 62-296.320(4)b**

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

1. Visible Emissions Subtype: **VE99**

2. Basis for Allowable Opacity: [x ] Rule [ ] Other

3. Requested Allowable Opacity
Normal Conditions: % Exceptional Conditions: **100** %
Maximum Period of Excess Opacity Allowed: **60** min/hour

4. Method of Compliance:
**Best Operating Practice**

5. Visible Emissions Comment (limit to 200 characters):
**Not to exceed 2 hrs in 24-hrs for start-up, shutdown, and malfunction, Rule 62-210.700,F.A.C.**

Emissions Unit Information Section 1 of 4 **Drill Rig #1**

## J. CONTINUOUS MONITOR INFORMATION
### (Regulated Emissions Units Only)

**Continuous Monitoring System** Continuous Monitor _____ of _____

1. Parameter Code:

2. Pollutant(s):

3. CMS Requirement: [ ] Rule [ ] Other

4. Monitor Information:
Monitor Manufacturer:
Model Number: Serial Number:

5. Installation Date:

6. Performance Specification Test Date:

7. Continuous Monitor Comment (limit to 200 characters):

**Continuous Monitoring System** Continuous Monitor _____ of _____

1. Parameter Code:

2. Pollutant(s):

3. CMS Requirement: [ ] Rule [ ] Other

4. Monitor Information:
Monitor Manufacturer:
Model Number: Serial Number:

5. Installation Date:

6. Performance Specification Test Date:

7. Continuous Monitor Comment (limit to 200 characters):

## K. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION
### (Regulated and Unregulated Emissions Units)

**PSD Increment Consumption Determination**

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

If the emissions unit addressed in this section emits particulate matter or sulfur dioxide, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for particulate matter or sulfur dioxide. Check the first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

If the emissions unit addressed in this section emits nitrogen oxides, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for nitrogen dioxide. Check first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code:

| | | | |
|---|---|---|---|
| PM | [x ] C | [ ] E | [ ] Unknown |
| $SO_2$ | [x ] C | [ ] E | [ ] Unknown |
| $NO_2$ | [x ] C | [ ] E | [ ] Unknown |

4. Baseline Emissions:

| | | |
|---|---|---|
| PM | lb/hour | tons/year |
| $SO_2$ | lb/hour | tons/year |
| $NO_2$ | | tons/year |

5. PSD Comment (limit to 200 characters):

**See Technical Support Document**

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

**Supplemental Requirements for All Applications**

1. Process Flow Diagram

[ x ] Attached, Document ID: TSD
[   ] Not Applicable [   ] Waiver Requested

2. Fuel Analysis or Specification

[ x ] Attached, Document ID: TSD
[   ] Not Applicable [   ] Waiver Requested

3. Detailed Description of Control Equipment

[ x ] Attached, Document ID: TSD
[   ] Not Applicable [   ] Waiver Requested

4. Description of Stack Sampling Facilities

[   ] Attached, Document ID: ____________
[ x ] Not Applicable [   ] Waiver Requested

5. Compliance Test Report

[   ] Attached, Document ID: ____________ [ x ] Not Applicable
[   ] Previously Submitted, Date: ____________

6. Procedures for Startup and Shutdown

[   ] Attached, Document ID: ____________ [ x ] Not Applicable

7. Operation and Maintenance Plan

[   ] Attached, Document ID: ____________ [ x ] Not Applicable

8. Supplemental Information for Construction Permit Application

[ x ] Attached, Document ID: TSD [   ] Not Applicable

9. Other Information Required by Rule or Statute

[   ] Attached, Document ID: ____________ [ x ] Not Applicable

## Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operation

[ ] Attached, Document ID: ____________ [ ] Not Applicable

11. Alternative Modes of Operation (Emissions Trading)

[ ] Attached, Document ID: ____________ [ ] Not Applicable

12. Identification of Additional Applicable Requirements

[ ] Attached, Document ID: ____________ [ ] Not Applicable

13. Compliance Assurance Monitoring Plan

[ ] Attached, Document ID: ____________ [ ] Not Applicable

14. Acid Rain Permit 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: ____________

[ ] Not Applicable

## III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through L 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. Some of the subsections comprising the Emissions Unit Information Section of the form are intended for regulated emissions units only. Others are intended for both regulated and unregulated emissions units. Each subsection is appropriately marked.

### A. TYPE OF EMISSIONS UNIT
### (Regulated and Unregulated Emissions Units)

**Type of Emissions Unit Addressed in This Section**

1. 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.

2. Single Process, Group of Processes, or Fugitive Only? 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.

## B. GENERAL EMISSIONS UNIT INFORMATION
## (Regulated and Unregulated Emissions Units)

### Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Drill Rig #2-Main & Aux. Eng./Vessels/Well Testing Flare**

2. Emissions Unit Identification Number: [ x ] No Corresponding ID [ ] Unknown

| | | |
|---|---|---|
| 3. Emissions Unit Status Code: **C** | 4. Acid Rain Unit?<br>[ ] Yes [ x ] No | 5. Emissions Unit Major Group SIC Code: **13** |

6. Emissions Unit Comment (limit to 500 characters):

**The emission unit consists of the following sources: Main Diesel Turbine Power Engines, Emergency Generators, Cranes, Compressors, Mud and Logging Diesel Engines, and Exploratory Well Testing Flare.**

**Emissions Unit Control Equipment Information**

**A.**

1. Description (limit to 200 characters):

**Well Testing Flare**

2. Control Device or Method Code: **23**

**B.**

1. Description (limit to 200 characters):

2. Control Device or Method Code:

**C.**

1. Description (limit to 200 characters):

2. Control Device or Method Code:

## C. EMISSIONS UNIT DETAIL INFORMATION
(Regulated Emissions Units Only)

### Emissions Unit Details

1. Initial Startup Date:

2. Long-term Reserve Shutdown Date:

3. Package Unit:
Manufacturer: Model Number:

4. Generator Nameplate Rating: MW

5. Incinerator Information:
Dwell Temperature: °F
Dwell Time: seconds
Incinerator Afterburner Temperature: °F

### Emissions Unit Operating Capacity

1. Maximum Heat Input Rate: mmBtu/hr

2. Maximum Incineration Rate: lbs/hr tons/day

3. Maximum Process or Throughput Rate:

4. Maximum Production Rate:

5. Operating Capacity Comment (limit to 200 characters):

**See Technical Support Document. Operating Capacity varies based on drilling activities.**

### Emissions Unit Operating Schedule

1. Requested Maximum Operating Schedule:

**24** hours/day **7** days/week

**52** weeks/yr **8,760** hours/yr

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

**Rule Applicability Analysis** (Required for Category II Applications and Category III applications involving non Title-V sources. See Instructions.)

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

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

## Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram:
**See TSD**

2. Emission Point Type Code:
[ ] 1 [ ] 2 [x] 3 [ ] 4

3. Descriptions of Emissions Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):
**Three Gen., One Emergency Gen., Misc. Diesel Gen., One Flare**

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code:
[ ] D [ ] F [x] H [ ] P
[ ] R [ ] V [ ] W

6. Stack Height: **153** feet

7. Exit Diameter: **1.5** feet

8. Exit Temperature: **800** °F

| | |
|---|---|
| 9. Actual Volumetric Flow Rate: | 11,420 acfm |
| 10. Percent Water Vapor: | % |
| 11. Maximum Dry Standard Flow Rate: | dscfm |
| 12. Nonstack Emission Point Height: | feet |

13. Emission Point UTM Coordinates:

Zone: East (km): North (km):

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

**Emission point information provided typical of main electric power generators located in Drill Rig. Refer to Technical Support Document, Table 6-1.**

## F. SEGMENT (PROCESS/FUEL) INFORMATION
## (Regulated and Unregulated Emissions Units)

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

**Diesel Fuel Combustion - Large Bore Engine**

2. Source Classification Code (SCC):

**2-02-004-01**

3. SCC Units:

**1,000 Gallons Burned**

| | |
|---|---|
| 4. Maximum Hourly Rate: | 5. Maximum Annual Rate:<br>**870** |

6. Estimated Annual Activity Factor:

| | |
|---|---|
| 7. Maximum Percent Sulfur:<br>**0.5** | 8. Maximum Percent Ash: |

9. Million Btu per SCC Unit:

**138**

10. Segment Comment (limit to 200 characters):

**Segment ton main electric power engines associated with the Drill Rig emission unit. See Table A-1 in Technical Support Document.**

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

**Diesel Fuel Consumption**

2. Source Classification Code (SCC): **2-02-001-02**

3. SCC Units: **1,000 Gallons Burned**

4. Maximum Hourly Rate: **0.02**

5. Maximum Annual Rate: **22**

6. Estimated Annual Activity Factor:

7. Maximum Percent Sulfur: **0.5**

8. Maximum Percent Ash:

9. Million Btu per SCC Unit: **138**

10. Segment Comment (limit to 200 characters):

**Max Annual Rate = 21.6 (rounded to 22). Segment for crane and auxiliary diesel engine. See table A-1 in Technical Support Document.**

## G. EMISSIONS UNIT POLLUTANTS
## (Regulated and Unregulated Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | EL |
| SO2 | | | EL |
| NOx | | | EL |
| CO | | | EL |
| VOC | | | EL |

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information:**

1. Pollutant Emitted: **PM**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **11.55** lb/hour **3.22** tons/year

4. Synthetically Limited? [ ] Yes [ **X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ ] 2 [ **X** ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

Drill Rig #2
Particulate Matter - Total

Emissions Unit Information Section 2 of 4
**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **SO2**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **64.7** lb/hour **32.72** tons/year

4. Synthetically Limited? [ ] Yes [ X ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ____________ to ___________ tons/yr

6. Emission Factor: **0.5 % Sulfur**

Reference: **Fuel Analysis**

7. Emissions Method Code:

[ ] 0 [ ] 1 [ x ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 2 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

**0.5 %Sulfur Diesel**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

**Fuel Analysis**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
### (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **NOx**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **214.7** lb/hour **218.39** tons/year

4. Synthetically Limited? [ ] Yes [ **X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ **x** ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 2 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

**Ignition Retard**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

**Vendor Certification**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **405** lb/hour **90.27** tons/year

4. Synthetically Limited? [ ] Yes [X ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [X ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

Drill Rig #2
Carbon Monoxide

**Emissions Unit Information Section** 2 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

Emissions Unit Information Section 2 of 4

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information:**

1. Pollutant Emitted: VOC

2. Total Percent Efficiency of Control: %

3. Potential Emissions: 138.82 lb/hour 12.36 tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [x] 2 [ ] 3 ____ to ____ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [x] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 2 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## I. VISIBLE EMISSIONS INFORMATION
## (Regulated Emissions Units Only)

**Visible Emissions Limitations**: 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:

5. Visible Emissions Comment (limit to 200 characters):
**Rule 62-296.320(4)b**

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

1. Visible Emissions Subtype: **VE99**

2. Basis for Allowable Opacity: [x] Rule [ ] Other

3. Requested Allowable Opacity
Normal Conditions: % Exceptional Conditions: **100** %
Maximum Period of Excess Opacity Allowed: **60** min/hour

4. Method of Compliance:
**Best Operating Practice**

5. Visible Emissions Comment (limit to 200 characters):
**Not to exceed 2 hrs in 24-hrs for start-up, shutdown, and malfunction, Rule 62-210.700,F.A.C.**

## J. CONTINUOUS MONITOR INFORMATION
## (Regulated Emissions Units Only)

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

## K. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION

## (Regulated and Unregulated Emissions Units)

### PSD Increment Consumption Determination

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

If the emissions unit addressed in this section emits particulate matter or sulfur dioxide, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for particulate matter or sulfur dioxide. Check the first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

If the emissions unit addressed in this section emits nitrogen oxides, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for nitrogen dioxide. Check first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code:

| | | | |
|---|---|---|---|
| PM | [x ] C | [ ] E | [ ] Unknown |
| $SO_2$ | [x ] C | [ ] E | [ ] Unknown |
| $NO_2$ | [x ] C | [ ] E | [ ] Unknown |

4. Baseline Emissions:

| | | |
|---|---|---|
| PM | lb/hour | tons/year |
| $SO_2$ | lb/hour | tons/year |
| $NO_2$ | | tons/year |

5. PSD Comment (limit to 200 characters):

**See Technical Support Document**

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

**Supplemental Requirements for All Applications**

1. Process Flow Diagram

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

2. Fuel Analysis or Specification

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

3. Detailed Description of Control Equipment

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

4. Description of Stack Sampling Facilities

[ ] Attached, Document ID: ____________
[ x ] Not Applicable [ ] Waiver Requested

5. Compliance Test Report

[ ] Attached, Document ID: ____________ [ x ] Not Applicable
[ ] Previously Submitted, Date: ____________

6. Procedures for Startup and Shutdown

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

7. Operation and Maintenance Plan

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

8. Supplemental Information for Construction Permit Application

[ x ] Attached, Document ID: TSD [ ] Not Applicable

9. Other Information Required by Rule or Statute

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

## Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operation

[ ] Attached, Document ID: ____________ [ ] Not Applicable

11. Alternative Modes of Operation (Emissions Trading)

[ ] Attached, Document ID: ____________ [ ] Not Applicable

12. Identification of Additional Applicable Requirements

[ ] Attached, Document ID: ____________ [ ] Not Applicable

13. Compliance Assurance Monitoring Plan

[ ] Attached, Document ID: ____________ [ ] Not Applicable

14. Acid Rain Permit 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: ____________

[ ] Not Applicable

## III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through L 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. Some of the subsections comprising the Emissions Unit Information Section of the form are intended for regulated emissions units only. Others are intended for both regulated and unregulated emissions units. Each subsection is appropriately marked.

## A. TYPE OF EMISSIONS UNIT
## (Regulated and Unregulated Emissions Units)

**Type of Emissions Unit Addressed in This Section**

1. 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.

2. Single Process, Group of Processes, or Fugitive Only? 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.

## B. GENERAL EMISSIONS UNIT INFORMATION
## (Regulated and Unregulated Emissions Units)

### Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Central Processing Facility**

2. Emissions Unit Identification Number: [ x ] No Corresponding ID [ ] Unknown

| | | |
|---|---|---|
| 3. Emissions Unit Status Code: A | 4. Acid Rain Unit?<br>[ ] Yes [ x ] No | 5. Emissions Unit Major Group SIC Code: 13 |

6. Emissions Unit Comment (limit to 500 characters):

**This emission unit consists of the following sources: Main Power Gas Turbine Generators, Emergency Generators, HP Flare, LP Flare, ATM Flare, Diesel Crane, and Direct Fired Glycol ReBoiler.**

## Emissions Unit Control Equipment Information

A.

1. Description (limit to 200 characters):

**L.P. Flare**

2. Control Device or Method Code: **23**

B.

1. Description (limit to 200 characters):

**H.P. Flare**

2. Control Device or Method Code: **23**

C.

1. Description (limit to 200 characters):

**Atmospheric Flare**

2. Control Device or Method Code: **23**

## C. EMISSIONS UNIT DETAIL INFORMATION
## (Regulated Emissions Units Only)

### Emissions Unit Details

1. Initial Startup Date:

2. Long-term Reserve Shutdown Date:

3. Package Unit:
   Manufacturer: Model Number:

4. Generator Nameplate Rating: MW

5. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

### Emissions Unit Operating Capacity

1. Maximum Heat Input Rate: mmBtu/hr

2. Maximum Incineration Rate: lbs/hr tons/day

3. Maximum Process or Throughput Rate:

4. Maximum Production Rate:

5. Operating Capacity Comment (limit to 200 characters):

**Operating capacity varies based on drilling activities. See Technical Support Document for details.**

### Emissions Unit Operating Schedule

1. Requested Maximum Operating Schedule:

| | | | |
|---|---|---|---|
| **24** | hours/day | **7** | days/week |
| **52** | weeks/yr | **8,760** | hours/yr |

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

<u>**Rule Applicability Analysis**</u> (Required for Category II Applications and Category III applications involving non Title-V sources. See Instructions.)

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

**Refer to Technical Support Document**

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

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram:
   **See Part II**

2. Emission Point Type Code:
   [ ] 1 [ ] 2 [x] 3 [ ] 4

3. Descriptions of Emissions Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):
   **Three Turbine Gen., Diesel Gen., Three Flares, Glycol Reboiler, Fugitive Emissions.**

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code:
   [ ] D [ ] F [x] H [ ] P
   [ ] R [ ] V [ ] W

6. Stack Height: **100** feet

7. Exit Diameter: **2** feet

8. Exit Temperature: **670** °F

9. Actual Volumetric Flow Rate: **23,500** acfm

10. Percent Water Vapor: %

11. Maximum Dry Standard Flow Rate: dscfm

12. Nonstack Emission Point Height: feet

13. Emission Point UTM Coordinates:

Zone: East (km): North (km):

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

**Stack Height = 99.6 ft (rounded to 100). Values characteristic of main emission source of CPU unit-Turbine Generator. Refer to Table 6-1 in TSD.**

## F. SEGMENT (PROCESS/FUEL) INFORMATION
## (Regulated and Unregulated Emissions Units)

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

   **Natural Gas Combustion**

2. Source Classification Code (SCC):

   **2-02-002-01**

3. SCC Units:

   **MMCU FT. Burned**

|  |  |
|---|---|
| 4. Maximum Hourly Rate:<br>**0.08** | 5. Maximum Annual Rate:<br>**607** |

6. Estimated Annual Activity Factor:

|  |  |
|---|---|
| 7. Maximum Percent Sulfur: | 8. Maximum Percent Ash: |

9. Million Btu per SCC Unit:

   **950**

10. Segment Comment (limit to 200 characters):

    **Max Annual Rate = 607.1 (rounded to 607). Rates based on all natural gas uses. Refer to Table A-4a in TSD.**

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):
**Diesel Fuel**

2. Source Classification Code (SCC): **2-02-001-02**

3. SCC Units: **1,000 Gallons Burned**

| | |
|---|---|
| 4. Maximum Hourly Rate:<br>**0.024** | 5. Maximum Annual Rate:<br>**214** |

6. Estimated Annual Activity Factor:

| | |
|---|---|
| 7. Maximum Percent Sulfur:<br>**0.5** | 8. Maximum Percent Ash: |

9. Million Btu per SCC Unit: **138**

10. Segment Comment (limit to 200 characters):
**Segment for crane and auxiliary diesel engines on CPF.**

## G. EMISSIONS UNIT POLLUTANTS
## (Regulated and Unregulated Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | NS |
| SO2 | | | NS |
| NOx | | | NS |
| CO | | | NS |
| VOC | | | NS |

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **PM**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **1.77** lb/hour **7.45** tons/year

4. Synthetically Limited? [ ] Yes [**X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ____________ to ____________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ ] 2 [**x** ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 3 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

Emissions Unit Information Section 3 of 4

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **SO2**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **7.59** lb/hour **33.09** tons/year

4. Synthetically Limited? [ ] Yes [x] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [x] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 3 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **NOx**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **35.48** lb/hour **154.4** tons/year

4. Synthetically Limited? [ ] Yes [ X ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ X ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 3 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

<u>Pollutant Detail Information</u>:

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **31.07** lb/hour **135.22** tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [X] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Emissions Unit Information Section** 3 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **VOC**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **12.18** lb/hour **53.2** tons/year

4. Synthetically Limited? [ ] Yes [ X ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ____________ to ___________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ X ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

Emissions Unit Information Section 3 of 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

## I. VISIBLE EMISSIONS INFORMATION
## (Regulated Emissions Units Only)

**Visible Emissions Limitations**: 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:
**EPA Method 9**

5. Visible Emissions Comment (limit to 200 characters):
**Rule 62-296.320(4)b**

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

1. Visible Emissions Subtype: **VE99**

2. Basis for Allowable Opacity: [x ] Rule [ ] Other

3. Requested Allowable Opacity
Normal Conditions: % Exceptional Conditions: **100** %
Maximum Period of Excess Opacity Allowed: **60** min/hour

4. Method of Compliance:
**Best Operating Practice**

5. Visible Emissions Comment (limit to 200 characters):
**Not to exceed 2 hrs in 24-hrs for start-up, shutdown, and malfunction, Rule 62-210.700,F.A.C.**

## J. CONTINUOUS MONITOR INFORMATION
### (Regulated Emissions Units Only)

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

## K. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION
### (Regulated and Unregulated Emissions Units)

**PSD Increment Consumption Determination**

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

If the emissions unit addressed in this section emits particulate matter or sulfur dioxide, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for particulate matter or sulfur dioxide. Check the first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

If the emissions unit addressed in this section emits nitrogen oxides, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for nitrogen dioxide. Check first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code:

| | | | |
|---|---|---|---|
| PM | [x ] C | [ ] E | [ ] Unknown |
| $SO_2$ | [x ] C | [ ] E | [ ] Unknown |
| $NO_2$ | [x ] C | [ ] E | [ ] Unknown |

4. Baseline Emissions:

| | | |
|---|---|---|
| PM | lb/hour | tons/year |
| $SO_2$ | lb/hour | tons/year |
| $NO_2$ | | tons/year |

5. PSD Comment (limit to 200 characters):

**See Technical Support Document**

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

**Supplemental Requirements for All Applications**

1. Process Flow Diagram

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

2. Fuel Analysis or Specification

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

3. Detailed Description of Control Equipment

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

4. Description of Stack Sampling Facilities

[ ] Attached, Document ID: ______
[ x ] Not Applicable [ ] Waiver Requested

5. Compliance Test Report

[ ] Attached, Document ID: ______ [ x ] Not Applicable
[ ] Previously Submitted, Date: ______

6. Procedures for Startup and Shutdown

[ ] Attached, Document ID: ______ [ x ] Not Applicable

7. Operation and Maintenance Plan

[ ] Attached, Document ID: ______ [ x ] Not Applicable

8. Supplemental Information for Construction Permit Application

[ x ] Attached, Document ID: Part II [ ] Not Applicable

9. Other Information Required by Rule or Statute

[ ] Attached, Document ID: ______ [ x ] Not Applicable

## Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operation

[ ] Attached, Document ID: ____________ [ ] Not Applicable

11. Alternative Modes of Operation (Emissions Trading)

[ ] Attached, Document ID: ____________ [ ] Not Applicable

12. Identification of Additional Applicable Requirements

[ ] Attached, Document ID: ____________ [ ] Not Applicable

13. Compliance Assurance Monitoring Plan

[ ] Attached, Document ID: ____________ [ ] Not Applicable

14. Acid Rain Permit 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: ____________

[ ] Not Applicable

## III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through L 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. Some of the subsections comprising the Emissions Unit Information Section of the form are intended for regulated emissions units only. Others are intended for both regulated and unregulated emissions units. Each subsection is appropriately marked.

## A. TYPE OF EMISSIONS UNIT
### (Regulated and Unregulated Emissions Units)

**Type of Emissions Unit Addressed in This Section**

1. 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.

2. Single Process, Group of Processes, or Fugitive Only? 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.

## B. GENERAL EMISSIONS UNIT INFORMATION
(Regulated and Unregulated Emissions Units)

### Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Satellite Platforms consist of 1 or 2 Natural Gas Fired Gen.**

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

3. Emissions Unit Status Code: C

4. Acid Rain Unit? [ ] Yes [ X ] No

5. Emissions Unit Major Group SIC Code: 13

6. Emissions Unit Comment (limit to 500 characters):

**Two types of Satellite Platforms (one well or two well) will be utilized in the Destin Dome area. The main source of emissions on a Satellite Platform is the natural gas fired generator engine. Installation of platforms will depend on resource development. Potential development could be 16 platforms designated as: 54C, 15C, 54A/B, 55A/B, 99A/B, 12A/56A, 14A, 56 #2, 56B, 56C, 56D, 57, 100A, 13B, 13A and 15A/B. Numbers designates block.**

## Emissions Unit Control Equipment Information

A.

1. Description (limit to 200 characters):

**Catalytic Reduction of NOx, CO and VOC from gas-fired engine(s)**

2. Control Device or Method Code: **65**

B.

1. Description (limit to 200 characters):

2. Control Device or Method Code:

C.

1. Description (limit to 200 characters):

2. Control Device or Method Code:

## C. EMISSIONS UNIT DETAIL INFORMATION
## (Regulated Emissions Units Only)

### Emissions Unit Details

1. Initial Startup Date:

2. Long-term Reserve Shutdown Date:

3. Package Unit:
Manufacturer: Model Number:

4. Generator Nameplate Rating: MW

5. Incinerator Information:
Dwell Temperature: °F
Dwell Time: seconds
Incinerator Afterburner Temperature: °F

### Emissions Unit Operating Capacity

1. Maximum Heat Input Rate: mmBtu/hr

2. Maximum Incineration Rate: lbs/hr tons/day

3. Maximum Process or Throughput Rate:

4. Maximum Production Rate:

5. Operating Capacity Comment (limit to 200 characters):

**Operating capacity varies based on drilling activities. See Technical Support Document for details.**

### Emissions Unit Operating Schedule

1. Requested Maximum Operating Schedule:

**24** hours/day **7** days/week

**52** weeks/yr **8,760** hours/yr

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

**Rule Applicability Analysis** (Required for Category II Applications and Category III applications involving non Title-V sources. See Instructions.)

**List of Applicable Regulations** (Required for Category I applications and Category III applications involving Title-V sources. See Instructions.)

**refer to Technical Support Document**

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

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram:
   **See TSD**

2. Emission Point Type Code:
   [ ] 1 [ ] 2 [x] 3 [ ] 4

3. Descriptions of Emissions Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):
   **Satellite Platform gas-fired engine(s).**

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code:
   [ ] D [ ] F [x] H [ ] P
   [ ] R [ ] V [ ] W

6. Stack Height: **93** feet

7. Exit Diameter: **0.6** feet

8. Exit Temperature: **600** °F

9. Actual Volumetric Flow Rate: **1,811** acfm

10. Percent Water Vapor: %

11. Maximum Dry Standard Flow Rate: dscfm

12. Nonstack Emission Point Height: feet

13. Emission Point UTM Coordinates:

Zone: East (km): North (km):

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

**Values characterstic of typical single natural gas fired generator.**

## F. SEGMENT (PROCESS/FUEL) INFORMATION
## (Regulated and Unregulated Emissions Units)

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

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

**Natural Gas Combustion**

2. Source Classification Code (SCC):

**2-02-002-02**

3. SCC Units:

**MMCOFT Burned**

| | |
|---|---|
| 4. Maximum Hourly Rate:<br>**0.007** | 5. Maximum Annual Rate:<br>**24** |

6. Estimated Annual Activity Factor:

| | |
|---|---|
| 7. Maximum Percent Sulfur: | 8. Maximum Percent Ash: |

9. Million Btu per SCC Unit:

**1,000**

10. Segment Comment (limit to 200 characters):

**Max Hourly Rate = 0.0073 (rounded to 0.007). Max Annual Rate = 24.3 (rounded to 24). Rates based on two well natural gas fired generator. Refer to TSD**

**Segment Description and Rate**: Segment _____ of _____

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) (limit to 500 characters):

2. Source Classification Code (SCC):

3. SCC Units:

4. Maximum Hourly Rate:

5. Maximum Annual Rate:

6. Estimated Annual Activity Factor:

7. Maximum Percent Sulfur:

8. Maximum Percent Ash:

9. Million Btu per SCC Unit:

10. Segment Comment (limit to 200 characters):

## G. EMISSIONS UNIT POLLUTANTS
## (Regulated and Unregulated Emissions Units)

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | NS |
| SO2 | | | NS |
| NOx | | | NS |
| CO | | | NS |
| VOC | | | NS |

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **PM**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **0.04** lb/hour **0.12** tons/year

4. Synthetically Limited? [ ] Yes [ **X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ **X** ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Potential emissions for a 2-well satellite platform.**

**Emissions Unit Information Section** 4 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

Emissions Unit Information Section 4 of 4

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: SO2

2. Total Percent Efficiency of Control: %

3. Potential Emissions: 0.06 lb/hour 0.21 tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ____________ to ____________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [X] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Potential emissions for a 2-well satellite platform.**

**Emissions Unit Information Section** 4 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

### H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
### (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **NOx**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **1.53** lb/hour **5.35** tons/year

4. Synthetically Limited? [ ] Yes [**X** ] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ ] 2 [**x** ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Potential emissions for a 2-well satellite platform.**

**Emissions Unit Information Section** 4 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:
**Catalytic Conv.**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):
**Vendor Information**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information**:

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **1.53** lb/hour **5.35** tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive/Other Emissions:

☐ 1 ☐ 2 ☐ 3 ________ to ________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

☐ 0 ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Potential emissions for a 2-well satellite platform.**

**Emissions Unit Information Section** 4 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:
   **Catalytic Conv.**

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):
   **Vendor Information**

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

**B.**

1. Basis for Allowable Emissions Code:

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units:

4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) (limit to 200 characters):

## H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

**Pollutant Detail Information:**

1. Pollutant Emitted: **VOC**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **0.2** lb/hour **0.71** tons/year

4. Synthetically Limited? [ ] Yes [X] No

5. Range of Estimated Fugitive/Other Emissions:

[ ] 1 [ ] 2 [ ] 3 ____________ to ____________ tons/yr

6. Emission Factor:

Reference:

7. Emissions Method Code:

[ ] 0 [ ] 1 [ ] 2 [X] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

**Refer toTechnical Support Document for calculations.**

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

**Potential emissions for a 2-well satellite platform.**

**Emissions Unit Information Section** 4 **of** 4

**Allowable Emissions (Pollutant identified on front page)**

**A.**

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

**B.**

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

# I. VISIBLE EMISSIONS INFORMATION
(Regulated Emissions Units Only)

**Visible Emissions Limitations**: 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:
**EPA Method 9**

5. Visible Emissions Comment (limit to 200 characters):
**Rule 62-296.320(4)b**

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

1. Visible Emissions Subtype: **VE99**

2. Basis for Allowable Opacity: [x ] Rule [ ] Other

3. Requested Allowable Opacity
Normal Conditions: % Exceptional Conditions: **100** %
Maximum Period of Excess Opacity Allowed: **60** min/hour

4. Method of Compliance:
**Best Operating Practice**

5. Visible Emissions Comment (limit to 200 characters):
**Not to exceed 2 hrs in 24-hrs for start-up, shutdown, and malfunction, Rule 62-210.700,F.A.C.**

## J. CONTINUOUS MONITOR INFORMATION
### (Regulated Emissions Units Only)

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

**Continuous Monitoring System** Continuous Monitor _____ of _____

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

## K. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION
### (Regulated and Unregulated Emissions Units)

**PSD Increment Consumption Determination**

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

If the emissions unit addressed in this section emits particulate matter or sulfur dioxide, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for particulate matter or sulfur dioxide. Check the first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

If the emissions unit addressed in this section emits nitrogen oxides, answer the following series of questions to make a preliminary determination as to whether or not the emissions unit consumes PSD increment for nitrogen dioxide. Check first statement, if any, that applies and skip remaining statements.

[x ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and the source consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and the emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code:

| | | | |
|---|---|---|---|
| PM | [x ] C | [ ] E | [ ] Unknown |
| $SO_2$ | [x ] C | [ ] E | [ ] Unknown |
| $NO_2$ | [x ] C | [ ] E | [ ] Unknown |

4. Baseline Emissions:

| | | |
|---|---|---|
| PM | lb/hour | tons/year |
| $SO_2$ | lb/hour | tons/year |
| $NO_2$ | | tons/year |

5. PSD Comment (limit to 200 characters):

**See Technical Support Document**

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

**Supplemental Requirements for All Applications**

1. Process Flow Diagram

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

2. Fuel Analysis or Specification

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

3. Detailed Description of Control Equipment

[ x ] Attached, Document ID: TSD
[ ] Not Applicable [ ] Waiver Requested

4. Description of Stack Sampling Facilities

[ ] Attached, Document ID: ____________
[x ] Not Applicable [ ] Waiver Requested

5. Compliance Test Report

[ ] Attached, Document ID: ____________ [ x ] Not Applicable
[ ] Previously Submitted, Date: ____________

6. Procedures for Startup and Shutdown

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

7. Operation and Maintenance Plan

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

8. Supplemental Information for Construction Permit Application

[ x ] Attached, Document ID: TSD [ ] Not Applicable

9. Other Information Required by Rule or Statute

[ ] Attached, Document ID: ____________ [ x ] Not Applicable

## Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operation

[ ] Attached, Document ID: ____________ [ ] Not Applicable

11. Alternative Modes of Operation (Emissions Trading)

[ ] Attached, Document ID: ____________ [ ] Not Applicable

12. Identification of Additional Applicable Requirements

[ ] Attached, Document ID: ____________ [ ] Not Applicable

13. Compliance Assurance Monitoring Plan

[ ] Attached, Document ID: ____________ [ ] Not Applicable

14. Acid Rain Permit 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: ____________

[ ] Not Applicable

# PART 2

# TECHNICAL SUPPORT DOCUMENT

# 1.0 INTRODUCTION

## 1.1 OVERVIEW

Chevron U.S.A., Inc. (Chevron), as operator of the Destin Dome 56 Unit, is proposing to develop natural gas reserves in the Destin Dome Outer Continental Shelf (OCS) area in Blocks 12, 13, 14, 15, 16, 54, 55, 56, 57, 99, and 100. This area is located approximately 25 miles offshore of Escambia and Bay counties in Florida (Figure 1-1). The development will include activities that will also be required to obtain an air pollution permit from the U.S. Environmental Protection Agency (EPA) under OCS Air Regulations codified in 40 Code of Federal Regulations (CFR) Part 55. The proposed facilities associated with the development activity would be defined in 40 CFR 55, Section 55.2 as a new OCS source within 25 miles of Florida's seaward boundaries. New OCS sources are required to obtain EPA or delegated agency approval prior to installation. Most of the emissions to be permitted are temporary in nature and related to the construction of the proposed OCS sources. A detailed discussion of the OCS regulations is presented in Section 1.2.

The proposed activity will include facilities that have air pollutant emissions associated with the construction and operation of the development. The OCS source includes two drilling rigs used for well drilling, testing, and completion; operation of a central production facility (CPF); and operation of fifteen satellite platform facilities. A pipe-lay barge and vessels are associated with the activity and their emissions are used in determining the "potential-to-emit" for the activity. The number and type of air emission sources reflect a potential maximum development scenario that produces a "worst-case" air emissions estimate. The actual development may have fewer facilities depending on the outcome of drilling in the respective blocks. This report provides technical information to support the OCS permit application.

## 1.2 AIR QUALITY REVIEW REGULATIONS

### 1.2.1 OCS AIR REGULATIONS

The Clean Air Act Amendments of 1990 (CAAA) (Public Law 101-549) require EPA to establish requirements to control air pollution from OCS sources. The purpose of the regulations was to establish procedures to insure sources attain and maintain federal and state Ambient Air Quality Standards (AAQS) and meet air pollution control requirements in the designated OCS areas. These regulations were promulgated in 40 CFR 55 (57 Federal Register 40806).

### 1.2.1.1 Applicability

The OCS air regulations apply only to those OCS sources in the Gulf of Mexico, that are located east of 87.5 degrees longitude. OCS sources located within 25 miles of the state's seaward boundaries are subject to all the requirements of 40 CFR 55 and the federal, state, and local requirements in the corresponding onshore area (COA). The COA is the geographically closest shore area to the OCS source located within 25 miles of the state's seaward boundary and is designated as the nearest onshore area (NOA) for this exploratory source pursuant to 40 CFR 55. The EPA Administrator can designate another COA if requested by an air pollution control agency and approved by EPA according to Section 55.5. For the proposed activity, Florida is the COA. OCS sources located beyond 25 miles of state's seaward boundaries are required to meet all the requirements of the OCS air regulations except those related to notification or to state or local regulations or delegation.

### 1.2.1.2 Requirements for OCS Sources Within 25 Miles of State's Seaward Boundaries

The requirements for OCS sources located within 25 miles of the states' seaward boundaries include submitting a notice of intent (NOI) and permit application. The NOI must be submitted to the EPA Region Office with a copy to the air pollution agency in the NOA for any OCS source prior to performing any physical change or change in method of operation that results in an increase in emissions. The information requirements for an NOI include general company information, facility description, description of sources including emission estimates and stack parameters, air pollution control equipment and procedures, and any other information deemed appropriate to determine applicability and impacts to onshore areas (Section 55.4). The EPA Region IV was given notice of the proposed activity in 1997.

The permit application must contain all information necessary to determine conformance with any of the requirements of the OCS air regulations. OCS sources located within an NOA must meet the following requirements:

- Federal new source performance standards (40 CFR 60), as applicable.
- Federal prevention of significant deterioration (PSD) rules (40 CFR 52.21).
- Federal national emission standards for hazardous air pollutants (HAPs) (40 CFR 61).
- State and local requirements (provided the requirements are more stringent than federal requirements).

The administrative procedures for issuing permits under the OCS air regulations by EPA are in accordance with 40 CFR Part 124. The OCS air regulations also require OCS sources to obtain a federal air operating permit under 40 CFR 71 or the state approved program if delegated by EPA. The federal air operating program is applicable to major sources and implements Title V of the CAAA; often referred to as "Title V" permits.

### 1.2.2 FEDERAL NEW SOURCE PERFORMANCE STANDARDS (NSPS)

Federal NSPS are applicable to certain categories of industrial facilities for which construction, reconstruction, or modification commenced prior to the date EPA proposes the NSPS. NSPS are contained in various subparts within 40 CFR 60. Specific applicability depends on the category of source. The State of Florida has adopted the NSPS by reference in Rule 62-204.800(7) Florida Administrative Code (F.A.C.).

### 1.2.3 NATIONAL AND STATE AAQS

Primary national AAQS were promulgated to protect the public health and secondary national AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. The framework for implementing the AAQS is the development by states of a State Implementation Plan (SIP) that provides a plan and regulations for achieving and maintaining the AAQS. The State of Florida, the COA under the Part 55 regulations, has developed and been approved by EPA to implement a plan that would achieve and maintain the AAQS. Florida's AAQS are promulgated in Rule 62-204.240 F.A.C. The existing applicable national and Florida AAQS are presented in Table 1-1. Areas in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Areas in the COA are classified as either attainment or unclassifiable (Rule 62-204.340 F.A.C.).

### 1.2.4 PSD REQUIREMENTS

Under federal PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a preconstruction permit issued. Federal PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. For OCS sources located within 25 miles of a state's seaward boundaries (or COA), the PSD regulations applicable in the state apply if EPA has approved these regulations (40 CFR 55.14). Florida's SIP contains PSD regulations which have been approved by EPA; therefore, PSD approval authority has been granted to the Florida Department of Environmental Protection (FDEP) and FDEP PSD regulations apply to OCS development. The applicable PSD regulations have been promulgated in Rule 62-212.400 F.A.C. and have been designated as the appropriate regulations in 40 CFR 55.14(e)(6).

PSD review applied to a "major facility," which is defined as any one of 28 named source categories that has the potential to emit 100 tons per year (TPY) or more, or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility for new major facilities and major modifications are required to undergo a series of evaluations for each regulated pollutant that is emitted in excess of the PSD significant emission rates. PSD significant emission rates are shown in Table 1-2. The evaluations include:

- Control technology review,
- Source impact analysis,
- Air quality analysis (monitoring),
- Source information, and
- Additional impact analyses.

In addition to these analyses, a new facility also must be reviewed with respect to Good Engineering Practice (GEP) stack height regulations.

### 1.2.5 FEDERAL AIR OPERATING PROGRAM - TITLE V PERMITS

The CAAA (Public Law 101-549) established a federally mandated air operating permitting program. The program requires the states to adopt regulations consistent with the CAAA and to implement regulations promulgated by the EPA in 40 CFR 70 (57 CFR 32250-32312; July 21, 1992). The state program must have been developed and submitted for EPA approval by November 15, 1993, and must incorporate by reference all applicable federal requirements including Prevention of Significant Deterioration, New Source Review in Nonattainment Areas, New Source Performance Standards, National Emission Standards for Hazardous Pollutants, and State Implementation requirements. The program applies to "Title V or Part 70" sources, which include "major" stationary sources of regulated air pollutants (see attached EPA guidance on the definition of regulated air pollutant).

For states that have not adopted a federally approved Title V program or in the case of OCS sources where the state has not been delegated authority as the COA within 25 miles of the state's seaward boundary, EPA administers the Title V program under 40 CFR 71 regulations. These regulations mirror the requirements of Part 70.

During the last several years, a majority of states have passed legislation and developed regulations to implement Title V requirements. In most cases, states have developed and submitted regulations for EPA review. Some minor changes are required for most states and generally focus on enforcement issues. Fees approved in many states follow the CAAA and EPA presumed amount of $25 per ton (4,000 ton cap per pollutant, with carbon monoxide excluded from fees) with adjustment for the Consumer Price Index (CPI). EPA's implemented program would follow the requirements of Section 71.9 of Part 71 which is $32 per ton (1995) adjusted to the CPI.

For OCS sources, Title V permits will be required for all major sources. A "major source" is defined in Section 71.2 as a stationary source (or group of stationary sources) that is within a contiguous area, under common control, belongs to the same two-digit Major Group Standard Industrial Classification (SIC) code, and emits any regulated air pollutant meeting the following general requirements (some exemptions apply):

(a) Any source that emits (or has the potential to emit) 10 TPY or more of a single HAP or 25 TPY or more of any combination of HAPs. HAPs are substances contained in a list of 189 toxic air pollutants, as defined in Section 112(b) of the CAAA.

(b) Any source that emits (or has the potential to emit) more than 100 TPY of any regulated pollutant (including fugitive emissions for sources within 27 specific source categories).

(c) Any source that includes one or more emission units subject to the federal acid rain program.

(d) Sources subject to Title I of the CAAA (nonattainment areas); e.g., potential emissions of greater than 100 TPY in a marginal ozone nonattainment area or 50 TPY in a moderate ozone nonattainment area.

(e) Any source designated by EPA under 40 CFR 70 as a Title V source.

For newly installed or constructed sources, the Title V permit application must be submitted within 12 months after initial operation [Section 71.5 (a)].

The information required for Title V permit applications must be submitted on forms adopted by the state or EPA and must contain the minimum requirements specified by Section 71.5(c). The minimum information required includes: identifying information, description of the source's processes and products, emission estimates of all regulated pollutants, process and operation information, calculations, identification of all applicable requirements and test methods, control equipment information, limitations on the source operation affecting emissions, proposed alternate methods of operation, compliance statement, compliance schedule and methodology (if applicable), reporting and record keeping requirements, and a list of insignificant activities, which are exempt or information to determine applicability. An application submitted with all the requisite information would be deemed complete by EPA or the state.

The emission estimates for all regulated pollutants must be included in the application unless they are insignificant activities or insignificant emission levels. In this context, regulated pollutants are criteria pollutants, NSPS, National Emission Standard of Hazardous Air Pollutants (NESHAPs), and HAPs. The applicant must have reason to believe the pollutants are being emitted from the source even if no limitations would apply. Information on both point and fugitive emissions must be submitted unless exempted. Except for supplying compliance data, actual test data are not required for determining estimated or potential emissions. For pollutants that have no standard test method or published emission factor available, emission estimates can be based on other methods (e.g., mass balance, engineering judgment) as long as the basis of the method is provided in the application. Emission estimates are required to be reported as follows:

- All pollutants for which there is a federally enforceable permit limitation including NSPS and NESHAPs.

- An emission unit's potential emissions of regulated pollutants (excluding HAPs) are 2 TPY or more must be provided.
- If the source's potential emissions of any single HAP are 0.5 TPY or more, or the *de minimis* level in 112(g) of CAAA, whichever is less, must be provided.

The application also includes statements that must be signed by the "responsible official" for the facility. The "responsible official" (Section 71.2) is, if the source is owned by a corporation, generally a corporate official or person in charge of the business unit in which the source is located. For partnerships, the responsible official is the general partner. The principal executive officer or ranking elected official is the responsible official for government entities. For sources subject to Title IV (Acid Rain Provisions), the responsible official can be the designated representative.

Any information that is proprietary can be claimed as confidential pursuant to Section 71.(a)(3) and Part 2, Subpart B of Part 71.

Each Title V permit issued by EPA or the state must contain specific conditions on each method of operation including all emission limitations. Operational requirements and limitations that ensure compliance with EPA or state conditions must be included. The term of the Title V permit must not exceed 5 years, except for sources subject to the Federal Acid Rain Program; the permit term for these sources is specified as 5 years. The permit must include specific monitoring, record keeping, and reporting requirements (Section 71.6) that include:

- Specific emission monitoring and analysis procedures,
- Specific information on the monitoring performed,
- Maintenance of records for at least 5 years,
- Submittal of required monitoring at least every 6 months,
- Descriptions of any deviations in permit requirements, and
- An accompanying statement signed by the responsible official.

EPA has issued draft model Title V Operating Permits for various pollutants and industries that include operating permit conditions.

Title V permits must be revised for any changes that constitute a modification. A modification is any change that would: violate any applicable requirement; exceed an allowable emission limit; contravene any permit term, condition, monitoring, record keeping, reporting or compliance certification requirement; require a case-by-case determination; or result in emission trading unless otherwise specified. These changes would be processed in the same manner as any Title V permit application request.

Permit revisions are not necessary and no notice is required for:

- Any alternative method of operation expressly allowed by the permit,
- Changes that do not result in an increase in actual emissions and do not contravene a permit term or condition,
- Routine maintenance, repair, or replacement of any emission unit, and
- Any increase in the hours of operation or production rate unless prohibited under a federally enforceable permit.

For such changes, the source must maintain logs or records to verify the circumstances.

Permitted sources may be implemented with any other operating change, with at least 7 days written notice, if the change does not result in an actual increase in emissions or contravene a permit term or condition, and does not constitute a modification.

Administrative changes, such as typographical errors, changes in address or telephone number, will be issued.

## 1.3 APPLICABILITY SUMMARY

The proposed development includes about 20 emission units that will require EPA approval under the OCS air regulations. The emission units that will require an OCS permit include the two drilling rigs used for well drilling, testing, and completion; the CPF; and the fifteen satellite facilities. To determine each source's potential-to-emit, the applications for each OCS source will include the emissions of the pipe-lay barge vessels required to support the proposed facility. The potential-to-emit is used to determine PSD applicability for the OCS source. The emissions from these emission units, including vessels, have been determined to be greater than the PSD thresholds for several regulated pollutants. This is based on EPA Region IV's interpretation of the OCS source definition (EPA Region IV, February 1999). Therefore, PSD review will be applicable. NSPS is applicable to two emission units located on the CPF. Title V permits will likely be required for three OCS sources; the two drilling rigs and the CPF.

Table 1-1. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

| Pollutant | Averaging Time | AAQS ($\mu g/m^3$) | | | PSD Increments ($\mu g/m^3$) | | Significant Impact Levels ($\mu g/m^3$) [b] |
|---|---|---|---|---|---|---|---|
| | | Primary Standard | Secondary Standard | Florida | Class I | Class II | |
| Particulate Matter[c] (PM10) | Annual Arithmetic Mean | 50 | 50 | 50 | 4 | 17 | 1 |
| | 24-Hour Maximum | 150 | 150 | 150 | 8 | 30 | 5 |
| Sulfur Dioxide | Annual Arithmetic Mean | 80 | NA | 60 | 2 | 20 | 1 |
| | 24-Hour Maximum | 365 | NA | 260 | 5 | 91 | 5 |
| | 3-Hour Maximum | NA | 1,300 | 1,300 | 25 | 512 | 25 |
| Carbon Monoxide | 8-Hour Maximum | 10,000 | 10,000 | 10,000 | NA | NA | 500 |
| | 1-Hour Maximum | 40,000 | 40,000 | 40,000 | NA | NA | 2,000 |
| Nitrogen Dioxide | Annual Arithmetic Mean | 100 | 100 | 100 | 2.5 | 25 | 1 |
| Ozone[c] | 8-Hour Maximum[d] | 157 | 157 | 157 | NA | NA | NA |
| Lead | Calendar Quarter Arithmetic Mean | 1.5 | 1.5 | 1.5 | NA | NA | NA |

Note: NA = Not applicable, i.e., no standard exists.
Particulate matter ($PM_{10}$) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.
$\mu g/m^3$ = milligrams per cubic meter.

[a] Short-term maximum concentrations are not to be exceeded more than once per year.

[b] Maximum concentrations are not to be exceeded.

[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, PM2.5 standards were introduced with a 24-hour standard of 65 g/m$^3$ (3-year average of 98th percentile) and an annual standard of 15 g/m$^3$ (3-year average at community monitors). Implementation of these standards are many years away.

[d] 0.08 ppm; achieved when 3-year average of 99th percentile is 0.08 ppm or less. FDEP has not yet adopted these standards.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.
40 CFR 50; 40 CFR 52.21.
Chapter 62-272, F.A.C.

Table 1-2. PSD Significant Emission Rates and *De Minimis* Monitoring Concentrations

| Pollutant | Regulated Under | Significant Emission Rate (TPY) | *De Minimis* Monitoring Concentration[a] ($\mu g/m^3$) |
|---|---|---|---|
| Sulfur Dioxide | NAAQS, NSPS | 40 | 13, 24-hour |
| Particulate Matter [PM(TSP)] | NSPS | 25 | 10, 24-hour |
| Particulate Matter ($PM_{10}$) | NAAQS | 15 | 10, 24-hour |
| Nitrogen Dioxide | NAAQS, NSPS | 40 | 14, annual |
| Carbon Monoxide | NAAQS, NSPS | 100 | 575, 8-hour |
| Volatile Organic Compounds (Ozone) | NAAQS, NSPS | 40 | 100 TPY[b] |
| Lead | NAAQS | 0.6 | 0.1, 3-month |
| Sulfuric Acid Mist | NSPS | 7 | NM |
| Total Fluorides | NSPS | 3 | 0.25, 24-hour |
| Total Reduced Sulfur | NSPS | 10 | 10, 1-hour |
| Reduced Sulfur Compounds | NSPS | 10 | 10, 1-hour |
| Hydrogen Sulfide | NSPS | 10 | 0.2, 1-hour |
| Mercury | NESHAP | 0.1 | 0.25, 24-hour |
| MWC Organics | NSPS | $3.5x10^{-6}$ | NM |
| MWC Metals | NSPS | 15 | NM |
| MWC Acid Gases | NSPS | 40 | NM |
| MSW Landfill Gases | NSPS | 50 | NM |

Note: Ambient monitoring requirements for any pollutant may be exempted if the impact of the increase in emissions is below *de minimis* monitoring concentrations.

NAAQS = National Ambient Air Quality Standards.
NM = No ambient measurement method established; therefore, no *de minimis* concentration has been established.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.
$\mu g/m^3$ = micrograms per cubic meter.
MWC = Municipal waste combustor.
MSW = Municipal solid waste.

[a] Short-term concentrations are not to be exceeded.

[b] No *de minimis* concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.

[c] Any emission rate of these pollutants.

Sources: 40 CFR 52.21.
Rule 62-212.400

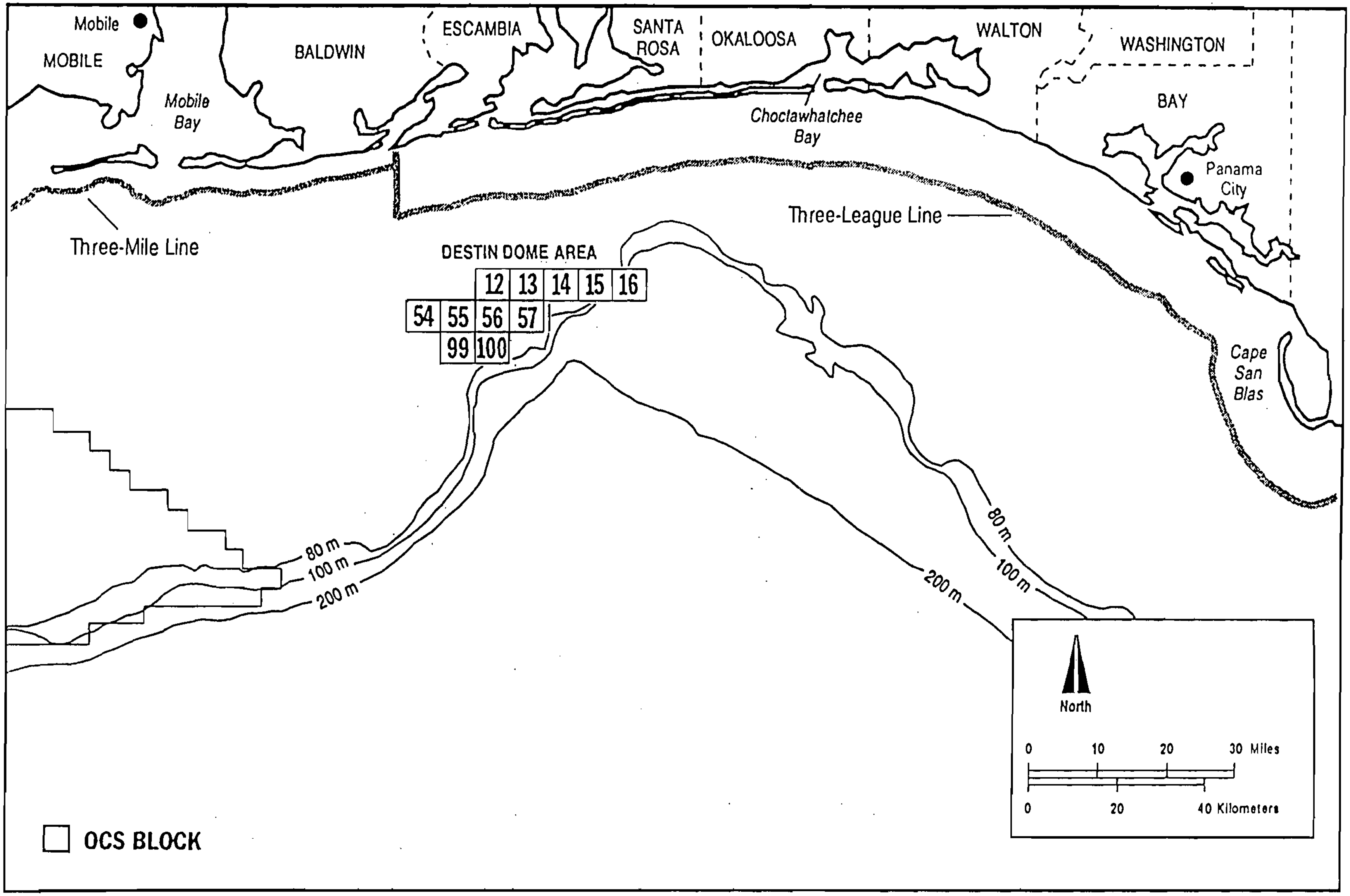


Figure 1-1
Location of Destin Dome Production Facility

Golder Associates

# 2.0 SUMMARY OF EXPLORATORY WELLS

## 2.1 BLOCK 97 WELL

On January 5, 1994, the EPA Region IV issued to Chevron a permit to operate and construct, under OCS regulations, exploratory drilling in Destin Dome Block 97. The activity was initiated on March 11, 1994, and completed on August 6, 1994. The OCS permit was based on estimated fuel usage for the activity and established limitations on emissions of various air pollutants. The primary air pollutant sources associated with this activity included the main diesel powered electric generators, auxiliary equipment consisting of cranes, compressors, mud and logging engines and emergency generators, and vessels consisting of crew boat, supply boat, and utility boat. The permitted and actual fuel usage associated with these air pollutant sources are presented in Table 2-1. As seen from this table, the actual fuel usage was about 40 percent the permitted level. The lower fuel usage resulted in lower estimated emissions compared with the permitted levels (see Table 2-2). Total emissions for the Block 97 drilling program was about 151 tons compared to about 365 tons authorized by permit (exclusive of the well test flow). Although the drilling program was authorized for 280 days, drilling could have been conducted for about 360 days without exceeding the emission limitations.

## 2.2 BLOCK 57 WELL

On June 29, 1995, the EPA Region IV issued to Chevron a permit to operate and construct, under OCS regulations, exploratory drilling in Destin Dome Block 57. The activity was initiated on November 7, 1995, and completed on April 31, 1996. The OCS permit was based on estimated fuel usage for the activity and established limitations on emissions of various air pollutants. The primary air pollutant sources associated with this activity included the main diesel powered electric generators, auxiliary equipment consisting of cranes, compressors, mud and logging engines and emergency generators, and vessels consisting of crew boat, supply boat, and utility boat. The permitted and actual fuel usage associated with these air pollutant sources are presented in Table 2-3. As seen from this table, the actual fuel usage was about 40 percent the permitted level. The lower fuel usage resulted in lower estimated emissions compared with the permitted levels (see Table 2-4). Total emissions for the Block 97 drilling program was about 149 tons compared to about 372 tons authorized by permit (exclusive of the well test flow). The drilling could have been conducted for 365 days without exceeding the emission limitations.

Table 2-1. Permitted and Actual Fuel Usage for Destin Dome Block 97 Drilling Program

| Source | Fuel Usage (gallons) | |
|---|---|---|
| | Permitted | Actual |
| Main Engines | 793,333 | 377,089 |
| Auxiliary Engines | 43,200 | 3,113 |
| Crew Boat | 92,917 | 5,830 |
| Supply Boat | 64,267 | 17,897 |
| Utility Boat | 46,790 | 9,921 |

Source: Chevron, 1994.

Table 2-2. Permitted and Estimated Actual Emissions for Destin Dome Block 97 Drilling Program

| Source | | Pollutant Emissions (TPY) | | | | |
|---|---|---|---|---|---|---|
| | | PM | $SO_2$ | $NO_x$ | CO | VOC |
| Main Engines | Permitted | 2.56 | 28.56 | 192.70 | 69.69 | 6.72 |
| | Actual | 1.22 | 13.58 | 91.59 | 33.13 | 3.19 |
| Auxiliary Engines | Permitted | 0.14 | 1.56 | 9.42 | 2.06 | 0.27 |
| | Actual | 0.01 | 0.11 | 0.68 | 0.15 | 0.02 |
| Crew Boat | Permitted | 0.80 | 3.35 | 20.57 | 2.83 | 1.12 |
| | Actual | 0.05 | 0.21 | 1.29 | 0.18 | 0.07 |
| Supply Boat | Permitted | 0.54 | 2.31 | 9.54 | 1.97 | 0.77 |
| | Actual | 0.15 | 0.64 | 2.66 | 0.55 | 0.21 |
| Utility Boat | Permitted | 0.39 | 1.69 | 3.52 | 1.43 | 0.57 |
| | Actual | 0.08 | 0.36 | 0.75 | 0.30 | 0.12 |

Note: CO = carbon monoxide.
$NO_x$ = nitrogen oxide.
PM = particulate matter.
$SO_2$ = sulfur dioxide.
VOC = volatile organic compound.

Table 2-3. Permitted and Actual Fuel Usage for Destin Dome Block 57 Drilling Program

| Source | Fuel Usage (gallons)[a] | |
|---|---|---|
| | Permitted | Actual |
| Main Engines | 870,000 | 330,680 |
| Auxiliary Engines [b] | 21,600 | 0 |
| Crew Boat | 47,959 | 13,050 |
| Supply Boat | 64,267 | 41,815 |
| Utility Boat | 29,270 | 10,770 |
| Subtotal Boats: | 141,496 | 65,635 |
| Total: | 1,033,096 | 396,315 |

[a] Numbers based on three quarters of operation - 4th quarter 1995 and 1st, 2nd quarter 1996.

[b] Auxiliary engines on the drilling rig used for Block 57 were electric powered using the electricity generated by the main engines.

Source: Chevron, 1996.

Table 2-4. Permitted and Estimated Actual Emissions for Destin Dome Block 57 Drilling Program

| Source | | Pollutant Emissions (TPY) | | | | |
|---|---|---|---|---|---|---|
| | | PM | $SO_2$ | $NO_x$ | CO | VOC |
| Main Engines | Permitted | 2.80 | 31.32 | 211.32 | 76.42 | 7.37 |
| | Actual | 1.07 | 11.91 | 80.32 | 29.05 | 2.80 |
| Auxiliary Engines | Permitted | 0.07 | 0.80 | 4.71 | 1.03 | 0.14 |
| | Actual | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Crew/Supply/Utility Boats | Permitted | 1.24 | 5.10 | 22.45 | 4.45 | 2.70 |
| | Actual | 0.58 | 2.37 | 10.41 | 2.06 | 1.25 |

Source: KBN, 1996.

# 3.0 DESCRIPTION OF OCS SOURCES AND VESSELS

The development of the Destin Dome will potentially include two drilling rigs, a central processing facility and 16 satellite platforms. These facilities are the OCS source as defined by Part 55 regulations. A flow diagram is shown in Figure 3-1. The activity will also include vessels which are used in determining the "potential-to-emit".

## 3.1 DRILLING RIG

The proposed drilling rigs in Destin Dome will involve activities that can be segregated into three primary source categories that produce air emissions: diesel engines that are used for electrical production and mechanical usage, fugitive particulate emissions related to mud preparation, and gas flaring to determine the hydrocarbon well properties (see Figure 3-2).

The types and purposes of diesel engines associated with drilling are:

- Main electric power generators--these generators typically are rated at 1,600 to 2,200 brake-horsepower (BHP). These units use about 90.3 gallons of diesel fuel per hour [about 13 million British thermal units per hour (MMBtu/hr)] at full load. These diesel-powered generators are run continuously to provide electric service for most operations on the rig. The rigs under consideration for the Destin Dome drilling typically have three engines where only two are operated at any one time. The typical loads on these engines are low (i.e., about 50 percent) to assure reliability.
- Emergency diesel-powered electric generator--generally rated at about 500 BHP. Fuel use rates are about 28 gallons per hour (3.8 MMBtu/hr). This generator is only used to supply emergency backup for the main generators.
- Cold-start diesel generator--this generator is used for initiating electric power production on the rig by energizing the other generators. This generator is small, usually rated at less than 50 BHP, with fuel use rates less than 3 gallons per hour (about 0.4 MMBtu/hr).
- Mud/logging diesel-powered generators--these engines range from about 150 to 250 BHP and are used for mud and logging operations. The nominal fuel use rate at full load for these engines is about 14 gallons per hour (about 1.9 MMBtu/hr). These

diesel engines are operated only for activities associated with mud preparation and logging.

- Miscellaneous diesel engines--these engines range from the approximate 200 BHP engines on the cranes to the diesel engines associated with the welding units and hydraulic tongs. The latter diesels use about 4 gallons of diesel fuel per hour (0.6 MMBtu). All these type engines are operated intermittently.

The typical fuel usage on a rig, the size being considered for the Destin Dome drilling activity ranges from about 2,200 to 2,800 gallons per day while operational. These fuel rates are, however, relatively constant over the operational period (see Section 2.0). The air pollutants emitted include all those commonly associated with combustion sources, such as sulfur dioxide, nitrogen oxides, carbon monoxide, etc.

The fugitive sources include particulate emissions from mud preparation and VOC emissions from painting. The mud activities involve the usage of about 400,000 pound (lb) of materials. Painting will involve using about 275 gallons of VOC-containing paints. Other VOC sources include solvent usage (maximum of 65 gallons).

The last source is the flare associated with well testing. The flare will burn/incinerate natural gas purged from the well over set periods of time and at certain rates. Air pollutants will include those associated with combustion sources. Since hydrogen sulfide can be in the well test gas, flaring must be performed for safety reasons as well. For the project, about 68 million cubic feet (MMcf) of gas is expected to be flared over a test period of approximately 148 hours. Actual flaring of gas will occur over approximately half of this time period. Butane is used as a pilot gas for the flare.

Estimating emissions from the sources associated with the drilling and exploration well in Destin Dome is confounded by two factors. First, the actual rig to be used has not been determined, resulting in some uncertainty associated with the exact equipment that may ultimately be used for the drilling. Second, even if the exact rig were known, the variability associated with each source's operation results in some uncertainties in emission estimates. However, the emission estimates took into consideration this inherent variability by estimating emissions in a conservative manner.

## 3.2 CENTRAL PROCESSING FACILITY

The central processing facility in Destin Dome will involve activities that can be segregated into two primary source categories that produce air emissions: gasoline and diesel engines that are used for electrical production and mechanical usage and gas flaring during processing.

The types and purposes of diesel engines associated with the central processing facility are:

- Main electric power generators--there are three gas turbine electric generators typically are rated at 1,171 kilowatts (kW) each (59°F turbine inlet). These units use about 18,800 cubic feet of natural gas per hour (about 17.9 MMBtu/hr) at full load. Two units usually run at full load while the third unit operates at 50 percent load. These generators are run continuously to provide electric service for most operations on the rig. The typical loads on these engines are low to assure reliability.
- Emergency diesel-powered electric generator--generally rated at about 500 BHP. Fuel use rates are about 28 gallons per hour (3.8 MMBtu/hr). This generator is only used to supply emergency backup for the main generators.
- Direct fired glycol reboiler--this boiler uses 10,900 standard cubic feet (scf) of natural gas per hour and is rated approximately 10.4 MMBtu/hr at full load.
- Low pressure, high pressure flares--these are mainly purge flares with a ratio of approximately 17.6 MMBtu/hr. These units use approximately 22,000 scf of natural gas per hour.
- Miscellaneous diesel engines--these engines range from the approximate 200 BHP engines on the cranes to the diesel engines associated with the welding units and hydraulic tongs. These diesels use about 4 gallons of diesel fuel per hour (0.6 MMBtu) when operated. All these type engines are operated intermittently.

The typical fuel usage on the central processing facility being considered for the Destin Dome area range from about 900 to 1,100 Mscf per day while operational. These fuel rates are, however, relatively constant over the operational period (see Section 2.0). The air pollutants emitted include all those commonly associated with combustion sources, such as sulfur dioxide, nitrogen oxides, carbon monoxide, etc.

The fugitive sources include VOC emissions from painting and gas venting. Painting will involve using about 275 gallons of VOC-containing paints. Other VOC sources include solvent usage (maximum of 65 gallons).

## 3.3 SATELLITE PLATFORMS

Two types of satellite platforms will be used in the Destin Dome area. There will be satellite platforms with one or two wells. The main source of emissions on a satellite platform is the gas-fired generator engine. The generator on the two-well platform is rated at 462 BHP and consumes 3,646 scf of natural gas per hour [about 3.5 MMBtu/hr] at full load. The generator on the single well platform is rated at 264 BHP and consumes 2,083 scf of natural gas per hour (about 2.0 MMBtu/hr) at full load.

The fugitive sources include VOC emissions from painting and gas venting. Painting will involve using about 275 gallons of VOC-containing paints. Other VOC sources include solvent usage (maximum of 65 gallons).

## 3.4 VESSELS

The pipe-lay barge and support boats are vessels under Part 55 and only used to determine the potential-to-emit for the activity.

### 3.4.1 PIPE-LAYING BARGE

The pipe-laying barge is a vessel and will be operating throughout all of the Destin Dome area. While operating, the pipe-lay barge moves at 1,100 meters (m) in a 24-hour period. Emissions from this source are primarily from diesel engines that are used for electrical production and mechanical usage.

- Main electric power generators--these generators are typically rated at 2,000 kilowatts (kW). These units use about 63.9 gallons of diesel fuel per hour on average and about 146 gallons of diesel fuel per hour at full load. These diesel-powered generators are run continuously to provide electric service for most operations on the barge.
- Emergency diesel-powered electric generator--generally rated at about 500 BHP. Fuel use rates are about 28 gallons per hour (3.8 MMBtu/hr). This generator is only used to supply emergency backup for the main generators.

- Miscellaneous diesel engines--these engines range from the approximate 200 BHP engines on the cranes to the diesel engines associated with the welding units and hydraulic tongs. The latter diesels use about 4 gallons of diesel fuel per hour (0.6 MMBtu).

### 3.4.2 SUPPORT VESSELS

All of the activities previously described have support vessels associated with their operation. The support vessels include a crew boat, supply boat, and utility boats. These vehicles have 2,025 BHP, 3,000 BHP, and 3,000 BHP engines, respectively. These vessels on average consume 395 gallons of diesel per hour. The crew and supply boats support the drilling rigs, central processing facility, satellite platforms, and pipe-lay barges with coordinated trips between each source. Utility boats would be associated with each source and is stationed nearby to primarily support any emergency activity associated with the platforms. A more detailed description of the support vessels are presented in the appendices.

## 3.5 AIR POLLUTANT EMISSIONS AND DEVELOPMENT

The maximum estimated potential air emissions from each facility and vessels are presented in Table 3-1. Table 3-2 presents a summary of air emissions as a function of gas field development. The development of the Destin Dome area will begin with the drilling and development of wells using two drilling rigs. The central processing facility, satellite platforms, and the pipe-lay barge will begin operation in the year 2001. With each year, additional satellite platforms will be installed and connected to the CPF. In the year 2006, it is estimated that the area will be fully developed with a drilling rig used for well re-development as needed during the course of operation. The number of satellite platforms and amount of pipeline represent the maximum predicted development for the Destin Dome area. Actual development will depend on the actual resources determined from each exploratory drilling well. If gas resources do not justify development, there will be lower potential emissions.

Table 3-1. Summary of Emissions for Emission Units and Vessels Under Worst-Case Scenario for Destin Dome

| Descriptive Name | Particulate Matter | | Sulfur Dioxide | | Nitrogen Dioxide | | Carbon Monoxide | | Total NMHC | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) |
| **OCS Source** | | | | | | | | | | |
| Drilling Rig[a] | | | | | | | | | | |
| Drilling Rig main | 1.74 | 2.80 | 19.50 | 31.32 | 131.57 | 211.32 | 47.58 | 76.42 | 4.59 | 7.37 |
| Crane & Aux | 0.26 | 0.07 | 3.00 | 0.80 | 18.17 | 4.71 | 3.96 | 1.03 | 0.53 | 0.14 |
| Well testing flare | 9.55 | 0.35 | 42.20 | 0.60 | 64.96 | 2.36 | 353.46 | 12.82 | 133.70 | 4.85 |
| Total = | 11.55 | 3.22 | 64.70 | 32.72 | 214.70 | 218.39 | 405.00 | 90.27 | 138.82 | 12.36 |
| CPF Operation[b] | | | | | | | | | | |
| Turbine Generator - Exhaust - Sour Fuel Gas, 100% | 0.32 | 1.40 | 0.28 | 1.23 | 7.82 | 34.25 | 2.16 | 9.46 | 0.62 | 2.72 |
| Turbine Generator - Exhaust - Sour Fuel Gas, 100% | 0.32 | 1.40 | 0.28 | 1.23 | 7.82 | 34.25 | 2.16 | 9.46 | 0.62 | 2.72 |
| Turbine Generator - Exhaust - Sour Fuel Gas, 50% | 0.16 | 0.70 | 0.14 | 0.61 | 3.91 | 17.13 | 1.08 | 4.73 | 0.31 | 1.36 |
| Diesel Generators - Exhaust | 0.34 | 1.48 | 1.76 | 7.70 | 10.81 | 47.34 | 2.87 | 12.57 | 0.30 | 1.33 |
| Atmospheric Flare | 0.03 | 0.14 | 0.11 | 0.46 | 0.44 | 1.91 | 2.38 | 10.38 | 0.40 | 1.73 |
| L.P. Flare 3 - (adjusted for no down time) | 0.51 | 2.28 | 4.64 | 20.30 | 3.54 | 15.45 | 19.20 | 84.06 | 7.26 | 31.80 |
| H.P. Flare - 3 | 0.0084 | 0.036 | 0.21 | 0.93 | 0.06 | 0.25 | 0.30 | 1.35 | 0.12 | 0.51 |
| Direct Fired Glycol Reboiler | 0.08 | 0.01 | 0.18 | 0.63 | 1.09 | 3.82 | 0.92 | 3.21 | 0.06 | 0.21 |
| Fugitive Emissions | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.49 | 10.84 |
| | 1.77 | 7.45 | 7.59 | 33.09 | 35.48 | 154.40 | 31.07 | 135.22 | 12.18 | 53.20 |
| Satellite Operation[b] | | | | | | | | | | |
| Platforms - Single Well | 0.02 | 0.07 | 0.02 | 0.06 | 0.87 | 3.06 | 0.87 | 3.06 | 0.12 | 0.41 |
| Double Well | 0.04 | 0.12 | 0.06 | 0.21 | 1.53 | 5.35 | 1.53 | 5.35 | 0.20 | 0.71 |
| **Vessels** | | | | | | | | | | |
| Pipe-laying Operations[c] | 8.66 | 5.72 | 19.60 | 12.94 | 144.73 | 95.52 | 16.64 | 10.98 | 6.50 | 4.29 |
| Vessel Operations[d] | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |

[a] See Table A-1 and A-2.

[b] See Tables A-4A and A-4B. (Note: for modeling purposes, uncontrolled emissions from the satellite platform engines were used. The emission rates were: 11.22 lb/hour/engine for $No_x$. This emission rate was consistent with the modeling performed for the EIS prepared for the Destin Dome development. For the gas turbine, modeling was performed using emission rates of 5.34 lb/hr for $NO_x$ and 4.65 lb/hr for CO. These emission rates reflect emissions of existing T-1500 turbines that would likely be used. These rates were also used in the EIS.

[c] Based on a maximum of 1,320 hours of operation and includes tug operations.

Example calculation for particulate matter. From Table A-3; PM = 0.76 tons/year for 175.5 hours of pipelaying (see Table A-9). PM = 0.76 TPY x 1,320 hours/175.5 hours = 5.72 TPY

[d] See Table A-3.

Note: lb/hr = pounds per hour.

Table 3-2. Summary of Annual Emissions for Destin Dome

| Year | Descriptive Name | Particulate Matter | | Sulfur Dioxide | | Nitrogen Dioxide | | Carbon Monoxide | | Total NMHC | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) | Average (lb/hr) | Annual (TPY) |
| 1 | 2 Drilling Rigs (a) | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| 2 | 2 Drilling Rigs | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| | CPF Operation for 6 Months (a) | 1.77 | 3.73 | 7.59 | 16.54 | 29.72 | 64.39 | 36.75 | 80.31 | 11.08 | 24.20 |
| | Pipelaying Barge (b) | 8.66 | 5.72 | 19.60 | 12.94 | 144.73 | 95.52 | 16.64 | 10.98 | 6.50 | 4.29 |
| | 4 satellites - 3 single, 1 double (c) | 0.095 | 0.33 | 0.11 | 0.40 | 30.45 | 106.73 | 3.85 | 13.50 | 1.23 | 4.28 |
| | Total - | 34.91 | 21.85 | 159.84 | 109.04 | 655.69 | 797.13 | 869.89 | 296.95 | 297.49 | 62.06 |
| 3 | 2 Drilling Rigs | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| | CPF Operation | 1.77 | 7.45 | 7.59 | 33.09 | 29.72 | 128.77 | 36.75 | 160.62 | 11.08 | 48.40 |
| | Pipelaying Barge | 8.66 | 5.72 | 19.60 | 12.94 | 144.73 | 95.52 | 16.64 | 10.98 | 6.50 | 4.29 |
| | 8 satellites - 6 single, 2 double | 0.19 | 0.65 | 0.22 | 0.79 | 60.90 | 213.46 | 7.70 | 27.00 | 2.46 | 8.56 |
| | Total - | 35.01 | 25.90 | 159.95 | 125.97 | 686.14 | 968.24 | 873.74 | 390.76 | 298.72 | 90.53 |
| 4 | 2 Drilling Rigs | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| | CPF Operation | 1.77 | 7.45 | 7.59 | 33.09 | 29.72 | 128.77 | 36.75 | 160.62 | 11.08 | 48.40 |
| | Pipelaying Barge | 8.66 | 5.72 | 19.60 | 12.94 | 144.73 | 95.52 | 16.64 | 10.98 | 6.50 | 4.29 |
| | 10 satellites - 7 single, 3 double | 0.25 | 0.84 | 0.30 | 1.06 | 78.53 | 275.25 | 9.93 | 34.82 | 3.17 | 11.04 |
| | Total - | 35.06 | 26.09 | 160.03 | 126.25 | 703.77 | 1,030.03 | 875.97 | 398.58 | 299.43 | 93.01 |
| 5 | 2 Drilling Rigs | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| | CPF Operation | 1.77 | 7.45 | 7.59 | 33.09 | 29.72 | 128.77 | 36.75 | 160.62 | 11.08 | 48.40 |
| | Pipelaying Barge | 8.66 | 5.72 | 19.60 | 12.94 | 144.73 | 95.52 | 16.64 | 10.98 | 6.50 | 4.29 |
| | 12 satellites - 7 single, 5 double | 0.32 | 1.08 | 0.42 | 1.49 | 100.97 | 353.89 | 12.77 | 44.78 | 4.07 | 14.20 |
| | Total - | 35.13 | 26.33 | 160.15 | 126.67 | 726.21 | 1,108.67 | 878.81 | 408.54 | 300.33 | 96.17 |
| 6 | 2 Drilling Rigs | 23.10 | 6.44 | 129.40 | 65.44 | 429.40 | 436.78 | 810.00 | 180.54 | 277.64 | 24.72 |
| | Vessel Operations | 1.29 | 5.64 | 3.13 | 13.72 | 21.39 | 93.71 | 2.65 | 11.62 | 1.04 | 4.57 |
| | CPF Operation | 1.77 | 7.45 | 7.59 | 33.09 | 29.72 | 128.77 | 36.75 | 160.62 | 11.08 | 48.40 |
| | Pipelaying Barge - 1/4 year | 8.66 | 1.43 | 19.60 | 3.23 | 144.73 | 23.88 | 16.64 | 2.75 | 6.50 | 1.07 |
| | 14 satellites - 9 single, 5 double | 0.36 | 1.22 | 0.46 | 1.61 | 113.79 | 398.83 | 14.39 | 50.46 | 4.59 | 16.00 |
| | Total - | 35.17 | 22.18 | 160.18 | 117.09 | 739.03 | 1,081.97 | 880.43 | 405.98 | 300.85 | 94.76 |
| 7 | 1 Drilling Rig | 11.55 | 3.22 | 64.70 | 32.72 | 214.70 | 218.39 | 405.00 | 90.27 | 138.82 | 12.36 |
| | Vessel Operations | 0.43 | 1.88 | 1.04 | 4.57 | 7.13 | 31.24 | 0.88 | 3.87 | 0.35 | 1.52 |
| | CPF Operation | 1.77 | 7.45 | 7.59 | 33.09 | 29.72 | 128.77 | 36.75 | 160.62 | 11.08 | 48.40 |
| | 16 satellites - 11 single, 5 double | 0.40 | 1.36 | 0.49 | 1.73 | 126.61 | 443.77 | 16.01 | 56.14 | 5.11 | 17.80 |
| | Total - | 14.14 | 13.91 | 73.83 | 72.11 | 378.16 | 822.17 | 458.65 | 310.90 | 155.36 | 80.08 |

(a) See Table 3-1 and Tables A-1 and A-2.

(b) Based on a maximum of 1,320 hours of operation and includes tug operations.
Example calculation for particulate matter. From Table A-3; PM = 0.76 tons/year for 175.5 hours of pipelaying (see Table A-9). PM = 0.76 TPY x 1,320 hours/175.5 hours = 5.72 TPY

(c) See Table A-4A and A-4B.

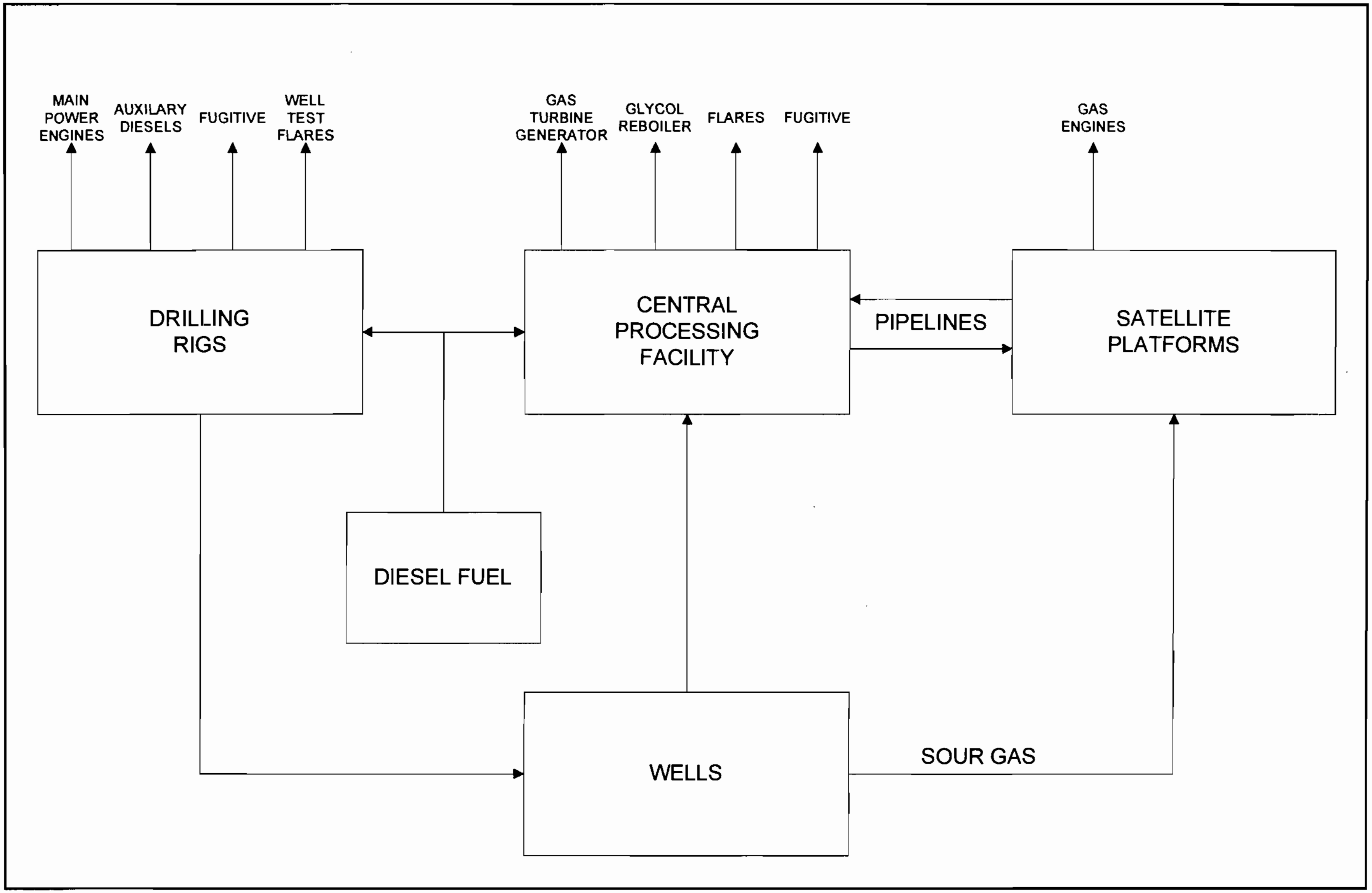
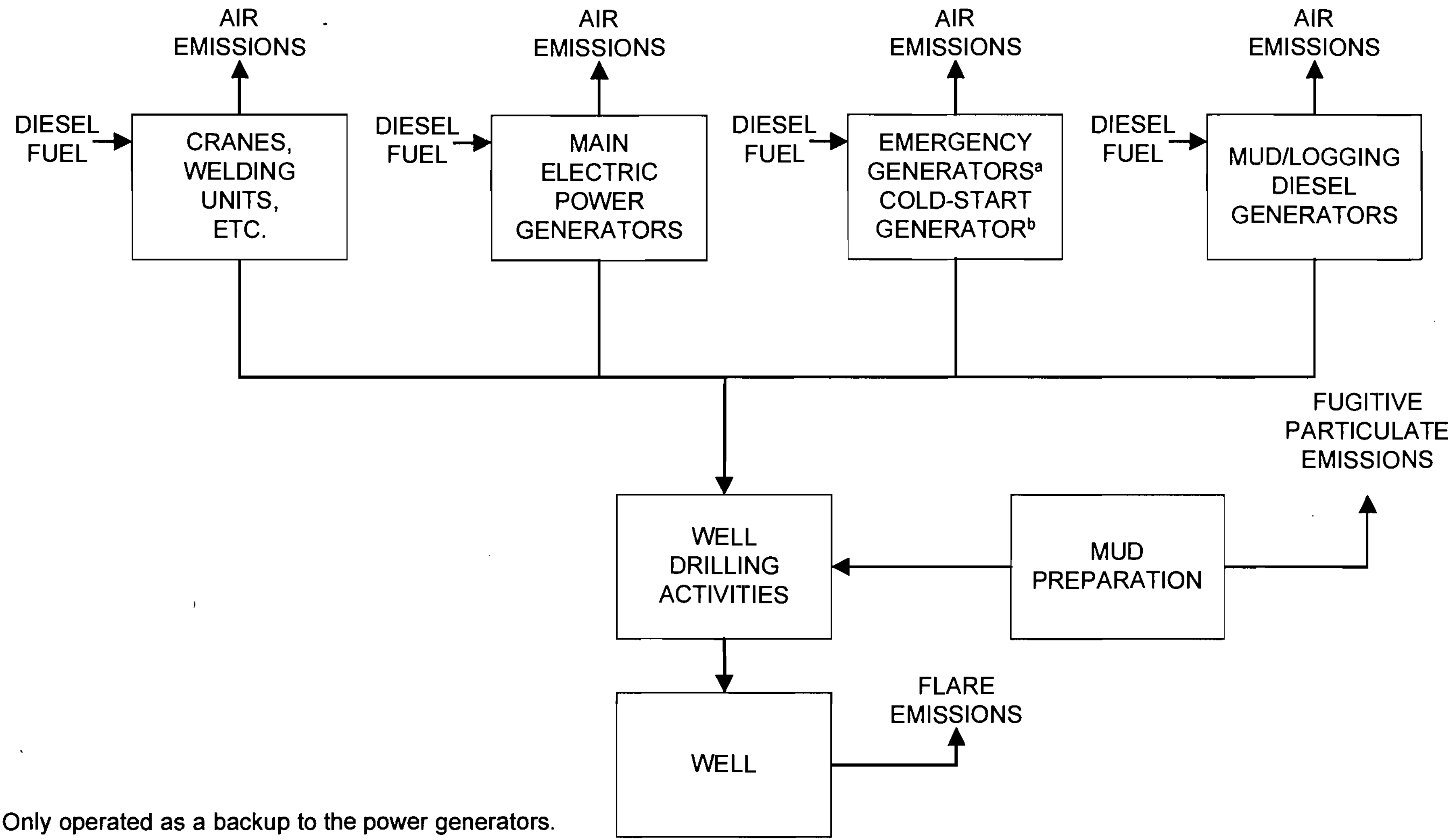


Figure 3-1
Flow Diagram of Destin Dome OCS Source

**Process Flow Legend**
Solid/Liquid ⟶
Gas - - - ->
Steam ········>

Filename: **9651116Y/F21/FIG3-1.VSD/Page1**
Date: 04/13/99

Golder Associates



[a] Only operated as a backup to the power generators.
[b].Operated for initial startup or black-start condition.

Figure 3-2
Flow Diagram of
Proposed Destin Dome Drilling Activities

**Process Flow Legend**
Solid/Liquid ⟶
Gas - - - - ->
Steam ······>

Filename: 9651116Y/F21/FIG3-1.VSD/Page2
Date: 04/13/99

# 4.0 REGULATORY APPLICABILITY

## 4.1 INTRODUCTION

The proposed OCS source associated with the exploratory drilling program in Destin Dome Block will be installed after the promulgation date of 40 CFR 55 and will be either within 25 miles of a state's (Florida) seaward boundary or just outside and within the EPA's area of jurisdiction. Therefore, Section 55.14 is applicable. As a minimum, compliance must be demonstrated with the NSPS, PSD, and NESHAPS regulations. In addition, the OCS source must not interfere with the attainment of any AAQS for which nonattainment provisions have been promulgated by the state. While state and local requirements must be met by an OCS source located within 25 miles of the state's seaward boundary, delegation must be given by EPA. Currently, the State of Florida does not have this delegation. In addition, OCS sources that are classified as "major sources" under 40 CFR 70 and 71, must obtain a federal air operating permit from either EPA or from Florida, if the source is within 25 miles of the seaward boundary. The authority for an OCS source Part 55 permit, commonly referred to as a "Title V permit", has not been delegated to Florida.

In 40 CFR 55.2, an OCS source is defined as any equipment, activity, or facility that emits or has potential to emit any air pollutant, is regulated or authorized under the Outer Continental Shelf Lands Act and is located on or in the waters above the OCS. Vessels are included in the definition if they are permanently or temporarily attached to the seabed or physically attached to an OCS facility. For the purposes of the Destin Dome development, the OCS source that will be installed will include the two drilling rigs, the CPF, and the fifteen satellite platforms.

A major stationary source, where PSD is applicable, is defined as a facility with the potential to emit 100 TPY and one of the 28 source categories, or a source with the potential to emit 250 TPY. A facility is defined as all the polluting emitting activities, which belong to the same industrial grouping are located on one or more contiguous or adjacent properties and are under the common control of the same person. For the proposed Destin Dome development, EPA Region IV has interpreted the locations of each source as contiguous and adjacent properties.

PSD/new source review is required for any major OCS source where 40 CFR 55 is applicable. A major source under federal PSD regulations is defined as any one of the 28 listed source categories that has a potential to emit 100 TPY or more, or any stationary source that has the potential to emit 250 TPY of more of any pollutant regulated under the CAA. The sources associated with the development of the Destin Dome resource are not one of the 28 listed source categories and the potential emissions from the facilities would exceed 250 TPY emissions of any regulated pollutant. Therefore, PSD/new source review (including BACT, monitoring, and modeling requirements) is applicable. It should be noted that the activities of any vessels are not included in the definition of building, structure, facility, or installation for PSD purposes [see 40 CFR 52.21(b)(6)]. Therefore, the review requirements (e.g., BACT) are not applicable to vessels.

The applications for development of the Destin Dome does not contain a request for the federal Title V permit under the federally administered program codified in 40 CFR 71. The requirements for submitting an application apply to major sources that are defined in 40 CFR 71.2 as meeting the emission or regulatory thresholds, under the common control of the same entity, and located on one or more contiguous and adjacent properties belonging to the same Standard Industrial Classification (SIC; two digit code). As discussed, definitions for contiguous and adjacent properties have been determined by EPA to have the same meaning, and the Destin Dome OCS source has been determined by EPA Region IV to be contiguous or adjacent properties. The criteria for determining applicability in the case of the proposed development is whether the OCS source emits 100 TPY of a regulated pollutant, 25 tons of total HAPs, or 10 TPY of any individual HAP. The requirement for submittal of a Title V permit application for sources is codified in 40 CFR 71.3(a)(1) and program implementation for OCS sources is codified in 40 CFR 71.4(d). Because this is an operating permit program, a permit application must be submitted within 12 months after a source commences operation.

This will be required to submit a Title V permit application to EPA (or Florida, if designation of COA is made and delegation obtained) 12 months after commencing operation. Emissions of a regulated pollutant, $NO_x$, is above 100 TPY. Because the development will occur in several stages, the Title V permit would have to be sufficiently flexible to allow the addition of emission units.

## 4.2 DRILLING RIG

### 4.2.1 NSPS

Currently, there are no applicable emission-limiting standards for large-bore diesel engines that would apply to the proposed drilling rig.

### 4.2.2 NESHAPS

The facilities associated with the proposed drilling rig do not include any facility regulated under 40 CFR 61. Therefore, NESHAPS do not apply to the proposed project.

### 4.2.3 RELOCATION

Under rules promulgated by the FDEP, allowance for relocatable facilities have been provided at 62-217.400(3)(a) F.A.C. The requirements for such a facility include:

- The duration of emissions for the facility at the new location would not exceed 2 years;
- The federally enforceable allowable emissions would not be increased at the new location, and the emissions of the facility would not have a significant impact on any Class I area or area where an applicable maximum allowable increase is known to be violated;
- The owner or operator has provided the FDEP with reasonable assurance that the emissions of the facility at the new location would not cause or contribute to a violation of AAQS; and
- The owner or operator of the facility would obtain an amendment to the operating permit prior to beginning operation at the new location identifying the new location and the duration of operation.

This regulation provides some guidance on the potential for allowing "relocatable" facilities in permitting OCS sources. The proposed activity is relocatable, and the circumstances provide an ideal mechanism for implementing relocatable provisions in the OCS permit. That is, the OCS source is located in an open area and at some distances from land areas. As a result, it is proposed that EPA consider conditions that would provide for relocation under the these terms within the Destin Dome area.

## 4.3 CENTRAL PROCESSING FACILITY

### 4.3.1 NSPS

There are two separate NSPS regulations that would apply to emission units located on the CPF. The NSPS in 40 CFR 60, Subpart GG applicable to stationary gas turbines would apply to the gas turbine electric generators. The NSPS in 40 CFR 60, Subpart Dc would apply to the glycol boiler.

The NSPS applicable to the stationary gas turbines on the CPF are codified in 40 CFR 60.330 through 60.335. These NSPS establish emission limits for $NO_x$ and $SO_2$ and require certain testing, monitoring, and record keeping. The $NO_x$ emission limits are 150 parts per million volume and dry basis (ppmvd) corrected to 15 percent oxygen with a heat rate and fuel-bound nitrogen (FBN) corrections [see 40 CFR 60.332(a)(2)]. These limits are applicable to stationary gas turbines with a heat input at peak load of between 10 and 100 MMBtu/hr. The proposed turbines have a heat input of 16 MMBtu/hr. The formula is: NSPS (ppmvd corrected to 15 percent oxygen) = 150 x 14.4/Y + F. The heat rate correction of 14.4 kilojoules per watt hour is divided by Y, which is the manufacturer's rated heat rate at low heating value (LHV) of fuel and peak load for the facility. The FBN correction (F) applies to fuel oil firing and is no applicable to the proposed project. The manufacturer's heat rate (LHV) is 14,780 Btu/kW-hr or 15.59 kJ/W-hr resulting in an NSPS of 138.5 ppmvd corrected to 15 percent oxygen (150 x 14.4/15.59). Based on the manufacturer's data, the $NO_x$ emissions at peak load will be about 90 ppmvd corrected to 15 percent oxygen and well within the NSPS limit.

The $SO_2$ standard requires that either the stack gas concentration is less than 150 ppmvd corrected to 15 percent oxygen or that the fuel sulfur content is less than 0.8 percent [40 CFR 60.333(a) and (b), respectively]. The stack gas concentration and fuel content of the unsweetened natural gas will be less than 10 ppmvd corrected to 15 percent oxygen and less than 0.1 percent, respectively. These are well within the NSPS.

The NSPS contains requirements for initial compliance testing and monitoring. Compliance testing is required to be performed within 180 days of initial operation or 90 days from maximum production. EPA Method 20 in 40 CFR 60 Appendix A. The proposed turbine will not use water injection to meet the $NO_x$ emission limits. Monitoring of operations is only required when subject to the $NO_x$ limit and using water injection to control $NO_x$ emissions (emphasis added). There are no other monitoring requirements in 60.334. Alternative monitoring methods for determining sulfur content as described in the EPA memorandum in Appendix B is requested. Presented below are the applicable NSPS for the combustion turbines.

NSPS General Requirements:
40 CFR 60.7(b) - Notification/Record keeping (startup/shutdown/malfunction)
40 CFR 60.7(f) - Notification/Record keeping (maintain records for 2 years)
40 CFR 60.8(c) - Performance Tests (representative conditions)
40 CFR 60.8(e) - Performance Tests (provide stack sampling facilities)
40 CFR 60.8(f) - Test Runs
40 CFR 60.11(a) - Compliance (ref. S. 60.8)
40 CFR 60.11(d) - Compliance (maintain air pollution control equipment)
40 CFR 60.12 - Circumvention
NSPS Subpart GG:
40 CFR 60.332(a)(2) - $NO_x$ for turbines with a heat input of 10 to 100 MMBtu/hr
40 CFR 60.333 - $SO_2$ limits (0.8 percent sulfur)
40 CFR 60.334(b)(2) - Monitoring of Operations (custom monitoring plan requested)
40 CFR 60.335 - Test Methods

The NSPS applicable to the glycol boiler, applies to steam generating units (which also includes steam, water, or other heat transfer mediums but excludes process heaters that use fuel in reactions) from 10 to 100 MMBtu heat input. The glycol heater is just above 10 MMBtu/hr and is fired with natural gas. There are no emission limits for natural gas firing. Records must be kept that natural gas is only used in the boiler. Listed below are the applicable NSPS requirements.

NSPS General:
40 CFR 60.7(f) - Notification and Record keeping (maintain records)
NSPS Subpart Dc:
40 CFR 60.48c(g) - Reporting and Record keeping (fuel usage)

Note: There are no standards of performance for Subpart Dc units using natural gas. Therefore, it is not an affected facility as defined in 40 CFR 60.2, since to be an "affected facility" under any subpart there must be an "apparatus to which a standard is applicable." Since there are no "standards", as defined in 40 CFR 60.2, applicable to natural gas firing in Subpart Dc, it is not an applicable requirement. It was listed for the purpose of completeness.

### 4.3.2 NESHAPS

The facilities associated with the proposed drilling rig do not include any facility regulated under 40 CFR 61. Therefore, NESHAPS do not apply to the proposed project.

### 4.3.3 RELOCATION

The CPF platform will not be relocated when installed. Drill rigs may be used to re-develop wells attached to the CPF.

## 4.4 SATELLITE PLATFORM

### 4.4.1 NSPS

Currently, there are no applicable emission-limiting standards for gas engines that would apply to the proposed satellite platforms.

### 4.4.2 NESHAPS

The facilities associated with the proposed drilling rig do not include any facility regulated under 40 CFR 61. Therefore, NESHAPS do not apply to the proposed project.

### 4.4.3 RELOCATION

The satellite platforms will not be relocated when installed. Drill rigs may be used to re-develop wells attached to the platforms.

# 5.0 BEST AVAILABLE CONTROL TECHNOLOGY

## 5.1 CONTROL TECHNOLOGY REVIEW REQUIREMENTS

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that BACT be applied to control emissions from the source. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the significant emission rate.

BACT is defined in 40 CFR 52.21 (b)(12), as:

> An emissions limitation (including a visible emission standard) based on the maximum degree of reduction of each pollutant subject to regulation under the Act which would be emitted by any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice, or operation and shall provide for compliance by means which achieve equivalent results.

BACT was promulgated within the framework of the PSD requirements in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (EPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in EPA's *Guidelines for Determining Best Available Control*

*Technology (BACT)* (EPA, 1978) and in the *PSD Workshop Manual* (EPA, 1980). These guidelines were promulgated by EPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to EPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with new source performance standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

Historically, a "bottom-up" approach consistent with the BACT Guidelines and PSD Workshop Manual has been used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected. However, EPA developed a concern that the bottom-up approach was not providing the level of BACT decisions originally intended. As a result, in December 1987, the EPA Assistant Administrator for Air and Radiation mandated changes in the implementation of the PSD program, including the adoption of a new "top-down" approach to BACT decision making.

The top-down BACT approach essentially starts with an evaluation of the most stringent (or top) available technology and emissions limit that have been applied elsewhere to the same or a similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose to use it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic, or energy impacts. The differences between the proposed facility and the facility on which the control technique was applied previously must be justified as being "inappropriate". EPA has issued a draft guidance document on the top-down approach entitled *Top-Down Best Available Control Technology Guidance Document* (EPA, 1990).

## 5.2 EMISSION UNITS AND POLLUTANTS SUBJECT TO BACT

The proposed project will have several types of emission units for which a BACT analysis is required. These emission units are:

- CPF Combustion Turbines
- Satellite Gas Engines
- Drilling Rig Main Engines
- Direct Fired Glycol Reboiler
- Flares
- Miscellaneous Diesel Engines

As shown in Table 3-2, PSD including a determination of BACT, is applicable to the emissions of nitrogen oxides, carbon monoxide, volatile organic compounds, sulfur dioxide, particulate matter (PM) and $PM_{10}$. Tables 5-1 and 5-2 presents a listing of the lowest achievable emission rates/best available control technology (LAER/BACT) decisions made by state environmental agencies and EPA regional offices for gas turbines and engines. These tables were developed from the information obtained from BACT/LAER Information System (BLIS) database maintained at EPA's National Computer Center located at Research Triangle Park, North Carolina.

It must be recognized that LAER is distinctly different from BACT in that there is no consideration of economic, energy, or environmental impacts; if a control technology has previously been installed, it must be required as LAER. LAER is defined as follows:

> Lowest achievable emission rate means, for any source, the more stringent rate of emissions based on the following: (i) The most stringent emissions limitation which is contained in the implementation plan of any State of such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or (ii) The most stringent

emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within the stationary source. In no event shall the application of this term permit a proposed new modified stationary source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance (40 CFR 51, Appendix S.II, A.18).

There are distinct regulatory and policy differences between LAER and BACT. The BACT evaluation is presented in the following sections.

## 5.3 NITROGEN OXIDES

### 5.3.1 IDENTIFICATION OF NO$_X$ CONTROL TECHNOLOGIES

NO$_x$ emissions from combustion of fossil fuels consist of thermal NO$_x$ and fuel-bound NO$_x$. Thermal NO$_x$ is formed from the reaction of oxygen and nitrogen in the combustion air at combustion temperatures. Formation of thermal NO$_x$ depends on the flame temperature, residence time, combustion pressure, and air-to-fuel ratios in the primary combustion zone. The design and operation of the combustion chamber dictates these conditions. Fuel-bound NO$_x$ is created by the oxidation of volatilized nitrogen in the fuel. Nitrogen content in the fuel is the primary factor in its formation.

As discussed in Section 5.1, BACT involves an evaluation of the economic, environmental, and energy impacts of alternative control technologies. In contrast, LAER only considers the technical aspects of control. For the emission units subject to BACT the following are potential control technologies:

- CPF Combustion Turbines - Wet Injection, Dry Low NO$_x$ Combustors, Selective Catalytic Reduction (SCR) and SCONO$_x$.
- Satellite Gas Engines - Engine Adjustments, non-selective catalytic reduction (NSCR) and SCR
- Drilling Rig Main Engines -_Engine Adjustments, SCR and NSCR
- Direct Fired Glycol Reboiler - Low NO$_x$ Burners, SCR and Selective Non Catalytic Reduction (SNCR)
- Flares - Proper operation and maintenance.
- Miscellaneous Diesel Engines - Proper operation and maintenance.

The control technologies include both combustion controls to reduce the amount $NO_x$ of formed in the combustion process and add-on controls to remove (or convert) $NO_x$ in the flue gas. The combustion controls include wet injection, DLN and engine adjustments; the add on controls include SCR, SNCR, NSCR and $SCONO_x$.

## 5.3.2 TECHNOLOGY DESCRIPTION

### 5.3.2.1 Wet Injection

The injection of water or steam in the combustion zone of CTs reduces the flame temperature with a corresponding decrease of $NO_x$ emissions. The amount of $NO_x$ reduction possible depends on the combustor design and the water-to-fuel ratio employed. An increase in the water-to-fuel ratio will cause a concomitant decrease in $NO_x$ emissions until flame instability occurs.

Wet injection historically has been the primary method of reducing $NO_x$ emissions from CTs. This method of control was first mandated by the NSPS to reduce $NO_x$ levels to 75 parts per million by volume, dry (ppmvd) (corrected to 15 percent $O_2$ and heat rate) for large (100 mmBtu/hr) stationary electric utility gas turbines. For the small turbines, (10 to 100 mmBtu/hr) $NO_x$ levels of 150 parts per million by volume, dry (ppmvd) (corrected to 15 percent $O_2$ and heat rate) is required and can generally be met without water injection. Development of improved wet injection combustors reduced $NO_x$ concentrations to 25 ppmvd (corrected to 15 percent $O_2$) when burning natural gas.

### 5.3.2.2 Dry Low-$NO_x$ Combustor and Low $NO_x$ Burners

In the past several years, CT manufacturers have offered and installed machines with dry low-$NO_x$ combustors. These combustors, which are offered on conventional machines manufactured by Westinghouse, GE, Siemens, ABB and Solar can achieve $NO_x$ concentrations of 25 ppmvd or less when firing natural gas. Thermal $NO_x$ formation is inhibited by using combustion techniques where natural gas and combustion air is premixed before ignition.

Low $NO_x$ burners (LBN) reduces $NO_x$ formation by inducing staged combustion in burners for steam generators. This is accomplished by through the creation of fuel rich and lean zones in the central and outer portions of the flame, respectively. Thermal $NO_x$ formation is limited by the reduced flame temperature.

### 5.3.2.3 Engine Adjustments and Tuning

Engine adjustments and tuning can be made to reduce emissions of $NO_x$. Typical techniques for diesel engines include derating and ignition retard. Derating is operating the engine at lower than the rated power output. Ignition retard is a method to change the timing in order to "retard or delay " the time of ignition which reduces the time that combustion occurs at higher temperatures. While ignition retard is specific to each machine, a 20 percent reduction can be accomplished. However, increases in CO will occur.

For natural gas engines, the carburetor can be adjusted to affect the emissions of $NO_x$. Reduction of over 60 percent can be obtained with such adjustment with concomitant increases in CO.

In all cases, engine adjustments can reduce the efficiency of the engine requiring more fuel for operation under the same load conditions.

### 5.3.2.4 Selective Catalytic Reduction (SCR)

SCR uses ammonia ($NH_3$) to react with $NO_x$ in the gas stream in the presence of a catalyst. $NH_3$, which is diluted with air to about 5 percent by volume, is introduced into the gas stream at reaction temperatures between 600°F and 750°F. The reactions are as follows:

$$4NH_3 + 4NO + O_2 = 4N_2 + 6H_2O$$

$$4NH_3 + 2NO_2 + O_2 = 3N_2 + 6H_2O$$

SCR is a potential control technology for combustion turbines, diesel engines, natural gas engines and boilers.

Operating experience, as applied to gas turbines, consists primarily of baseload natural-gas-fired installations either of cogeneration or combined cycle configuration; few simple cycle facilities have SCR. Exhaust gas temperatures of simple cycle CTs generally are in the range of 1,000°F, which exceeds the optimum range for SCR with base metal catalysts. All current SCR applications have the catalyst placed in the HRSG to achieve proper reaction conditions. This allows a relatively constant temperature for the reaction of $NH_3$ and $NO_x$ on the catalyst surface.

The use of SCR has been limited to facilities that burn natural gas or small amounts of fuel oil since SCR catalysts are contaminated by sulfur-containing fuels (i.e., fuel oil). For most fuel-oil-burning facilities, catalyst operation is discontinued, or the exhaust bypasses the SCR system. While the operating experience with SCR has not been extensive, certain cost, technical, and environmental considerations have surfaced for units firing both natural gas and oil while using SCR.

Ammonium salts (ammonium sulfate and bisulfate) are formed by the reaction of $NH_3$ and sulfur combustion products. Ammonium bisulfate can be corrosive and could cause damage to the HRSG surfaces that follow the catalyst, as well as to the stack. Corrosion protection for these areas would be required with concomitant cost and technical requirements. Ammonium sulfate is emitted as particulate matter. While the formation of ammonium salts is primarily associated with oil firing, sulfur combustion products from natural gas also could form small amounts of ammonium salts.

Zeolite and specially designed high temperature catalysts, which are reported to be capable of operating in temperature ranges up to 1,100°F, have become available commercially only recently. Their application with SCR primarily has been limited to internal combustion engines. Optimum performance of an SCR system using a zeolite catalyst is reported to range from about 800°F to 900°F. At temperatures of 1,100°F and above, the high-temperature catalyst will be irreparably damaged. Application of an SCR system using a zeolite catalyst would be feasible for the project; however, use in simple cycle operation will require monitoring to assure the temperature limits are not exceeded. If temperatures are exceeded then exhaust gas cooling would be required.

The replacement of the SCR catalyst will create additional economic and environmental impacts since certain catalysts contain materials that are listed as hazardous chemical wastes under Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). In addition, SCR will require the construction and maintenance of storage vessels of anhydrous or aqueous ammonia for use in the reaction. Ammonia has a number of potential health effects, and the construction of ammonia storage facilities triggers the application of at least three major standards: Clean Air Act (section 112), Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000, and OSHA 29 CFR 1910.119.

At elevated temperatures, ammonia may contribute to instability and cause containers to burst (ammonia will auto-ignite at a temperature of approximately 100° F). It is incompatible with strong oxidizers, calcium, hypochlorite bleaches, gold, mercury, halogens, and silver. Liquid ammonia will corrode some forms of plastic, rubber, and coatings. Ammonia is a severe irritant of the eyes, especially the cornea, the respiratory tract, and the skin. It is detectable at about 5 ppm and causes respiratory irritation in humans above 25 ppm. The irritating effects of ammonia are less noticeable with chronic exposure.

As a strong alkali, ammonia can cause severe burns of the cornea and the effects are often delayed. Even burns that at the time of injury appear to be mild can go on to opacification, vascularization, and ulceration or perforation. Of all the alkali compounds that cause eye damage, ammonia penetrates the cornea the most rapidly, resulting in potentially severe damage to the cornea. Because ammonia is very soluble in water, it is irritating to the upper respiratory tract. Inhalation of the gas will cause throat and nose irritation and dyspnea as aqueous ammonia is formed. Liquid anhydrous ammonia will cause first and second degree burns on contact with the skin.

Historically, the most stringent $NO_x$ controls for CTs established as LAER/BACT by state agencies were selective catalytic reduction (SCR) with wet injection and wet injection alone. When SCR has been employed, wet injection is used initially to reduce $NO_x$ emissions. However, advanced dry low-$NO_x$ technology has been developed and used with SCR on combined cycle projects.

SCR has been installed or permitted in over 100 projects. The majority of these projects (more than 90 percent) are cogeneration facilities with capacities of 50 MW or less. About 80 percent of the projects have been in California. Of the projects that have either installed SCR or have been permitted with SCR, about 40 percent have been in the Southern California $NO_2$ nonattainment area or the Northeast Ozone Transport Region (NOTR) where SCR was required not as BACT but as LAER, a more stringent requirement. All the projects in California have natural gas as the primary fuel, and only a small percentage of the SCR applications have distillate fuel as backup.

The projects with SCR located in the eastern United States are primarily in Vermont, Massachusetts, Connecticut, New Jersey, New York, Rhode Island, and Virginia. A majority of these projects are cogenerators or independent power producers. The only SCR application in Florida is the Florida Power Corporation Hines Energy Complex which uses DLN and SCR to achieve 12 ppmvd on 2 Westinghouse 501F turbines (nominal 170 MW). The size of these projects ranges from 22 MW to 450 MW, with nearly 90 percent less than 100 MW in size. While almost all of the facilities have distillate oil as backup fuel, distillate oil generally is restricted by permit to 1,000 hours or less per CT.

Reported and permitted $NO_x$ removal efficiencies of SCR range from 40 to 80 percent of $NO_x$ in the exhaust gas stream. The most common emission limiting standards associated with SCR is approximately 9 ppm for natural gas firing. However, a few facilities have reported emission limits of about 3.5 ppm. These emission limits were clearly determined to be LAER on CTs with uncontrolled $NO_x$ levels below 42 ppm using DLN or water injection.

The installation of SCR has primarily been on combined cycle units where the catalyst is located in the HRSG at the proper temperature range. SCR has been installed on two simple cycle projects in California and one in Puerto Rico. A high temperature catalyst is required for these applications and is more than 2 times more costly than conventional base metal catalysts that are installed in a HRSG. While manufacturers guarantee the high temperature catalysts for 3 years, operating experience at temperatures above 1,000° F is limited. Continuous exposure at these elevated temperatures suggests a more limited life of the SCR system.

### 5.3.2.5 SCONOxTM

$SCONO_x^{TM}$ is a $NO_x$ and CO control system exclusively offered by Goal Line Environmental Technologies (GLET). GLET is a partnership formed by Sunlaw Energy Corporation and Advanced Catalyst Systems, Inc.

The $SCONO_x^{TM}$ system employs a single catalyst to simultaneously oxidize CO to $C0_2$ and NO to $N0_2$. $N0_2$ formed by the oxidation of NO is subsequently absorbed onto the catalyst surface through the use of a potassium carbonate absorber coating. The $SCONO_x^{TM}$ oxidation/absorption cycle reactions are:

$$CO + 1/2\ O_2 \Rightarrow CO_2 \qquad (1)$$

$$NO + 1/2\ O_2 \Rightarrow NO_2 \qquad (2)$$

$$2NO_2 + K_2CO_3 \Rightarrow CO_2 + KNO_2 + KNO_3 \qquad (3)$$

$CO_2$ produced by reaction (1) and (2) is released to the atmosphere as part of the CT/HRSG exhaust gas stream.

As shown in Reaction (3), the potassium carbonate catalyst coating reacts with $NO_2$ to form potassium nitrites and nitrates. Prior to saturation of the potassium carbonate coating, the catalyst must be regenerated. This regeneration is accomplished by passing a dilute hydrogen-reducing gas across the surface of the catalyst in the absence of $O_2$. Hydrogen in the reducing gas reacts with the nitrites and nitrates to form water and elemental nitrogen. $CO_2$ in the regeneration gas reacts with potassium nitrites and nitrates to form potassium carbonate; this compound is the catalyst absorber coating present on the surface of the catalyst at the start of the oxidation/absorption cycle. The $SCONO_x^{TM}$ regeneration cycle reaction is:

$$KNO_2 + KNO_3 + 4\ H_2 + CO_2 \Rightarrow K_2CO_3 + 4\ H_2O_{(g)}) + N_2 \qquad (4)$$

Water vapor and elemental nitrogen are released to the atmosphere as part of the CT/HRSG exhaust stream. Following regeneration, the $SCONO_x^{TM}$ catalyst has a fresh coating of potassium carbonate, allowing the oxidation/absorption cycle to begin again. There is no net gain or loss of potassium carbonate after both the oxidation/absorption and regeneration cycles have been completed.

Since the regeneration cycle must take place in an oxygen-free environment, the section of catalyst undergoing regeneration is isolated from the exhaust gas stream using a set of louvers. Each catalyst section is equipped with a set of upstream and downstream louvers. During the regeneration cycle, these louvers close and valves open allowing fresh regeneration gas to enter and spent regeneration gas to exit the catalyst section being regenerated. At any given time, 75 percent of the catalyst sections will be in the oxidation/absorption cycle, while 25 percent will be in regeneration mode. A regeneration cycle is typically set to last for 3 to 5 minutes.

Regeneration gas is produced by reacting natural gas with $O_2$ present in ambient air. The $SCONO_x^{TM}$ system uses a gas generator produced by Surface Combustion. This unit uses a two-stage process to produce hydrogen and carbon dioxide. In the first stage, natural gas and ambient air are reacted across a partial oxidation catalyst at 1,900°F to form CO and hydrogen. Steam is added and the gas mixture is then passed across a low temperature shift catalyst, forming $CO_2$ and additional hydrogen. The resulting gas stream is diluted to less than 4 percent hydrogen using steam or another inert gas. The regeneration gas reactions are:

$CH_4 + 1/2\ O_2 + 1.88\ N_2 \Rightarrow CO + 2\ H_2 + 1.88\ N_2$ (5)

$CO + 2\ H_2 + H_2O + 1.88\ N2_2 \Rightarrow CO_2 + 3\ H_2 + 1.88\ N_2$ (6)

The $SCONO_x^{TM}$ operates at a temperature range of 300 to 700°F and, therefore, must be installed in the appropriate temperature section of a HRSG. For $SCONO_x^{TM}$ systems installed in locations of the HRSG above 500°F, a separate regeneration gas generator is not required. Instead, regeneration gas is produced by introducing natural gas directly across the $SCONO_x^{TM}$ catalyst that reforms the natural gas.

The $SCONO_x^{TM}$ system catalyst is subject to reduced performance and deactivation due to exposure to sulfur oxides. For this reason, an additional catalytic oxidation/absorption system ($SCONO_x^{TM}$) to remove sulfur compounds is installed upstream of the $SCONO_x^{TM}$ catalyst. During regeneration of the $SCONO_x^{TM}$ catalyst, either hydrogen sulfide or $S0_2$ is released to the atmosphere as part of the CT/HRSG exhaust gas stream. The absorption portion of the $SCONO_x^{TM}$ process is proprietary. $SCONO_x^{TM}$ oxidation/absorption and regeneration reactions are:

$CO + 1/2\ O_2 \Rightarrow CO_2$ (7)

$SO_2 + 1/2\ O_2 \Rightarrow SO_3$ (8)

$SO_3 + SORBER \Rightarrow [SO_3 + SORBER]$ (9)

$[SO_3 + SORBER] + 4\ H_2 \Rightarrow H_2S + 3\ H_2O$ (10)

Utility materials needed for the operation of the $SCONO_x^{TM}$ control system include ambient air, natural gas, water, steam, and electricity. The primary utility material is natural gas used for regeneration gas production. Steam is used as the carrier/dilution gas for the regeneration gas. Electricity is required to operate the computer control system, control valves, and louver actuators.

Commercial experience to date with the $SCONO_x^{TM}$ control system is limited to one small combined cycle (CC) power plant located in Los Angeles. This power plant, owned by GLET partner Sunlaw Energy Corporation, utilizes a GE LM2500 turbine equipped with water injection to control $NO_x$ emissions to approximately 25 ppmvd. The $SCONO_x^{TM}$ control system was installed at the Sunlaw Energy facility in December 1996 and has achieved a $NO_x$ exhaust concentration of 3.5 ppmv resulting in an approximate 85 percent $NO_x$ removal efficiency.

### 5.3.2.6 $NO_x$OUT Process

The $NO_x$OUT process originated from the initial research by the Electric Power Research Institute (EPRI) in 1976 on the use of urea to reduce $NO_x$. This process is referred to as Selective Non-Catalytic Reduction (SNCR). EPRI licensed the proprietary process to Fuel Tech, Inc., for commercialization. In the $NO_x$OUT process, aqueous urea is injected into the flue gas stream ideally within a temperature range of 1,600°F to 1,900°F. In the presence of oxygen, the following reaction results:

$$CO(NH_2)_2 + 2NO + \frac{1}{2} O_2 \dashrightarrow 2N_2 + CO_2 + 2H_2O \qquad (11)$$

The amount of urea required is most cost-effective when the treatment rate is 0.5 to 2 moles of urea per mole of $NO_x$. In addition to the original EPRI urea patents, Fuel Tech claims to have a number of proprietary catalysts capable of expanding the effective temperature range of the reaction to between 1,600°F and 1,950°F. Advantages of the system are as follows:

- Low capital and operating costs as a result of use of urea injection, and
- The proprietary catalysts used are nontoxic and nonhazardous, thus eliminating potential disposal problems.

Disadvantages of the system are as follows:

- Formation of ammonia from excess urea treatment rates and/or improper use of reagent catalysts, and
- Sulfur trioxide ($SO_3$), if present, will react with ammonia created from the urea to form ammonium bisulfate, potentially plugging the cold end equipment downstream.

Commercial application of the $NO_x$OUT system is limited to three reported cases:

- Trial demonstration on a 62.5-ton-per-hour (TPH) stoker-fired wood waste boiler with 60 to 65 percent $NO_x$ reduction,
- A 600 x $10^6$ Btu CO boiler with 60 to 70 percent $NO_x$ reduction, and
- A 75-MW pulverized coal-fired unit with 65 percent $NO_x$ reduction.

The $NO_x$OUT process is not technically feasible for combustion turbines, internal combustion engines or small boilers because of the high application temperature of 1,600°F to 1,950°F. The maximum exhaust gas temperature of the 501G CT is about 1,000°F. Raising the exhaust temperature the required amount essentially would require installation of heating. This would be economically prohibitive and would result in an increase in fuel consumption, an increase in the volume of gases that must be treated by the control system, and an increase in uncontrolled air emissions, including $NO_x$.

### 5.3.2.7 Thermal $DeNO_x$

Thermal $DeNO_x$ is Exxon Research and Engineering Company's patented process for $NO_x$ reduction. The process is a high temperature selective noncatalytic reduction (SNCR) of $NO_x$ using ammonia as the reducing agent. Thermal $DeNO_x$ requires the exhaust gas temperature to be above 1,800°F. However, use of ammonia plus hydrogen lowers the temperature requirement to about 1,000°F. For some applications, this must be achieved by additional firing in the exhaust stream before ammonia injection.

The only known commercial applications of Thermal $DeNO_x$ are on heavy industrial boilers, large furnaces, and incinerators that consistently produce exhaust gas temperatures above 1,800°F. There are no known applications on or experience with CTs. Temperatures of 1,800°F require alloy materials constructed with very large piping and components since the exhaust gas volume would be increased by several times. As with the $NO_xOUT$ process, high capital, operating, and maintenance costs are expected because of material requirements, an additional duct burner system, and fuel consumption. Uncontrolled emissions would increase because of the additional fuel burning.

Thus, the Thermal $DeNO_x$ process, similar to the $NO_xOUT$ process, is not technically feasible for combustion turbines, internal combustion engines and small boilers. The maximum exhaust gas temperature of these units is typically about 1,000°F; the cost to raise the exhaust gas to such a high temperature is prohibitively expensive.

### 5.3.2.8 Nonselective Catalytic Reduction

Certain manufacturers, such as Engelhard and Miratech, market a nonselective catalytic reduction system (NSCR) for $NO_x$ control on reciprocating engines having relatively low oxygen levels (i.e., less than 1 percent oxygen, dry). The NSCR process requires a low oxygen content in the exhaust gas stream and high temperature (700°F to 1,400°F) in order to be effective. The catalytic converters also require fuels with a minimum of sulfur content such as gasoline or pipeline quality natural gas. CTs have the required temperature but also have high oxygen levels (greater than 12 percent) and, therefore, cannot use the NSCR process. As a result, NSCR is not a technically feasible add-on $NO_x$ control device for CTs or boilers.

### 5.3.3 BACT EVALUATION

#### 5.3.3.1 CPF Turbines

Since the mid to late 1970s, injection of water or steam in the combustion zone of CTs has been used to reduce the flame temperature with a corresponding decrease of $NO_x$ emissions. The amount of $NO_x$ reduction possible depends on the combustor design and the water-to-fuel ratio employed. An increase in the water-to-fuel ratio will cause a concomitant decrease in $NO_x$ emissions until flame instability occurs. The $NO_x$ emission level when firing natural gas is generally limited to 25 ppmvd (corrected to 15% $O_2$).

For the Destin Dome development, three Solar Saturn T-1500 turbines will be installed. The maximum emission rates of these turbines are 110 ppmvd at 15 percent oxygen dry. Water injection systems are only available for new T-1500 turbines; existing turbines may be used in the Destin Dome development. Water injection can limit $NO_x$ emissions from new turbines to 42 ppmvd corrected to 15-percent oxygen.

Dry low-$NO_x$ combustor technology has recently been offered and installed by manufacturers to reduce $NO_x$ emissions by inhibiting thermal $NO_x$ formation through premixing fuel and air prior to combustion and providing staged combustion to reduce flame temperatures. $NO_x$ emissions ranging from 25 ppmvd (corrected to 15-percent $O_2$) and less has been offered by manufacturers for combustion turbines. As with the water injection systems, the manufacturer of the proposed turbine does not offer DLN for this size of turbine. DLN is only available for larger Solar CTs, such as the Taurus models, which start at 4000 hp.

SCR is a post-combustion process where $NO_x$ in the gas stream is reacted with ammonia in the presence of a catalyst to form nitrogen and water. The reaction occurs typically between 600°F and 750°F, which has limited SCR application to large combined cycle units where such temperatures occur in the heat recovery steam generator (HRSG).

The proposed project will include heat recovery from the turbines. However, the heat recovery system is much smaller than larger turbines and cannot accommodate a catalyst. Moreover, SCR is not considered feasible given the risk of handling and storage ammonia (both vessel transport and CPF) in an offshore environment. SCR has not been used in offshore environments even in non-attainment areas.

Potential consequences of a minor spill of either aqueous or anhydrous ammonia in the CPF would exceed the Emergency Response Planning Guideline, Level 2 (ERPG-2), as developed by the American Industrial Hygiene Association (AIHA). The ERPG-2 level is the maximum concentration below which all nearby individuals could be exposed for up to 1 hour without experiencing or developing irreversible or serious health effects that could impair their abilities to take protective action. Spills of 10 to 40 lb/min would exceed the ERPG-2 level at 0.1 mile, or the entire CPF platform. There is little opportunity to escape a platform other than the emergency pods and standby boats available near the platform.

Applications of SCR with sulfur bearing fuels are limited. Where sulfur-bearing fuels have been used, impacts have occurred to the catalyst and heat recovery surfaces due to ammonium salt formation. Catalyst manufacturers generally have a 30 to 40 percent premium per $NO_x$ reduction guarantee when firing sulfur-bearing fuels. The CTs will utilize sour gas, which may contain up to 100-ppm hydrogen sulfide or equivalent to 0.02 lb/mmBtu sulfur dioxide emission rate. The drilling rig main power engines will use diesel fuel. Ammonium salts (ammonium sulfate and ammonium bisulfate) are formed by the reaction of sulfur oxides in the gas stream and ammonia. These salts are highly acidic, and special precautions in materials and ammonia injection rates must be implemented to minimize their formation. Ammonia injected in the SCR system that does not react with $NO_x$ is emitted directly and referred to as ammonia slip. In general, SCR manufacturers guarantee ammonia slip to be no more than 10 ppmvd; however, permitted limits in some applications have exceeded 25 ppmvd.

A technical evaluation of available post-combustion gas controls (i.e., $NO_x$OUT, Thermal De$NO_x$, SCON$O_x^{TM}$ and NSCR) indicates that these processes have not been applied to turbines and are technically infeasible for the project because of process constraints (e.g., temperature).

Presented in Table 5-3 is a cost effectiveness evaluation of installing and operating water injection on the proposed gas turbines. The cost only considers new Solar Saturn T-1500 gas turbines, which are available with water injection. Chevron has existing gas turbines that could be used. Using new turbines would increase cost effectiveness shown in Table 5-3. For water injection to properly function demineralized water is required. In an offshore environment two stages of water treatment is required. First, seawater must be treated to produce potable water. For the proposed project a reverse osmosis unit could be used. Second, potable water must be de-mineralized (i.e., de-ionized). This can be accomplished using de-ionizer (i.e., ion exchange) trains or skids. The de-ionizing skids are self-contained and allow the production of the ion-free water for injection directly into the turbine.

The capital costs reflect the addition of water injection equipment for the turbine, installation of a reverse osmosis (RO) unit and construction of adequate deck space for the equipment. Two RO trains are required since the isolated location requires a backup for the de-ionizing trains. The operation costs include reverse osmosis cartridges and filters and de-ionizing skids. Each de-ionizing skid can make up to 6,000 gallons of de-ionized water before regeneration. Regeneration of each de-ionizing skid would occur on-shore. This would allow the exchange of de-ionizing chemicals and treatment of wastewater. Operation costs also included additional personnel to change out skids (one skid per 20 hours of operation) and servicing of the RO unit.

As shown in Table 5-3, the cost effectiveness is $16,168, which is considerable higher than the cost for other BACT determinations. Indeed, in Florida, cost effectiveness of greater than $10,000 per ton of $NO_x$ removed is considered in appropriate and unreasonable as BACT. Moreover, the costs shown are for new Saturn Solar T-1500 turbines. Existing equipment will likely be used from Chevron's existing supplies. Water injection is not available for existing turbines and the additional costs for new machines would be higher than that shown in Table 5-3. The RO unit would have a wastewater discharge of concentrated seawater. No wastewater discharge would occur from the de-ionizing trains.

The proposed BACT for the CPF turbines is the standard combustors available for the turbines. The emission level is about 70 percent of the applicable NSPS at full rating. Since the turbines are typically operated at less than full load, $NO_x$ emissions are expected to be even lower.

### 5.3.3.2 Satellite Gas Engines

Engine tuning and adjustment are technically feasible for the satellite gas engines. Typical $NO_x$ emissions range from 20 grams/hp-hr at the best economy setting to 8.5 grams/hp-hr for the lowest manifold setting. While fuel economy does change, the use of natural gas generated by the development has a limited influence on the economics of a particular engine setting.

A technical evaluation of available post-combustion gas controls (i.e., $NO_x$OUT, Thermal $DeNO_x$, and $SCONO_x$™ ) indicates that these processes have not been applied to gas engines and are technically infeasible for the project because of process constraints (e.g., temperature).

SCR is also not considered feasible given the risk of handling and storage ammonia (both vessel transport and CPF) in an offshore environment. SCR has not been used in offshore environments.

The installation of a catalytic converter (i.e., NSCR) is technically feasible for the proposed installation of natural gas engines in the satellite platforms. The catalysts that can be installed are similar to the installation of mufflers with flanged end connections. They operate at 750 to 1,200°F and reduce $NO_x$ concentrations by about 90 percent. The catalysts also reduce CO and VOCs by 85 and 50 percent, respectively. To achieve the appropriate control levels the engines have to be tuned so that $NO_x$ and CO concentrations are approximately equal. The capital costs of the systems are estimated at $11,800 per engine. This costs includes a spare catalyst for maintenance and cleaning. The systems require cleaning by the manufacturer every 2 years and catalyst replacement every 4 years. These operating costs are estimated to be about $1,000 per year. The cost effectiveness is estimated to be about $300 per ton of $NO_x$ removed based on the lowest manifold setting. When other pollutants are considered, the cost effectiveness ranges from about $50 to $120 per ton of pollutant removed. The cost effectiveness calculations are summarized in Table 5-4.

The catalytic converter systems cannot be rejected as BACT based on economic impacts. The energy and environmental impacts associated with the catalytic converters are minimal given the recycling of the catalyst back to the manufacturer and small influence on the energy usage of the development. The use of catalytic converters for the gas engines is proposed as BACT.

### 5.3.3.3 Drill Rig Main Engines

Engine tuning and adjustments are technically feasible for the main power engines. A $NO_x$ reduction of 20 percent can be achieved with ignition retard with a 30 percent increase in CO emissions. While fuel economy does change, the use of field gas has a limited influence on the economics of a particular engine setting.

A technical evaluation of available post-combustion gas controls (i.e., $NO_x$OUT, Thermal $DeNO_x$, and $SCONO_x$™ ) indicates that these processes have not been applied to diesel engines and are technically infeasible for the project because of process constraints (e.g., temperature).

SCR is also not considered feasible given the risk of handling and storage ammonia (both vessel transport and CPF) in an offshore environment. This is especially important for the drill rigs, which will be frequently moved over the course of development. In addition, the work activities on the main drill rigs are such that potential conflicts in drill rig operation could occur with the installation of an SCR system. SCR has not been used in offshore environments.

The installation of a catalytic converter (i.e., NSCR) is not technically feasible for the proposed installation of natural gas engines in the satellite platforms. Applications of such system are limited to gas engines using pipeline quality natural gas.

The proposed BACT for the main drill engines is ignition retard to reduce $NO_x$ emissions. This technique was used during the exploratory drilling in Destin Dome Blocks 97 and 57.

### 5.3.3.4 Direct Fired Glycol Reboiler

The $NO_x$ emission rate from the direct-fired boiler will be about 0.1 lb/mmBtu using good combustion practices. A technical evaluation of available post-combustion gas controls (i.e., SCR, $NO_x$OUT, Thermal $DeNO_x$, NSCR and $SCONO_x$™ ) indicates that these processes have not been applied to small boilers and are considered technically infeasible for the project because of process constraints (e.g., temperature and residence time). The proposed BACT for the boiler is good combustion practices and proper maintenance.

### 5.3.3.5 Flares

The $NO_x$ emission rates from the flares have been estimated to be less than 0.1 lb/mmBtu using proper flare design and good combustion practices. A technical evaluation of available post-combustion gas controls (i.e., SCR, $NO_x$OUT, Thermal De$NO_x$, NSCR and $SCONO_x^{TM}$ ) indicates that these processes have not been applied to small boilers and are considered technically infeasible for the project because of process constraints. The proposed BACT for the flares is good combustion practices and proper maintenance.

### 5.3.3.6 Miscellaneous Diesel Engines

The main drilling rigs and CPF will have various types of diesel engines associated with cranes, well logging equipment, air compressors, etc. that will generate $NO_x$ emissions. These engines are operated on an as needed basis. $NO_x$ emissions have been conservatively estimated to using emission factors for large bore engines and overall fuel usage. A technical evaluation of available post-combustion gas controls (i.e., SCR, $NO_x$OUT, Thermal De$NO_x$, NSCR and $SCONO_x^{TM}$ ) indicates that these processes have not been applied to small diesel engines and are considered technically infeasible for the project because of process constraints. The proposed BACT for these diesel engines is proper operation and maintenance.

## 5.4 CARBON MONOXIDE

### 5.4.1 IDENTIFICATION OF CO CONTROL TECHNOLOGIES

CO emissions are a result of incomplete or partial combustion of fossil fuel. Combustion design and catalytic oxidation are the control alternatives that are available for the project. Combustion design is the more common control technique used in CTs, gas engines, diesel engines and boilers. Sufficient time, temperature, and turbulence are required within the combustion zone to maximize combustion efficiency and minimize the emissions of CO. Combustion efficiency is dependent upon type of combustion process and its design.

Catalytic oxidation is a post-combustion control that has been employed in CO nonattainment areas where regulations have required CO emission levels to be less than those associated with good combustion practices. Such installations have been required to use LAER technology and typically have CO limits in the 10 ppm and less range (corrected to dry conditions).

### 5.4.2 TECHNOLOGY DESCRIPTION

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst, such as platinum. Combustion of CO starts at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required.

For CTs and gas engines, the oxidation catalyst can be located directly in the hot section of the exhaust. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency. The existing oxidation catalyst applications primarily have been limited too much larger facilities burning natural gas. Oxidation catalysts have not been used on diesel engines. The use of sulfur-containing fuels in an oxidation catalyst system would result in an increase of $SO_3$ emissions and concomitant corrosive effects to the stack. In addition, trace metals in the fuel could result in catalyst poisoning during prolonged periods of operation.

Since the emission units will likely experience numerous operating conditions, variations in exhaust conditions will influence catalyst life and performance. Very little technical data exist to demonstrate the effect of such cycling.

### 5.4.3 BACT EVALUATION

Emissions of CO are dependent upon the combustion process and design, which is a result of the manufacturer's operating specifications, including the air-to-fuel ratios, combustion staging, and type of fuel. The oxidation catalysts are not feasible for the CTs, diesel engines, boiler and flares due to physical and process constraints of this equipment. The proposed BACT for the project is to incorporate designs to optimize combustion efficiency and minimize CO, while maximizing the reduction of $NO_x$ emissions. For the CTs, diesel engines (main rig engines and miscellaneous engines), direct fired boiler, and flares, proper operation and maintenance is proposed as BACT. For the satellite gas engines, a catalytic converter is proposed as BACT for CO. However, the primary purpose of the catalytic converter is for $NO_x$ emissions.

It should be noted that, there is no air quality benefit from this technology since the air quality impacts of both oxidation catalyst control and combustion design control techniques are well below the PSD significant impact levels for CO. Therefore, no significant environmental benefit would be realized by the installation of a CO catalyst. Indeed, additional particulate emissions would result from installing an oxidation catalyst on the CTs due to the sulfur in the sour gas. The particulate would result from the conversion of $SO_2$ to sulfates. There would also be no secondary benefits, such as acidic deposition, to reducing CO.

## 5.5 VOLATILE ORGANIC COMPOUNDS

VOCs will be emitted by the proposed emission units and are a result of incomplete combustion. The proposed BACT for VOC emissions will be the use of proper operation and maintenance. The emission levels are similar to the BACT emission levels established for other similar sources. Good combustion practices have been overwhelmingly approved as BACT. While a catalytic converter will be installed for the satellite gas engines, it is not cost effective for VOC alone. The cost effectiveness for VOCs removal using a catalytic converter, ranges from $8,175 and $31,532 depending on engine setting. The environmental effect of further reducing emissions would not be significant.

## 5.6 SULFUR DIOXIDE ($SO_2$)

For the emission units proposed for the project, there are no post-combustion control technologies, such as flue gas desulfurization (FGD), that are feasible. The use of natural gas and low sulfur fuels are feasible. For the CTs and satellite gas engines, natural gas will be used. The satellite gas engines will use pipeline quality natural gas. The CTs will utilize, due to process considerations, sour gas with a maximum sulfur of 100-ppm hydrogen sulfide for an equivalent $SO_2$ emission rate of 0.017 lb/mmBtu. The maximum Federal Energy Regulation Commission (FERC) tariff for pipeline natural gas is equivalent to about 0.006 lb/mmBtu. In contrast, the maximum $SO_2$ rate for transportation diesel fuel is 0.052 lb/mmBtu, which is 3 times higher than the sour gas.

The available fuels for drilling rig main diesel engines and the miscellaneous diesel engines is marine diesel with a maximum sulfur content of 0.05 percent. The infrastructure for transportation diesel is not available and would have to be developed for the project. The cost of onshore facilities, which includes a new tank and associated facilities, would cost a minimum of $300,000. The cost of transportation diesel is $0.03 per gallon greater than marine diesel. Facilities at the shorebase are not available for segregating fuel usage once a commitment is made regarding fuels. As a result, the same fuel (i.e., either marine diesel or transportation diesel) would have to be used in support vessels and other activities not in the Destin Dome field development. Chevron supports multiple developments out of the same shorebase, which include the Mobile (MO) and Viosca Knoll (VK) areas. Using transportation diesel in Destin Dome would increase costs not only relative to the Destin Dome project, but also for Chevron's operations already established in the MO and VK areas in the Central Gulf of Mexico. These cost estimates are presented in Table 5-5. The annual cost is estimated to be about $250,000 and the overall cost effectiveness is $5,072 per ton of $SO_2$ removed. This cost is considered excessive and inappropriate as BACT. The use of marine diesel is clearly appropriate given the offshore nature of development and historical use of such fuel. The use of transportation diesel, while available, would require considerable infrastructure development and affect other activities not associated with the Destin Dome development. The use of transportation diesel would not altogether eliminate the use of marine diesel, which is also used in support of production processing. Therefore, additional vessels would be required to supply not only transportation diesel, but also marine diesel, increasing the total usage of fuel and number of required service vessels for the Destin Dome, MO and VK areas. The use of marine diesel is proposed as BACT for use in the drilling rig main engines and miscellaneous diesel engines.

## 5.7 PM10 AND OTHER REGULATED AND NONREGULATED POLLUTANT EMISSIONS

The emission of particulate matter from combustion of fossil fuels is a result of incomplete combustion and trace elements in the fuel. Trace concentrations of metals, such as lead, beryllium, mercury and inorganic arsenic, would occur when firing diesel fuel. A review of EPA's BACT/LAER Clearinghouse Documents did not reveal any post-combustion particulate control technologies being used on CTs, gas engines, small gas fired boilers, and large and small diesel engines.

The maximum particulate emissions from the emission units proposed for the project, will be lower in concentration than that normally specified for fabric filter designs {i.e., the grain loading associated with the maximum particulate emissions [about 10 pounds per hour (lb/hr) when firing natural gas]}. These emission rates are less than about 0.01 grain per standard cubic foot (gr/scf), which is a typical design specification for a baghouse. This further demonstrates that no further particulate controls are necessary for the proposed project.

There are no technically feasible methods for controlling the emissions of these pollutants from the proposed emission units, other than the inherent quality of the fuel. Clean fuels, natural gas and distillate oil represents BACT for these pollutants. The use of natural gas and very low sulfur (0.5 percent) fuel oil will limit emission of $SO_2$.

For the non-regulated pollutants, none of the control technologies evaluated for other pollutants (i.e., SCR) would reduce such emissions; thus, natural gas and distillate oil represent BACT because of their inherently low contaminant content.

Table 5-1a. Summary of Best Available Control Technology (BACT) Determinations for Nitrogen Oxide (NOx) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | NOx Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| SOUTHERN NATURAL GAS | AL | Mar-98 | 2-9160 HP GE MODEL MS3002G NATURAL GAS TURBINES | 9,160 HP | 53 LB/HR | | 0 | BACT-PSD |
| SOUTHERN NATURAL GAS | AL | Mar-98 | 9160 HP GE MODEL M53002G NATURAL GAS FIRED TURBINE | 9,160 HP | 53 LB/HR | | 0 | BACT-PSD |
| ALABAMA POWER COMPANY | AL | Dec-97 | COMBUSTION TURBINE W/ DUCT BURNER (COMBINED CYCLE) | 100 MW | 15 PPM | DRY LOW NOX BURNERS | 0 | BACT-PSD |
| BUCKNELL UNIVERSITY | PA | Nov-97 | NG FIRED TURBINE, SOLAR TAURUS T-7300S | 5.0 MW | 25 PPMV@15%O2 | SOLONOX BURNER: LOW NOX BURNER | 0 | BACT-OTHER |
| NORTHERN CALIFORNIA POWER AGENCY | CA | Oct-97 | GE FRAME 5 GAS TURBINE | 325 MMBTU/HR | 25 PPMVD @ 15% O2 | DRY LOW NOX BURNERS | 0 | LAER |
| LORDSBURG L P. | NM | Jun-97 | TURBINE, NATURAL GAS-FIRED, ELEC. GEN. | 100 MW | 74.4 LBS/HR | DRY LOW-NOX TECHNOLOGY WHICH ADOPTS STAGED OR SCHEDULED COMBUSTION | 80 | BACT-PSD |
| SOUTHERN CALIFORNIA GAS COMPANY | CA | May-97 | VARIABLE LOAD NATURAL GAS FIRED TURBINE COMPRESSOR | 50 MMBTU/HR | 25 PPMVD @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | LAER |
| MEAD COATED BOARD, INC. | AL | Mar-97 | COMBINED CYCLE TURBINE (25 MW) | 568 MMBTU/HR | 25 PPMVD@ 15% O2 (GAS) | FUEL OIL SULFUR CONTENT <=0.05% BY WEIGHT, DRY LOW NOX COMBUSTOR DESIGN FIRING GAS AND DRY LOW NOX COMBUSTOR WITH WATER INJECTION FIRING OIL | 0 | BACT-PSD |
| FORMOSA PLASTICS CORPORATION, BATON ROUGE PLANT | LA | Mar-97 | TURBINE/HSRG, GAS COGENERATION | 450 MM BTU/HR | 9 PPMV | DRY LOW NOX BURNER/COMBUSTION DESIGN AND CONSTRUCTION. | 0 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM STA | NM | Feb-97 | COMBUSTION TURBINE, NATURAL GAS | 100 MW | 0 SEE FACILITY NOTES | DRY LOW NOX COMBUSTION | 0 | BACT-PSD |
| CALRESOURCES LLC | CA | Jan-97 | SOLAR MODEL 1100 SATURN GAS TURBINE | 14 MMBTU/HR | 69 PPMVD @15% O2 | NO CONTROL | 0 | LAER |
| TEMPO PLASTICS | CA | Dec-96 | GAS TURBINE COGENERATION UNIT | 0.0 | 0.109 LB/MMBTU | LOW-NOX COMBUSTOR | 0 | LAER |
| SOUTHERN NATURAL GAS COMPANY | MS | Dec-96 | TURBINE, NATURAL GAS-FIRED | 9,160 HORSEPOWER | 110 PPMV @ 15% O2, DRY | PROPER TURBINE DESIGN AND OPERATION | 0 | BACT-PSD |
| SOUTHERN NATURAL GAS COMPANY-SELMA COMPRESSOR STAT | AL | Dec-96 | 9160 HP GE MS3002G NATURAL GAS FIRED TURBINE | 0.0 | 53 LB/HR | | 0 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION | NM | Nov-96 | COMBUSTION TURBINE, NATURAL GAS | 100 MW | 15 PPM; SEE FAC. NOTES | DRY LOW NOX COMBUSTION | 0 | BACT-PSD |
| ECOELECTRICA, L.P. | PR | Oct-96 | TURBINES, COMBINED-CYCLE COGENERATION | 461 MW | 60 LB/HR (GAS) | STEAM/WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION (SCR). | 72 | BACT-PSD |
| ECOELECTRICA, L P. | PR | Oct-96 | TURBINES, COMBINED-CYCLE COGENERATION | 461 MW | 73 LB/HR (OIL) | STEAM/WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION (SCR). | 72 | BACT-PSD |
| BLUE MOUNTAIN POWER, LP | PA | Jul-96 | COMBUSTION TURBINE WITH HEAT RECOVERY BOILER | 153 MW | 4 PPM @ 15% O2 | DRY LNB WITH SCR WATER INJECTION IN PLACE WHEN FIRING OIL. OIL FIRING LIMITS SET TO 8.4 PPM @15% O2 | 84 | LAER |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | INTERNAL COMBUSTION | 3.4 MW | 427 TPY | AFTERCOOLERS | 0 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | INTERNAL COMBUSTION | 6.5 MW | 633 TPY | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0 | BACT-PSD |
| GENERAL ELECTRIC GAS TURBINES | SC | Apr-96 | I.C. TURBINE | 2,700 MMBTU/HR | 885 LB/HR | GOOD COMBUSTION PRACTICES TO MINIMIZE EMISSIONS | 0 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | Apr-96 | COMBUSTION TURBINE, 4 EACH | 1,908 MMBTU/HR | 512 LB/HR (OIL) | WATER INJECTION, FUEL SPEC: 0.04% N FUEL OIL | 0 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | Apr-96 | COMBUSTION TURBINE, 4 EACH | 1908 MMBTU/HR | 158 LB/HR (GAS) | WATER INJECTION | 0 | BACT-PSD |
| MID-GEORGIA COGEN. | GA | Apr-96 | COMBUSTION TURBINE (2), FUEL OIL | 116 MW | 20 PPMVD | WATER INJECTION WITH SCR | 0 | BACT-PSD |
| MID-GEORGIA COGEN. | GA | Apr-96 | COMBUSTION TURBINE (2), NATURAL GAS | 116 MW | 9 PPMVD | DRY LOW NOX BURNER WITH SCR | 0 | BACT-PSD |
| GEORGIA GULF CORPORATION | LA | Mar-96 | GENERATOR, NATURAL GAS FIRED TURBINE | 1,123 MM BTU/HR | 25 PPMV-CORR. TO 15%O2 | CONTROL NOX USING STEAM INJECTION | 0 | BACT-PSD |
| SEMINOLE HARDEE UNIT 3 | FL | Jan-96 | COMBINED CYCLE COMBUSTION TURBINE | 140 MW | 15 PPM @ 15% O2 | DRY LNB STAGED COMBUSTION | 0 | BACT-PSD |
| KEY WEST CITY ELECTRIC SYSTEM | FL | Sep-95 | TURBINE, EXISTING CT RELOCATION TO A NEW PLANT | 23 MW | 75 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-PSD |
| UNION CARBIDE CORPORATION | LA | Sep-95 | GENERATOR, GAS TURBINE | 1,313 MM BTU/HR | 25 PPMV CORR. TO 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA) | PR | Jul-95 | COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EACH | 248 MW | 35 LB/HR AS NO2 | STEAM INJECTION PLUS SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM. USE OF NO. 2 FUEL OIL WITHNITROGEN CONTENT NOT TO EXCEED 0.10% BY WEIGHT. | 0 | BACT-PSD |
| HIGGINSVILLE MUNICIPAL POWER FACILITY | MO | Jul-95 | ADD OF A DUAL FUEL FIRED TWIN-PAC TURBINE | 49 MW | 42 PPM BY VOL 1 HR AVG (G | CONTROLS TO REGULATE THE FUEL CONSUMPTION AND THE RATIO OF WATER TO FUEL BEING FIRED IN THE TURBINES | 0 | BACT-PSD |
| HIGGINSVILLE MUNICIPAL POWER FACILITY | MO | Jul-95 | ADD OF A DUAL FUEL FIRED TWIN-PAC TURBINE | 49 MW | 75 PPM BY VOL 1 HR AVG (N | CONTROLS TO REGULATE THE FUEL CONSUMPTION AND THE RATIO OF WATER TO FUEL BEING FIRED IN THE TURBINES | 0 | BACT-PSD |
| BROOKLYN NAVY YARD COGENERATION PARTNERS L.P. | NY | Jun-95 | TURBINE, NATURAL GAS FIRED | 240 MW | 3.5 PPM @ 15% O2 | SCR | 0 | LAER |
| PANDA-KATHLEEN, L.P. | FL | Jun-95 | COMBINED CYCLE COMBUSTION TURBINE (TOTAL 115MW) | 75 MW | 15 PPM @ 15% O2 | DRY LOW NOX BURNER | 0 | BACT-PSD |
| PROCTOR AND GAMBLE PAPER PRODUCTS CO (CHARMIN) | PA | May-95 | TURBINE, NATURAL GAS | 580 MMBTU/HR | 55 PPM @ 15% O2 | STEAM INJECTION | 75 | RACT |
| MILAGRO, WILLIAMS FIELD SERVICE | NM | May-95 | TURBINE/COGEN, NATURAL GAS (2) | 900 MMCF/DAY | 9 PPM @ 15% O2 | DRY LOW NOX (GENERAL ELECTRIC MODEL PG6541B) | 94 | BACT-PSD |
| GAINESVILLE REGIONAL UTILITIES | FL | Apr-95 | SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL B-UP | 74 MW | 15 PPM AT 15% OXYGEN | DRY LOW NOX BURNERS GE FRAME UNIT, CAN ANNULAR COMBUSTORS | 0 | BACT-PSD |
| GAINESVILLE REGIONAL UTILITIES | FL | Apr-95 | OIL FIRED COMBUSTION TURBINE | 74 MW | 42 PPM AT 15% OXYGEN | WATER INJECTION | 0 | BACT-PSD |
| LEDERLE LABORATORIES | NY | Apr-95 | (2) GAS TURBINES (EP #S 00101&102) | 110 MMBTU/HR | 42 PPM, 18 LB/HR | STEAM INJECTION | 0 | BACT-PSD |
| PILGRIM ENERGY CENTER | NY | Apr-95 | (2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&2) | 1,400 MMBTU/HR | 4.5 PPM, 23.6 LB/HR | STEAM INJECTION FOLLOWED BY SCR | 0 | BACT |
| BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT | MD | Mar-95 | TURBINE, 140 MW NATURAL GAS FIRED ELECTRIC | 140 MW | 15 PPM @ 15% O2 | DRY BURN LOW NOX BURNERS | 91 | BACT-PSD |
| FORMOSA PLASTICS CORPORATION, LOUISIANA | LA | Mar-95 | TURBINE/HRSG, GAS COGENERATION | 450 MM BTU/HR | 9 PPMV | DRY LOW NOX BURNER/COMBUSTION DESIGN AND CONTROL | 0 | LAER |
| LSP-COTTAGE GROVE, L.P. | MN | Mar-95 | COMBUSTION TURBINE/GENERATOR | 1,970 MMBTU/HR | 4.5 PPM @ 15% O2 GAS | SELECTIVE CATALYTIC REDUCTION (SCR) | 70 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | Feb-95 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 89 MW | 360 TPY | WATER INJECTION. | 0 | BACT-PSD |
| MARATHON OIL CO. - INDIAN BASIN N.G. PLAN | NM | Jan-95 | TURBINES, NATURAL GAS (2) | 5,500 HP | 7.4 LBS/HR | LEAN-PREMIXED COMBUSTION TECHNOLOGY. DRY/LOW NOX | 66 | BACT-PSD |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | SIEMENS V64.3 GAS TURBINE (EP #00001) | 650 MMBTU/HR | 25 PPM | WATER INJECTION | 70 | BACT |
| INDECK-OSWEGO ENERGY CENTER | NY | Oct-94 | GE FRAME 6 GAS TURBINE | 533 LB/MMBTU | 42 PPM, 75.00 LB/HR | STEAM INJECTION | 53 | BACT |
| FULTON COGEN PLANT | NY | Sep-94 | GE LM5000 GAS TURBINE | 500 MMBTU/HR | 36 PPM, 65 LB/HR | WATER INJECTION | 59 | BACT |
| CAROLINA POWER AND LIGHT | SC | Aug-94 | STATIONARY GAS TURBINE | 1,520 MMBTU/H | 25 PPMDV @ 15% O2 (GAS) | WATER INJECTION | 30 | BACT-PSD |
| CAROLINA POWER AND LIGHT | SC | Aug-94 | STATIONARY GAS TURBINE | 1,520 MMBTU/H | 82 PPMDV @ 15% O2 (OIL) | WATER INJECTION | 30 | BACT-PSD |
| BRUSH COGENERATION PARTNERSHIP | CO | Jul-94 | TURBINE | 350 MMBTU/H | 25 PPM @ 15% O2 | DRY LOW NOX BURNER | 74 | BACT-PSD |
| COLORADO POWER PARTNERSHIP | CO | Jul-94 | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 385 MMBTU/H EACH TURBINE | 42 PPM @ 15% O2 | WATER INJECTION | 66 | BACT-PSD |
| MUDDY RIVER L.P. | NV | Jun-94 | COMBUSTION TURBINE, DIESEL & NATURAL GAS | 140 MEGAWATT | 303 LB/HR | LOW NOX BURNER | 0 | BACT-PSD |
| CSW NEVADA, INC. | NV | Jun-94 | COMBUSTION TURBINE, DIESEL & NATURAL GAS | 140 MEGAWATT | 273 LB/HR | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| PORTLAND GENERAL ELECTRIC CO. | OR | May-94 | TURBINES, NATURAL GAS (2) | 1,720 MMBTU | 4.5 PPM @ 15% O2 | SCR | 82 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | May-94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345 MMBTU/HR | 25 PPM BY VOL 1 HR AVG (G | LOW NOX BURNERS, AND WATER INJECTION | 0 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | May-94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1,345 MMBTU/HR | 1,135 TPY (NO. 2 OIL) | LOW NOX BURNERS, AND WATER INJECTION | 0 | BACT-PSD |
| GEORGIA POWER COMPANY, ROBINS TURBINE PROJECT | GA | May-94 | TURBINE, COMBUSTION, NATURAL GAS | 80 MW | 25 PPM | WATER INJECTION, FUEL SPEC: NATURAL GAS | 0 | BACT-PSD |
| WEST CAMPUS COGENERATION COMPANY | TX | May-94 | GAS TURBINES | 75 MW (TOTAL POWER) | 200 TPY | INTERNAL COMBUSTION CONTROLS | 0 | BACT-PSD |
| FLEETWOOD COGENERATION ASSOCIATES | PA | Apr-94 | NG TURBINE (GE LM6000) WITH WASTE HEAT BOILER | 360 MMBTU/HR | 21 LB/HR | SCR WITH LOW NOX COMBUSTORS | 47 | BACT-OTHER |
| HERMISTON GENERATING CO. | OR | Apr-94 | TURBINES, NATURAL GAS (2) | 1,696 MMBTU | 4.5 PPM @ 15% O2 | SCR | 82 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | Feb-94 | TURBINE, NATURAL GAS (2) | 1,510 MMBTU/H | 12 PPMVD @15 % O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | Feb-94 | TURBINE, FUEL OIL (2) | 1,730 MMBTU/H | 42 PPMVD @ 15 %O2 | WATER INJECTION | 0 | BACT-PSD |
| TECO POLK POWER STATION | FL | Feb-94 | TURBINE, SYNGAS (COAL GASIFICATION) | 1,755 MMBTU/H | 25 PPMVD @ 15 % O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| TECO POLK POWER STATION | FL | Feb-94 | TURBINE, FUEL OIL | 1,765 MMBTU/H | 42 PPMVD @ 15 % O2 | WET INJECTION | 0 | BACT-PSD |
| INTERNATIONAL PAPER | LA | Feb-94 | TURBINE/HRSG, GAS COGEN | 338 MM BTU/HR TURBINE | 25 PPMV 15% O2 TURBINE | DRY LOW NOX COMBUSTOR/COMBUSTION CONTROL | 0 | BACT |
| KAMINE/BESICORP CARTHAGE L.P | NY | Jan-94 | GE FRAME 6 GAS TURBINE | 491 BTU/HR | 42 PPM, 76.6 LB/HR | STEAM INJECTION | 63 | BACT |
| ORANGE COGENERATION LP | FL | Dec-93 | TURBINE, NATURAL GAS, 2 | 368 MMBTU/H | 15 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| PROJECT ORANGE ASSOCIATES | NY | Dec-93 | GE LM-5000 GAS TURBINE | 550 MMBTU/HR | 25 PPM, 47 LB/HR | STEAM INJECTION, FUEL SPEC; NATURAL GAS ONLY | 60 | BACT |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | Oct-93 | TURBINE, GAS-FIRED | 11,257 HP | 42 PPM @ 15% O2 | SOLONOX COMBUSTOR, DRY LOW NOX TECHNOLOGY | 66 | BACT-PSD |
| FLORIDA GAS TRANSMISSION | FL | Sep-93 | TURBINE, GAS | 132 MMBTU/H | 25 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP | VA | Sep-93 | TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3 | 10.2 X109 SCF/YR NAT GAS | 131 LB/HR(GAS); 339 OIL | DRY LOW NOX COMBUSTOR; DESIGN, WATER INJEC7ION | 0 | BACT-PSD |
| FLORIDA GAS TRANSMISSION COMPANY | AL | Aug-93 | TURBINE, NATURAL GAS | 12,600 BHP | 0.58 GM/HP HR | AIR-TO-FUEL RATIO CONTROL, DRY LOW NOX COMBUSTION | 71 | BACT-PSD |
| LOCKPORT COGEN FACILITY | NY | Jul-93 | (6) GE FRAME 6 TURBINES (EP #S 00001-00006) | 424 MMBTU/HR | 42 PPM | STEAM INJECTION | 78 | BACT |
| ANITEC COGEN PLANT | NY | Jul-93 | GE LM5000 COMBINED CYCLE GAS TURBINE EP #00001 | 451 MMBTU/HR | 25 PPM, 41 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | Jun-93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640 MMBTU/H (EACH) | 16 PPMDV | SCR | 0 | BACT-PSD |

Table 5-1a. Summary of Best Available Control Technology (BACT) Determinations for Nitrogen Oxide (NOx) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | NOx Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| NEWARK BAY COGENERATION PARTNERSHIP, L P. | NJ | Jun-93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617 MMBTU/HR (EACH) | 8.3 PPMDV | SCR | 0 | BACT-PSD |
| TIGER BAY LP | FL | May-93 | TURBINE, OIL | 1,850 MMBTU/H | 42 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-PSD |
| TIGER BAY LP | FL | May-93 | TURBINE, GAS | 1,615 MMBTU/H | 15 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| INDECK ENERGY COMPANY | NY | May-93 | GE FRAME 6 GAS TURBINE EP #00001 | 491 MMBTU/HR | 32 PPM | STEAM INJECTION | 58 | BACT |
| PHOENIX POWER PARTNERS | CO | May-93 | TURBINE (NATURAL GAS) | 311 MMBTU/HR | 22 PPM @ 15% O2 | DRY LOW NOX COMBUSTION | 0 | BACT-OTHER |
| TRIGEN MITCHEL FIELD | NY | Apr-93 | GE FRAME 6 GAS TURBINE | 425 MMBTU/HR | 60 PPM, 90 LB/HR | STEAM INJECTION | 20 | BACT |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, FUEL OIL | 928 MMBTU/H | 42 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, FUEL OIL | 371 MMBTU/H | 42 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, NATURAL GAS | 869 MMBTU/H | 15 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, NATURAL GAS | 367 MMBTU/H | 15 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| EAST KENTUCKY POWER COOPERATIVE | KY | Mar-93 | TURBINES (5), #2 FUEL OIL AND NAT GAS FIRED | 1,492 MMBTU/H (EACH) | 42 PPM @ 15% O2 (OIL) | WATER INJECTION | 46 | SEE NOTES |
| INTERNATIONAL PAPER CO. RIVERDALE MILL | AL | Jan-93 | TURBINE, STATIONARY (GAS-FIRED) WITH DUCT BURNER | 40 MW | 0 08 LB/MMBTU (GAS) | LOW NOX BURNERS (ON THE DUCT BURNER) STEAM INJECTION INTO THE TURBINE | 0 | BACT-PSD |
| OKLAHOMA MUNICIPAL POWER AUTHORITY | OK | Dec-92 | TURBINE, COMBUSTION | 58 MW | 65 PPM @ 15% O2 (OIL) | COMBUSTION CONTROLS | 83 | BACT-OTHER |
| OKLAHOMA MUNICIPAL POWER AUTHORITY | OK | Dec-92 | TURBINE, COMBUSTION | 58 MW | 25 PPM @ 15% O2 (GAS) | COMBUSTION CONTROLS | 83 | BACT-OTHER |
| AUBURNDALE POWER PARTNERS, LP | FL | Dec-92 | TURBINE, OIL | 1,170 MMBTU/H | 42 PPMVD @ 15 % O2 | STEAM INJECTION | 0 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | Dec-92 | TURBINE,GAS | 1,214 MMBTU/H | 15 PPMVD @ 15 % O2 | DRY LOW NOX COMBUSTOR | 0 | BACT-PSD |
| SITHE/INDEPENDENCE POWER PARTNERS | NY | Nov-92 | TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW) | 2,133 MMBTU/HR (EACH) | 4.5 PPM | SCR AND DRY LOW NOX | 0 | BACT-OTHER |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | Nov-92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650 MMBTU/HR | 9 PPM (GAS) | DRY LOW NOX OR SCR | 0 | BACT-OTHER |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | Nov-92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650 MMBTU/HR | 55 PPM (OIL) | DRY LOW NOX OR SCR | 0 | BACT-OTHER |
| KAMINE/BESICORP CORNING L.P. | NY | Nov-92 | TURBINE, COMBUSTION (79 MW) | 653 MMBTU/HR | 9 PPM | DRY LOW NOX OR SCR | 0 | BACT-OTHER |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | Nov-92 | TURBINE (NATURAL GAS & OIL) | 1,150 MMBTU | 9 PPMVD (NAT. GAS)* | DRY LOW NOX BURNER, COMBUSTION CONTROL | 0 | BACT-OTHER |
| GOAL LINE, LP ICEFLOE | CA | Nov-92 | TURBINE, COMBUSTION (NATURAL GAS) (42 4 MW) | 386 MMBTU/HR | 5 PPMVD @ 15% OXYGEN | WATER INJECTION & SCR W/ AUTOMATIC AMMONIA INJECT | 88 | BACT-OTHER |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS | 468 X10(6) BTU/HR #2 OIL | 15 PPM | SCR | 81 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS (TOTAL) | 0.0 | 69.T TPY | SCR | 0 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS | 474 X10(6) BTU/HR N. GAS | 9 PPM | SELECTIVE CATALYTIC REDUCTION (SCR) | T5 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINE FACILITY, GAS | T.4 X10(T) GPY FUEL OIL | 245 TOTAL TPY | SELECTIVE CATALYTIC REDUCTION (SCR) | 80 | BACT-PSD |
| GORDONSVILLE ENERGY L P. | VA | Sep-92 | TURBINES (2) [EACH WITH A SF] | 1.4 X10(9) BTU/H #2 OIL | 66 LBS/HR/UNIT | WATER INJECTION AND SCR | 80 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINE FACILITY, GAS | 1,331 X10(T) SCF/Y NAT GAS | 245 TOTAL TPY | SELECTIVE CATALYTIC REDUCTION (SCR) W/ WATER INJEC | 80 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINES (2) [EACH WITH A SF] | 1.5 X10(9) BTU/HR N GAS | 9 PPMDV/UNIT @ 15% 02 | SCR WITH WATER INJECTION | 80 | BACT-PSD |
| NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT | NV | Sep-92 | COMBUSTION TURBINE ELECTRIC POWER GENERATION | 600 MW (8 UNITS 75 EACH) | 88 6 TPY (EACH TURBINE) | LOW NOX COMBUSTOR | 0 | BACT-PSD |
| KAMINE SOUTH GLENS FALLS COGEN CO | NY | Sep-92 | GE FRAME 6 GAS TURBINE | 498 MMBTU/HR | 42 PPM, 76.6 LB/HR | WATER INJECTION | 50 | BACT |
| NORTHERN STATES POWER COMPANY | SD | Sep-92 | TURBINE, SIMPLE CYCLE, 4 EACH | 129 MW | 24 PPM @ 15% O2 GAS | WATER INJECTION FOR GAS & DISTILLATION | 0 | BACT-PSD |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | Sep-92 | TURBINE, COMBUSTION GAS (150 MW) | 1,146 MMBTU/HR (GAS)* | 9 PPM (GAS) | DRY LOW NOX | 0 | BACT-OTHER |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | Sep-92 | TURBINE, COMBUSTION GAS (150 MW) | 1,146 MMBTU/HR (GAS)* | 42 PPM (OIL) | WATER INJECTOR | 0 | BACT-OTHER |
| WEPCU, PARIS SITE | WI | Aug-92 | TURBINES, COMBUSTION (4) | 0.0 | 65 PPM @ 15% O2 (OIL) | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| WEPCU, PARIS SITE | WI | Aug-92 | TURBINES, COMBUSTION (4) | 0.0 | 25 PPM @ 15% O2 (GAS) | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | Aug-92 | TURBINE, OIL | 1,029 MMBTU/H | 42 PPMVD @ 15 % O2 | WET INJECTION | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | Aug-92 | TURBINE, OIL | 1,866 MMBTU/H | 42 PPMVD @ 15 % O2 | WET INJECTION | 0 | BACT-PSD |
| NORTHWEST PIPELINE COMPANY | WA | Aug-92 | TURBINE, GAS-FIRED | 12,100 HP | 196 PPM @ 15% O2 | ADVANCED DRY LOW NOX COMBUSTOR (BY 07/01/95) | 76 | BACT-PSD |
| CNG TRANSMISSION | OH | Aug-92 | TURBINE (NATURAL GAS) (3) | 5,500 HP (EACH) | 1 6 G/HP-HR* | LOW NOX COMBUSTION | 0 | BACT-OTHER |
| SARANAC ENERGY COMPANY | NY | Jul-92 | TURBINES, COMBUSTION (2) (NATURAL GAS) | 1,123 MMBTU/HR (EACH) | 9 PPM | SCR | 0 | BACT-OTHER |
| HARTWELL ENERGY LIMITED PARTNERSHIP | GA | Jul-92 | TURBINE, OIL FIRED (2 EACH) | 1,840 M BTU/HR | 25 PPMVD, FUEL N AFLOW | MAXIMUM WATER INJECTION | 0 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD./MAALAEA GENERATING STA | HI | Jul-92 | TURBINE, COMBINED-CYCLE COMBUSTION | 28 MW | 42.3 LB/HR | WATER INJECTION | 69 | BACT-OTHER |
| HARTWELL ENERGY LIMITED PARTNERSHIP | GA | Jul-92 | TURBINE, GAS FIRED (2 EACH) | 1,817 M BTU/HR | 25 PPM @ 15% O2 | MAXIMUM WATER INJECTION | 0 | BACT-PSD |
| INDECK-YERKES ENERGY SERVICES | NY | Jun-92 | GE FRAME 6 GAS TURBINE (EP #00001) | 432 MMBTU/HR | 42 PPM, 74 LB/HR | STEAM INJECTION | 35 | BACT |
| SELKIRK COGENERATION PARTNERS, L P. | NY | Jun-92 | COMBUSTION TURBINES (2) (252 MW) | 1,173 MMBTU/HR (EACH) | 9 PPM GAS | STEAM INJECTION AND SCR | 0 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | Jun-92 | COMBUSTION TURBINE (79 MW) | 1,173 MMBTU/HR | 25 PPM GAS | STEAM INJECTION | 0 | BACT-OTHER |
| NORTHWEST PIPELINE CORPORATION | CO | May-92 | TURBINE, SOLAR TAURUS | 45 MMBTU/HR | 95 PPMVD (UNTIL 11/98) | DRY LOW NOX COMBUSTOR (BY 11/01/98) | 0 | BACT-PSD |
| NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO. | RI | Apr-92 | TURBINE, GAS AND DUCT BURNER | 1,360 MMBTU/H EACH | 9 PPM @ 15% O2, GAS | SCR | 0 | BACT-PSD |
| KENTUCKY UTILITIES COMPANY | KY | Mar-92 | TURBINE, #2 FUEL OIL/NATURAL GAS (8) | 1,500 MM BTU/HR (EACH) | 42 PPM @ 15% O2, N GAS | WATER INJECTION | 0 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION | 1,175 MMBTU/H NAT. GAS | 9 PPM @ 15% O2 | SCR, STEAM INJECTION | 91 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION | 1,117 MMBTU/H NO2 FUEL OIL | 15 PPM @ 15% O2 | SCR, STEAM INJ. | 91 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION, 2 | 0.0 | 191 T/YR/UNIT | | 0 | BACT-PSD |
| THERMO INDUSTRIES, LTD. | CO | Feb-92 | TURBINE, GAS FIRED, 5 EACH | 246 MMBTU/H | 25 PPM @ 15% O2 | DRY LOW NOX TECH. | 0 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | Feb-92 | TURBINE, FUEL OIL #2 | 20 MW | 42.3 LB/HR | COMBUSTOR WATER INJECTOR, WATER INJECTION | 70 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | Feb-92 | TURBINES, 8 | 1,032 MMBTU/H, NAT GAS | 25 PPM @ 15% O2 | MAX WATER INJECTION | 0 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | Feb-92 | TURBINES, 8 | 972 MMBTU/H, #2 OIL | 0 SEE NOTES | MAX WATER INJECTION | 0 | BACT-PSD |
| LINDEN COGENERATION TECHNOLOGY | NJ | Jan-92 | TURBINE, NATURAL GAS FIRED | 50 X E12 BTU/YR | 33.8 LB/HR | STEAM INJECTION AND SCR | 95 | BACT-PSD |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | SOLAR CENTAUR, 3 | 800 KW | 150 PPMVD @ 15% O2 | LOW NOX BURNERS | 0 | NSPS |
| KAMINE/BESICORP NATURAL DAM LP | NY | Dec-91 | GE FRAME 6 GAS TURBINE | 500 MMBTU/HR | 42 PPM, 80.1 LB/HR | STEAM INJECTION | 35 | BACT |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | Dec-91 | TURBINE, COMBUSTION | 1,247 MM BTU/HR | 287 LB/HR | MULTINOZZLE COMBUSTOR, MAXIMUM WATER INJECTION | 0 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | Dec-91 | TURBINE, COMBUSTION | 1,313 MM BTU/HR | 119 LB/HR | MULTINOZZLE COMBUSTOR, MAXIMUM WATER INJECTION | 0 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | Dec-91 | TURBINE, FUEL OIL #2 | 28 MW | 42 PPM | WATER INJECTION | 71 | BACT-PSD |
| KALAMAZOO POWER LIMITED | MI | Dec-91 | TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS | 1,806 MMBTU/H | 15 PPMV | DRY LOW NOX TURBINES | 0 | BACT-PSD |
| LAKE COGEN LIMITED | FL | Nov-91 | TURBINE, OIL, 2 EACH | 42 MW | 42 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| LAKE COGEN LIMITED | FL | Nov-91 | TURBINE, GAS, 2 EACH | 42 MW | 25 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| SHELL PIPELINE CORPORATION | CA | Nov-91 | GENERATOR, EMERGENCY, PROPANE FIRED | 82 BHP | 0.28 LB/H | 3-WAY CATALYTIC CONVERTER | 60 | BACT-PSD |
| DE LA GUERRA POWER, INC | CA | Nov-91 | ENGINE IC & GEN (1 OF 3) | 380 HP | 6.34 LB/D | NON-SELECTIVE CATALYTIC CONVERTER | 90 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | Nov-91 | TURBINE, GAS, 4 EACH | 35 MW | 42 PPM @ 15% O2 | WET INJECTION | 70 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | Nov-91 | TURBINE, OIL, 4 EACH | 35 MW | 65 PPM @ 15% O2 | WET INJECTION | 0 | BACT-PSD |
| SOUTHERN CALIFORNIA GAS | CA | Oct-91 | TURBINE, GAS FIRED, SOLAR MODEL H | 5,500 HP | 8 PPM @ 15% O2 | HIGH TEMP SELECT. CAT. REDUCTION | 93 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5,500 HP | 84.9 PPM @ 15% O2 | LEAN BURN | 0 | NSPS |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5,500 HP | 42 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 51 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5,500 HP | 85.1 PPM @ 15% O2 | FUEL SPEC: LEAN FUEL MIX | 0 | NSPS |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5500 HP | 42 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 51 | BACT-PSD |
| FLORIDA POWER GENERATION | FL | Oct-91 | TURBINE, OIL, 6 EACH | 93 MW | 42 PPM @ 15% O2 | WET INJECTION | 0 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, NAT. GAS TRANSM., GE FRAME 3 | 12,000 HP | 225 PPM @ 15% O2 | LEAN BURN | 0 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, NAT. GAS TRANSM., GE FRAME 3 | 12,000 HP | 42 PPM @ 15% O2 | DRY LOW NOX COMBUSTOR | 80 | BACT-PSD |
| NUGGET OIL CO. | CA | Oct-91 | GENERATOR, STEAM, GAS FIRED | 63 MMBTU/H | 0.043 LB/MMBTU | LOW NOX BURNER AND FLUE GAS RECIRCULATION* | 57 | BACT-PSD |
| CAROLINA POWER AND LIGHT CO. | SC | Sep-91 | TURBINE, I.C. | 80 MW | 292 LB/H | WATER INJECTION | 50 | BACT-PSD |
| ENRON LOUISIANA ENERGY COMPANY | LA | Aug-91 | TURBINE, GAS, 2 | 39 MMBTU/H | 40 PPM @ 15% O2 | H2O INJECT 0 6T LB/LB | 71 | BACT-PSD |
| ALGONQUIN GAS TRANSMISSION CO. | RI | Jul-91 | TURBINE, GAS, 2 | 49 MMBTU/H | 100 PPM @ 15% O2 | LOW NOX COMBUSTION | 0 | BACT-OTHER |
| CHARLES LARSEN POWER PLANT | FL | Jul-91 | TURBINE, OIL, 1 EACH | 80 MW | 42 PPM @ 15% O2 | WET INJECTION | 0 | BACT-PSD |
| CHARLES LARSEN POWER PLANT | FL | Jul-91 | TURBINE, GAS, 1 EACH | 80 MW | 25 PPM @ 15% O2 | WET INJECTION | 0 | BACT-PSD |
| SUMAS ENERGY INC. | WA | Jun-91 | TURBINE, NATURAL GAS | 88 MW | 6 PPM @ 15% O2 | SCR | 90 | BACT-PSD |
| SAGUARO POWER COMPANY | NV | Jun-91 | COMBUSTION TURBINE GENERATOR | 35 MW | 16.9 PPH (WINTER) | SELECTIVE CATALYTIC REDUCTION (SCR) | 80 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, OIL, 2 EACH | 400 MW | 65 PPM @ 15% O2 | LOW NOX COMBUSTORS | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, GAS, 4 EACH | 400 MW | 25 PPM @ 15% O2 | LOW NOX COMBUSTORS | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, CG, 4 EACH | 400 MW | 42 PPM @ 15% O2 | LOW NOX COMBUSTORS | 0 | BACT-PSD |

Table 5-1a. Summary of Best Available Control Technology (BACT) Determinations for Nitrogen Oxide (NOx) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | NOx Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| GRANITE ROAD LIMITED | CA | May-91 | TURBINE, GAS, ELECTRIC GENERATION | 461 MMBTU/H* | 3.5 PPMVD @ 15% O2 | SCR, STEAM INJECTION | 97 | BACT-PSD |
| NORTHERN CONSOLIDATED POWER | PA | May-91 | TURBINES, GAS, 2 | 35 KW EACH | 25 PPM @ 15% O2 | STEAM INJECTION/+SCR IN 1997 | 85 | OTHER |
| CIMARRON CHEMICAL | CO | Mar-91 | TURBINE #1, GE FRAME 6 | 33 MW | 25 PPM @ 15% O2 | WATER INJECTION | 0 | OTHER |
| CIMARRON CHEMICAL | CO | Mar-91 | TURBINE #2, GE FRAME 6 | 33 MW | 9 PPM @ 15% O2 | SCR | 0 | OTHER |
| SEMINOLE FERTILIZER CORPORATION | FL | Mar-91 | TURBINE, GAS | 26 MW | 9 PPM @ 15% O2 | SCR | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Mar-91 | TURBINE, GAS, 4 EACH | 240 MW | 42 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Mar-91 | TURBINE, OIL, 4 EACH | 0.0 | 65 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| CITY UTILITIES OF SPRINGFIELD | MO | Mar-91 | GENERATION OF ELECTRICAL POWER | 752 MMBTU/HR | 42 PPM BY VOL 1 HR AVG (G | WATER INJECTION | 0 | BACT-PSD |
| CITY UTILITIES OF SPRINGFIELD | MO | Mar-91 | GENERATION OF ELECTRICAL POWER | 752 MMBTU/HR | 65 PPM BY VOL 1 HR AVG (O | WATER INJECTION | 0 | BACT-PSD |
| CITY UTILITIES OF SPRINGFIELD | MO | Mar-91 | GENERATION OF ELECTRICAL POWER | 585 MMBTU/HR. | 42 PPM BY VOL 1 HR AVG (G | WATER INJECTION | 0 | BACT-PSD |
| CITY UTILITIES OF SPRINGFIELD | MO | Mar-91 | GENERATION OF ELECTRICAL POWER | 585 MMBTU/HR. | 65 PPM BY VOL 1 HR AVG (O | WATER INJECTION | 0 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #2 | NV | Jan-91 | COMBINED-CYCLE POWER GENERATION | 85 MW POWER OUTPUT | 61.3 LBS/HR | SELECTIVE CATALYTIC SYSTEM ON ONE UNIT | 0 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #1 | NV | Jan-91 | COMBINED-CYCLE POWER GENERATION | 85 MW TOTAL OUTPUT | 61.3 LBS/HR | SELECTIVE CATALYTIC SYSTEM ON ONE UNIT | 0 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP | NJ | Nov-90 | TURBINE, NATURAL GAS FIRED | 585 MMBTU/HR | 0.033 LB/MMBTU | STEAM INJECTION AND SCR | 94 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINE, COMPRESSOR | 4,000 HP | 1.8 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINES, COMPRESSOR, 2 | 2,000 HP EACH | 1.8 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| TBG COGEN COGENERATION PLANT | NY | Aug-90 | GE LM2500 GAS TURBINE | 215 MMBTU/HR | 75 PPM + FBN CORRECTION | WATER INJECTION | 60 | BACT |
| PEPCO - CHALK POINT PLANT | MD | Jun-90 | TURBINE, 105 MW NATURAL GAS FIRED ELECTRIC | 105 MW | 77 PPM @ 15% O2 | DRY PREMIX AND WATER INJECTION | 0 | BACT-PSD |
| PEPCO - CHALK POINT PLANT | MD | Jun-90 | TURBINE, 84 MW NATURAL GAS FIRED ELECTRIC | 84 MW | 25 PPM @ 15% O2 | QUIET COMBUSTION AND WATER INJECTION | 0 | BACT-PSD |
| PACIFIC GAS TRANSMISSION COMPANY | OR | Jun-90 | TURBINE GAS, COMPRESSOR STATION | 110 MMBTU/HR | 199 PPM @ 15% O2 | LOW NOX BURNER DESIGN | 30 | NSPS |
| PEPCO - STATION A | MD | May-90 | TURBINE, 124 MW NATURAL GAS FIRED | 125 MW | 42 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-PSD |
| PEDRICKTOWN COGENERATION LIMITED PARTNERSHIP | NJ | Feb-90 | TURBINE, NATURAL GAS FIRED | 1,000 MMBTU/HR | 0.044 LB/MMBTU | STEAM INJECTION AND SCR | 93 | BACT-PSD |
| SC ELECTRIC AND GAS COMPANY - HAGOOD STATION | SC | Dec-89 | INTERNAL COMBUSTION TURBINE | 110 MEGAWATTS | 308 LBS/HR | WATER INJECTION | 0 | BACT-PSD |
| PEABODY MUNICIPAL LIGHT PLANT | MA | Nov-89 | TURBINE, 38 MW NATURAL FAS FIRED | 412 MMBTU/HR | 25 PPM @ 15% O2 | WATER INJECTION | 0 | BACT-OTHER |
| PACIFIC GAS TRANSMITION | OR | Nov-89 | TURBINE, NAT. GAS | 14,600 HP | 42 PPM @ 15% O2 | LOW NOX BURNERS | 75 | BACT-PSD |
| SOUTHERN MARYLAND ELECTRIC COOPERATIVE (SMECO) | MD | Oct-89 | TURBINE, NATURAL GAS FIRED ELECTRIC | 90 MW | 199 LB/HR | WATER INJECTION | 0 | BACT-PSD |
| KINGSBURG ENERGY SYSTEMS | CA | Sep-89 | TURBINE, NATURAL GAS FIRED, DUCT BURNER | 35 MW | 6 PPM @ 15% O2 | SCR, STEAM INJECTION | 90 | BACT-PSD |
| MEGAN-RACINE ASSOCIATES, INC | NY | Aug-89 | GE LM5000-N COMBINED CYCLE GAS TURBINE | 401 LB/MMBTU | 42 PPMDV @ 15% O2 | WATER INJECTION | 60 | BACT |

Note: PSD= Prevention of Significant Deterioration
BACT= Best Available Control Technology
LAER= Lowest Achievable Emission Rate

Table 5-1b. Summary of Best Available Control Technology (BACT) Determinations for Carbon Monoxide (CO) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| BUCKNELL UNIVERSITY | PA | Nov-97 | NG FIRED TURBINE, SOLAR TAURUS T-7300S | 5 MW | 50 PPMV@15%O2 | GOOD COMBUSTION | 0 | BACT-OTHER |
| LORDSBURG L.P. | NM | Jun-97 | TURBINE, NATURAL GAS-FIRED, ELEC. GEN. | 100 MW | 27 LBS/HR | DRY LOW-NOX TECHNOLOGY BY MAINTAINING PROPER AIR- FUEL RATIO | 0 | BACT-PSD |
| MEAD COATED BOARD, INC. | AL | Mar-97 | COMBINED CYCLE TURBINE (25 MW) | 568 MMBTU/HR | 28 PPMVD@15% O2 (GAS) | PROPER DESIGN AND GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FORMOSA PLASTICS CORPORATION, BATON ROUGE PLANT | LA | Mar-97 | TURBINE/HSRG, GAS COGENERATION | 450 MM BTU/HR | 70 LB/HR | COMBUSTION DESIGN AND CONSTRUCTION. | 0 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM STA | NM | Feb-97 | COMBUSTION TURBINE, NATURAL GAS | 100 MW | 0 SEE FACILITY NOTES | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION | NM | Nov-96 | COMBUSTION TURBINE, NATURAL GAS | 100 MW | 0 SEE P2 | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| ECOELECTRICA, L.P. | PR | Oct-96 | TURBINES, COMBINED-CYCLE COGENERATION | 461 MW | 33 PPMDV | COMBUSTION CONTROLS | 0 | BACT-PSD |
| ECOELECTRICA, L.P. | PR | Oct-96 | TURBINES, COMBINED-CYCLE COGENERATION | 461 MW | 100 PPMDV AT MIN. LOAD | COMBUSTION CONTROLS. | 0 | BACT-PSD |
| BLUE MOUNTAIN POWER, LP | PA | Jul-96 | COMBUSTION TURBINE WITH HEAT RECOVERY BOILER | 153 MW | 3.1 PPM @ 15% O2 | OXIDATION CATALYST 16 PPM @ 15% O2 WHEN FIRING NO. 2 OIL. AT 75% NG LIMIT SET TO 22.1 PPM | 80 | OTHER |
| COMMONWEALTH CHESAPEAKE CORPORATION | VA | May-96 | 3 COMBUSTION TURBINES (OIL-FIRED) | 6,000 HRS/YR | 96 TPY | GOOD COMBUSTION OPERATING PRACTICES | 0 | BACT/NSPS |
| PORTSIDE ENERGY CORP. | IN | May-96 | TURBINE, NATURAL GAS-FIRED | 63 MEGAWATT | 40 LBS/HR | GOOD COMBUSTION AND EMISSIONS NOT TO EXCEED 40 PPMVD AT 15% OXYGEN. | 0 | BACT-PSD |
| PORTSIDE ENERGY CORP. | IN | May-96 | TURBINE, NATURAL GAS-FIRED | 63 MEGAWATT | 12 LBS/HR | GOOD COMBUSTION AND EMISSIONS NOT TO EXCEED 10 PPMVD AT 15% OXYGEN. | 0 | BACT-PSD |
| GENERAL ELECTRIC GAS TURBINES | SC | Apr-96 | I.C. TURBINE | 2,700 MMBTU/HR | 27,169 LB/HR | GOOD COMBUSTION PRACTICES TO MINIMIZE EMISSIONS | 0 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | Apr-96 | COMBUSTION TURBINE, 4 EACH | 1,908 MMBTU/HR | 81 LB/HR | COMBUSTION CONTROL | 0 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | Apr-96 | COMBUSTION TURBINE, 4 EACH | 1,908 MMBTU/HR | 80 LB/HR | COMBUSTION CONTROL | 0 | BACT-PSD |
| SOUTH MISSISSIPPI ELECTRIC POWER ASSOC. | MS | Apr-96 | COMBUSTION TURBINE, COMBINED CYCLE | 1,299 MMBTU/HR NAT GAS | 26.3 PPM @ 15% O2, GAS | GOOD COMBUSTION CONTROLS | 0 | BACT-PSD |
| MID-GEORGIA COGEN. | GA | Apr-96 | COMBUSTION TURBINE (2), FUEL OIL | 116 MW | 30 PPMVD | COMPLETE COMBUSTION | 0 | BACT-PSD |
| MID-GEORGIA COGEN. | GA | Apr-96 | COMBUSTION TURBINE (2), NATURAL GAS | 116 MW | 10 PPMVD | COMPLETE COMBUSTION | 0 | BACT-PSD |
| GEORGIA GULF CORPORATION | LA | Mar-96 | GENERATOR, NATURAL GAS FIRED TURBINE | 1,123 MM BTU/HR | 972 TPY CAP FOR 3 TURB | GOOD COMBUSTION PRACTICE AND PROPER OPERATION | 0 | BACT-PSD |
| SEMINOLE HARDEE UNIT 3 | FL | Jan-96 | COMBINED CYCLE COMBUSTION TURBINE | 140 MW | 20 PPM (NAT. GAS) | DRY LNB GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| KEY WEST CITY ELECTRIC SYSTEM | FL | Sep-95 | TURBINE, EXISTING CT RELOCATION TO A NEW PLANT | 23 MW | 20 PPM @ 15% O2 FULL LD | GOOD COMBUSTION | 0 | BACT-PSD |
| UNION CARBIDE CORPORATION | LA | Sep-95 | GENERATOR, GAS TURBINE | 1,313 MM BTU/HR | 199 LB/HR | NO ADD-ON CONTROL GOOD COMBUSTION PRACTICE | 0 | BACT-PSD |
| PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA) | PR | Jul-95 | COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EACH | 248 MW | 20 LB/HR | MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMPLEMENT GOOD COMBUSTION PRACTICES. | 0 | BACT-PSD |
| PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA) | PR | Jul-95 | COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EACH | 248 MW | 104 LB/HR | MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMPLEMENT GOOD COMBUSTION PRACTICES. | 0 | BACT-PSD |
| BROOKLYN NAVY YARD COGENERATION PARTNERS L.P. | NY | Jun-95 | TURBINE, NATURAL GAS FIRED | 240 MW | 4 PPM @ 15% O2 | | 0 | LAER |
| PANDA-KATHLEEN, L.P. | FL | Jun-95 | COMBINED CYCLE COMBUSTION TURBINE (TOTAL 115MW) | 75 MW | 25 PPM @ 15% O2 | COMBUSTION CONTROLS STANDARD ONLY APPLIES IF GE CT IS SELECTED, THE ABB CT WAS LESS THAN SIGNIFICANT EMIS. INCR FOR CO | 0 | BACT-PSD |
| MILAGRO, WILLIAMS FIELD SERVICE | NM | May-95 | TURBINE/COGEN, NATURAL GAS (2) | 900 MMCF/DAY | 28 PPM @ 15% O2 | | 0 | BACT-PSD |
| LEDERLE LABORATORIES | NY | Apr-95 | (2) GAS TURBINES (EP #S 00101&102) | 110 MMBTU/HR | 48 PPM, 12.6 LB/HR | | 0 | BACT-OTHER |
| PILGRIM ENERGY CENTER | NY | Apr-95 | (2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&2) | 1,400 MMBTU/HR | 10 PPM, 29.0 LB/HR | | 0 | BACT-OTHER |
| BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT | MD | Mar-95 | TURBINE, 140 MW NATURAL GAS FIRED ELECTRIC | 140 MW | 20 PPM @ 15% O2 | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FORMOSA PLASTICS CORPORATION, LOUISIANA | LA | Mar-95 | TURBINE/HRSG, GAS COGENERATION | 450 MM BTU/HR | 26 LB/HR | PROPER OPERATION | 0 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | Feb-95 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 89 MW | 428 TPY | GOOD COMBUSTION CONTROL | 0 | BACT-PSD |
| MARATHON OIL CO. - INDIAN BASIN N.G. PLAN | NM | Jan-95 | TURBINES, NATURAL GAS (2) | 5,500 HP | 13 LBS/HR | LEAN-PREMIXED COMBUSTION TECHNOLOGY. | 66 | BACT-PSD |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | SIEMENS V64.3 GAS TURBINE (EP #00001) | 650 MMBTU/HR | 9.5 PPM | NO CONTROLS | 0 | BACT-OTHER |
| INDECK-OSWEGO ENERGY CENTER | NY | Oct-94 | GE FRAME 6 GAS TURBINE | 533 LB/MMBTU | 10 PPM, 10.00 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| FULTON COGEN PLANT | NY | Sep-94 | GE LM5000 GAS TURBINE | 500 MMBTU/HR | 107 PPM, 120 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| CAROLINA POWER AND LIGHT | SC | Aug-94 | STATIONARY GAS TURBINE | 1,520 MMBTU/H | 702 LB/H | PROPER OPERATION TO ACHIEVE GOOD COMBUSTION | 0 | BACT-PSD |
| CAROLINA POWER AND LIGHT | SC | Aug-94 | STATIONARY GAS TURBINE | 1,520 MMBTU/H | 414 LB/H | PROPER OPERATION TO ACHIEVE GOOD COMBUSTION | 0 | BACT-PSD |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | NATURAL GAS-FIRED COMPRESSOR ENGINE | 520 HORSEPOWER | 1.7 LBS/HR | GOOD COMBUSTION | 0 | BACT |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 2 GAS-FIRED GENERATOR ENGINES | 385 HORSEPOWER | 1.3 LBS/HR | GOOD COMBUSTION | 0 | BACT |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 1 GAS-FIRED GENERATOR ENGINE | 577 HORSEPOWER | 1.9 LBS/HR | GOOD COMBUSTION | 0 | BACT |
| COLORADO POWER PARTNERSHIP | CO | Jul-94 | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 385 MMBTU/H EACH TURBINE | 22 PPM @ 15% O2 | | 0 | BACT-PSD |
| MUDDY RIVER L.P. | NV | Jun-94 | COMBUSTION TURBINE, DIESEL & NATURAL GAS | 140 MEGAWATT | 77 LB/HR | FUEL SPEC: NATURAL GAS | 0 | BACT-PSD |
| CSW NEVADA, INC. | NV | Jun-94 | COMBUSTION TURBINE, DIESEL & NATURAL GAS | 140 MEGAWATT | 83 LB/HR | FUEL SPEC: NATURAL GAS | 0 | BACT-PSD |
| PORTLAND GENERAL ELECTRIC CO. | OR | May-94 | TURBINES, NATURAL GAS (2) | 1,720 MMBTU | 15 PPM @ 15% O2 | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | May-94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1,345 MMBTU/HR | 120 TPY | NONE | 0 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | May-94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1,345 MMBTU/HR | 1290 TPY | NONE | 0 | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 1 EMERGENCY GENERATOR | 1,500 KW | 14.4 TPY | RETARD TIMING 6 DEGREES | 0 | NSPS |
| WEST CAMPUS COGENERATION COMPANY | TX | May-94 | GAS TURBINES | 75 MW (TOTAL POWER) | 300 TPY | INTERNAL COMBUSTION CONTROLS | 0 | BACT |
| HERMISTON GENERATING CO. | OR | Apr-94 | TURBINES, NATURAL GAS (2) | 1,696 MMBTU | 15 PPM @ 15% O2 | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | Feb-94 | TURBINE, NATURAL GAS (2) | 1,510 MMBTU/H | 25 PPMVD | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | Feb-94 | TURBINE, FUEL OIL (2) | 1,730 MMBTU/H | 30 PPMVD | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| TECO POLK POWER STATION | FL | Feb-94 | TURBINE, SYNGAS (COAL GASIFICATION) | 1,755 MMBTU/H | 25 PPMVD | GOOD COMBUSTION | 0 | BACT-PSD |
| TECO POLK POWER STATION | FL | Feb-94 | TURBINE, FUEL OIL | 1,765 MMBTU/H | 40 PPMVD | GOOD COMBUSTION | 0 | BACT-PSD |
| INTERNATIONAL PAPER | LA | Feb-94 | TURBINE/HRSG, GAS COGEN | 338 MM BTU/HR TURBINE | 166 LB/HR | COMBUSTION CONTROL | 0 | BACT |
| KAMINE/BESICORP CARTHAGE L.P. | NY | Jan-94 | GE FRAME 6 GAS TURBINE | 491 BTU/HR | 10 PPM, 11.0 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| ORANGE COGENERATION LP | FL | Dec-93 | TURBINE, NATURAL GAS, 2 | 368 MMBTU/H | 30 PPMVD | GOOD COMBUSTION | 0 | BACT-PSD |
| PROJECT ORANGE ASSOCIATES | NY | Dec-93 | GE LM-5000 GAS TURBINE | 550 MMBTU/HR | 92 LB/HR TEMP > 20F | NO CONTROLS | 0 | BACT-OTHER |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | Oct-93 | TURBINE, GAS-FIRED | 11,257 HP | 50 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP | VA | Sep-93 | TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3 | 10.2 X109 SCF/YR NAT GAS | 26 LB/HR | GOOD COMBUSTION OPERATING PRACTICES | 0 | BACT-PSD |
| FLORIDA GAS TRANSMISSION COMPANY | AL | Aug-93 | TURBINE, NATURAL GAS | 12,600 BHP | 0.42 GM/HP HR | AIR-TO-FUEL RATIO CONTROL, DRY COMBUSTION CONTROLS | 0 | BACT-PSD |
| LOCKPORT COGEN FACILITY | NY | Jul-93 | (6) GE FRAME 6 TURBINES (EP #S 00001-00006) | 424 MMBTU/HR | 10 PPM | NO CONTROLS | 0 | BACT-OTHER |
| ANITEC COGEN PLANT | NY | Jul-93 | GE LM5000 COMBINED CYCLE GAS TURBINE EP #00001 | 451 MMBTU/HR | 36 PPM, 33 LB/HR | BAFFLE CHAMBER | 80 | SEE NOTE #4 |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | Jun-93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640 MMBTU/H (EACH) | 2.6 PPMDV | OXIDATION CATALYST | 0 | OTHER |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | Jun-93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617 MMBTU/HR (EACH) | 1.8 PPMDV | OXIDATION CATALYST | 0 | OTHER |
| PSI ENERGY, INC. WABASH RIVER STATION | IN | May-93 | COMBINED CYCLE SYNGAS TURBINE | 1,775 MMBTU/HR | 15 LESS THAN PPM | OPERATION PRACTICES AND GOOD COMBUSTION, COMBINED CYCLE SYNGAS TURBINE | 0 | BACT-PSD |
| TIGER BAY LP | FL | May-93 | TURBINE, OIL | 1,850 MMBTU/H | 98.4 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| TIGER BAY LP | FL | May-93 | TURBINE, GAS | 1,615 MMBTU/H | 49 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| INDECK ENERGY COMPANY | NY | May-93 | GE FRAME 6 GAS TURBINE EP #00001 | 491 MMBTU/HR | 40 PPM | NO CONTROLS | 0 | BACT-OTHER |
| TRIGEN MITCHEL FIELD | NY | Apr-93 | GE FRAME 6 GAS TURBINE | 425 MMBTU/HR | 10 PPM, 10.0 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, FUEL OIL | 928 MMBTU/H | 65 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, FUEL OIL | 371 MMBTU/H | 78 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, NATURAL GAS | 869 MMBTU/H | 54 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | Apr-93 | TURBINE, NATURAL GAS | 367 MMBTU/H | 40 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| EAST KENTUCKY POWER COOPERATIVE | KY | Mar-93 | TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED | 1,492 MMBTU/H (EACH) | 75 LBS/H (EACH) | PROPER COMBUSTION TECHNIQUES | 0 | BACT-OTHER |
| INTERNATIONAL PAPER CO. RIVERDALE MILL | AL | Jan-93 | TURBINE, STATIONARY (GAS-FIRED) WITH DUCT BURNER | 40 MW | 22 LB/HR | DESIGN | 0 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | Dec-92 | TURBINE, OIL | 1,170 MMBTU/H | 25 PPMVD | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | Dec-92 | TURBINE,GAS | 1,214 MMBTU/H | 15 PPMVD | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| SITHE/INDEPENDENCE POWER PARTNERS | NY | Nov-92 | TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW) | 2,133 MMBTU/HR (EACH) | 13 PPM | COMBUSTION CONTROLS | 0 | BACT-OTHER |

Table 5-1b. Summary of Best Available Control Technology (BACT) Determinations for Carbon Monoxide (CO) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | Nov-92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650 MMBTU/HR | 9.5 PPM | COMBUSTION CONTROLS | 0 | BACT-OTHER |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | Nov-92 | TURBINE (NATURAL GAS & OIL) | 1,150 MMBTU | 0.0055 LB/MMBTU (GAS)* | COMBUSTION | 0 | BACT-OTHER |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS | 468 X10(6) BTU/HR #2 OIL | 11 LBS/HR | GOOD COMBUSTION | 0 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS (TOTAL) | 0 | 48 TPY | GOOD COMBUSTION | 0 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | Oct-92 | TURBINE, COMBUSTION GAS | 474 X10(6) BTU/HR N GAS | 11 LBS/HR | GOOD COMBUSTION | 0 | BACT-PSD |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (2) (NATURAL GAS) | 443 KW (EACH) | 0 | LEAN BURN ENGINE | 0 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (3) (NATURAL GAS) | 443 KW (EACH) | 0 | LEAN BURN ENGINE | 0 | OTHER |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINE FACILITY, GAS | 7.44 X10(7) GPY FUEL OIL | 250 TOTAL TPY | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINES (2) [EACH WITH A SF] | 1.36 X10(9) BTU/H #2 OIL | 68 LBS/HR/UNIT | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| GORDONSVILLE ENERGY L.P | VA | Sep-92 | TURBINE FACILITY, GAS | 1,331 X10(7) SCF/Y NAT GAS | 250 TOTAL TPY | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINES (2) [EACH WITH A SF] | 1.51 X10(9) BTU/HR N GAS | 57 LBS/HR/UNIT | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT | NV | Sep-92 | COMBUSTION TURBINE ELECTRIC POWER GENERATION | 600 MW (8 UNITS 75 EACH) | 153 TPY (EACH TURBINE) | PRECISION CONTROL FOR THE LOW NOX COMBUSTOR | 0 | BACT-PSD |
| KAMINE SOUTH GLENS FALLS COGEN CO | NY | Sep-92 | GE FRAME 6 GAS TURBINE | 498 MMBTU/HR | 9 PPM, 11.0 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| NORTHERN STATES POWER COMPANY | SD | Sep-92 | TURBINE, SIMPLE CYCLE, 4 EACH | 129 MW | 50 PPM FOR GAS | GOOD COMBUSTION TECHNIQUES | 0 | BACT-PSD |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | Sep-92 | TURBINE, COMBUSTION GAS (150 MW) | 1,146 MMBTU/HR (GAS)* | 8.5 PPM | COMBUSTION CONTROL | 0 | BACT-OTHER |
| WEPCU, PARIS SITE | WI | Aug-92 | TURBINES, COMBUSTION (4) | 0 | 25 LBS/HR (SEE NOTES) | | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | Aug-92 | TURBINE, OIL | 1,029 MMBTU/H | 54 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | Aug-92 | TURBINE, OIL | 1,866 MMBTU/H | 79 LB/H | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| CNG TRANSMISSION | OH | Aug-92 | TURBINE (NATURAL GAS) (3) | 5,500 HP (EACH) | 0.015 G/HP-HR | FUEL SPEC: USE OF NATURAL GAS | 0 | OTHER |
| SARANAC ENERGY COMPANY | NY | Jul-92 | TURBINES, COMBUSTION (2) (NATURAL GAS) | 1,123 MMBTU/HR (EACH) | 3 PPM | OXIDATION CATALYST | 0 | BACT-OTHER |
| HARTWELL ENERGY LIMITED PARTNERSHIP | GA | Jul-92 | TURBINE, OIL FIRED (2 EACH) | 1,840 M BTU/HR | 25 PPMVD @ FULL LOAD | FUEL SPEC: CLEAN BURNING FUELS | 0 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD./MAALAEA GENERATING STA | HI | Jul-92 | TURBINE, COMBINED-CYCLE COMBUSTION | 28 MW | 27 LB/HR | COMBUSTION TECHNOLOGY/DESIGN | 0 | BACT-OTHER |
| HARTWELL ENERGY LIMITED PARTNERSHIP | GA | Jul-92 | TURBINE, GAS FIRED (2 EACH) | 1,817 M BTU/HR | 25 PPMVD @ FULL LOAD | FUEL SPEC: CLEAN BURNING FUELS | 0 | BACT-PSD |
| INDECK-YERKES ENERGY SERVICES | NY | Jun-92 | GE FRAME 6 GAS TURBINE (EP #00001) | 432 MMBTU/HR | 10 PPM, 10 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | Jun-92 | COMBUSTION TURBINES (2) (252 MW) | 1,173 MMBTU/HR (EACH) | 10 PPM | COMBUSTION CONTROLS | 0 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | Jun-92 | COMBUSTION TURBINE (79 MW) | 1,173 MMBTU/HR | 25 PPM | COMBUSTION CONTROL | 0 | BACT-OTHER |
| TENASKA WASHINGTON PARTNERS, L.P. | WA | May-92 | COGENERATION PLANT, COMBINED CYCLE | 1.83 MMBTU/HR | 20 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO | RI | Apr-92 | TURBINE, GAS AND DUCT BURNER | 1,360 MMBTU/H EACH | 11 PPM @ 15% O2, GAS | | 0 | BACT-PSD |
| KENTUCKY UTILITIES COMPANY | KY | Mar-92 | TURBINE, #2 FUEL OIL/NATURAL GAS (8) | 1,500 MM BTU/HR (EACH) | 75 LB/HR (EACH) | COMBUSTION CONTROL | 0 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION | 1,175 MMBTU/H NAT. GAS | 62 LB/H/UNIT | FURNACE DESIGN | 91 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION | 1,117 MMBTU/H NO2 FUEL OIL | 62 LB/H/UNIT | FURNACE DESIGN | 91 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | Mar-92 | TURBINE, COMBUSTION, 2 | 0 | 229 T/YR/UNIT | | 0 | BACT-PSD |
| THERMO INDUSTRIES, LTD. | CO | Feb-92 | TURBINE, GAS FIRED, 5 EACH | 246 MMBTU/H | 25 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | Feb-92 | TURBINE, FUEL OIL #2 | 20 MW | 27 LB/HR @ 100% PEAKLD | COMBUSTION DESIGN | 0 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | Feb-92 | TURBINE, FUEL OIL #2 | 20 MW | 56 LB/H @ 75-<100% PKLD | COMBUSTION DESIGN | 0 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | Feb-92 | TURBINE, FUEL OIL #2 | 20 MW | 181 LB/H @ 50-<75% PKLD | COMBUSTION DESIGN | 0 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | Feb-92 | TURBINE, FUEL OIL #2 | 20 MW | 476 LB/H @ 25-<50% PKLD | COMBUSTION DESIGN | 0 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | Feb-92 | TURBINES, 8 | 1,032 MMBTU/H, NAT GAS | 9 PPM @ 15% O2 | FUEL SPEC. LOW SULFUR FUEL OIL | 0 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | Feb-92 | TURBINES, 8 | 972 MMBTU/H, #2 OIL | 9 PPM @ 15% O2 | FUEL SPEC: LOW SULFUR FUEL OIL | 0 | BACT-PSD |
| KAMINE/BESICORP NATURAL DAM LP | NY | Dec-91 | GE FRAME 6 GAS TURBINE | 500 MMBTU/HR | 0.02 LB/MMBTU, 10 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | Dec-91 | TURBINE, COMBUSTION | 1,247 MM BTU/HR | 60 LB/HR | COMBUSTION CONTROL | 0 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | Dec-91 | TURBINE, COMBUSTION | 1,313 MM BTU/HR | 59 LB/HR | COMBUSTION CONTROL | 0 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | Dec-91 | TURBINE, FUEL OIL #2 | 28 MW | 0 SEE NOTES | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| KALAMAZOO POWER LIMITED | MI | Dec-91 | TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS | 1,806 MMBTU/H | 20 PPMV | DRY LOW NOX TURBINES | 0 | BACT-PSD |
| LAKE COGEN LIMITED | FL | Nov-91 | TURBINE, OIL, 2 EACH | 42 MW | 78 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| LAKE COGEN LIMITED | FL | Nov-91 | TURBINE, GAS, 2 EACH | 42 MW | 42 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | Nov-91 | TURBINE, GAS, 4 EACH | 35 MW | 10 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | Nov-91 | TURBINE, OIL, 4 EACH | 35 MW | 10 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| SOUTHERN CALIFORNIA GAS | CA | Oct-91 | TURBINE, GAS-FIRED | 48 MMBTU/H | 7.74 PPM @ 15% O2 | HIGH TEMPERATURE OXIDATION CATALYST | 80 | BACT-PSD |
| SOUTHERN CALIFORNIA GAS | CA | Oct-91 | TURBINE, GAS FIRED, SOLAR MODEL H | 5,500 HP | 7.74 PPM @ 15% D2 | HIGH TEMP OXIDATION CATALYST | 80 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5,500 HP | 10.5 PPM @ 15% O2 | FUEL SPEC: LEAN FUEL MIX | 0 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, GAS, SOLAR CENTAUR H | 5,500 HP | 10.5 PPM @ 15% O2 | FUEL SPEC: LEAN FUEL MIX | 0 | BACT-PSD |
| FLORIDA POWER GENERATION | FL | Oct-91 | TURBINE, OIL, 6 EACH | 93 MW | 54 LB/H | COMBUSTION CONTROL | 0 | BACT-PSD |
| EL PASO NATURAL GAS | AZ | Oct-91 | TURBINE, NAT. GAS TRANSM., GE FRAME 3 | 12,000 HP | 60 PPM @ 15% O2 | LEAN BURN | 0 | BACT-PSD |
| CAROLINA POWER AND LIGHT CO. | SC | Sep-91 | TURBINE, I.C. | 80 MW | 60 LB/H | | 0 | BACT-PSD |
| ENRON LOUISIANA ENERGY COMPANY | LA | Aug-91 | TURBINE, GAS, 2 | 39 MMBTU/H | 60 PPM @ 15% O2 | BASE CASE, NO ADDITIONAL CONTROLS | 0 | BACT-PSD |
| ALGONQUIN GAS TRANSMISSION CO. | RI | Jul-91 | TURBINE, GAS, 2 | 49 MMBTU/H | 0.114 LB/MMBTU | GOOD COMBUSTION PRACTICES | 0 | BACT-OTHER |
| CHARLES LARSEN POWER PLANT | FL | Jul-91 | TURBINE, OIL, 1 EACH | 80 MW | 25 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| CHARLES LARSEN POWER PLANT | FL | Jul-91 | TURBINE, GAS, 1 EACH | 80 MW | 25 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| SUMAS ENERGY INC. | WA | Jun-91 | TURBINE, NATURAL GAS | 88 MW | 6 PPM @ 15% O2 | CO CATALYST | 80 | BACT-PSD |
| SAGUARO POWER COMPANY | NV | Jun-91 | COMBUSTION TURBINE GENERATOR | 34.5 MW | 9 PPH | CONVERTER (CATALYTIC) | 90 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, OIL, 2 EACH | 400 MW | 33 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, GAS, 4 EACH | 400 MW | 30 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Jun-91 | TURBINE, CG, 4 EACH | 400 MW | 33 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| NORTHERN CONSOLIDATED POWER | PA | May-91 | TURBINES, GAS, 2 | 34.6 KW EACH | 110 T/YR | OXIDATION CATALYST | 90 | OTHER |
| LAKEWOOD COGENERATION, L.P. | NJ | Apr-91 | TURBINES (#2 FUEL OIL) (2) | 1,190 MMBTU/HR (EACH) | 0.06 LB/MMBTU | TURBINE DESIGN | 0 | BACT-OTHER |
| LAKEWOOD COGENERATION, L.P. | NJ | Apr-91 | TURBINES (NATURAL GAS) (2) | 1,190 MMBTU/HR (EACH) | 0.026 LB/MMBTU | TURBINE DESIGN | 0 | BACT-OTHER |
| CIMARRON CHEMICAL | CO | Mar-91 | TURBINE #2, GE FRAME 6 | 33 MW | 250 T/YR, LESS THAN | CO CATALYST | 0 | OTHER |
| FLORIDA POWER AND LIGHT | FL | Mar-91 | TURBINE, GAS, 4 EACH | 240 MW | 30 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | Mar-91 | TURBINE, OIL, 4 EACH | 0 | 33 PPM @ 15% O2 | COMBUSTION CONTROL | 0 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #2 | NV | Jan-91 | COMBINED-CYCLE POWER GENERATION | 85 MW POWER OUTPUT | 40 LBS/HR | CATALYTIC CONVERTER | 0 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #1 | NV | Jan-91 | COMBINED-CYCLE POWER GENERATION | 85 MW TOTAL OUTPUT | 40 LBS/HR | CATALYTIC CONVERTER | 0 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP | NJ | Nov-90 | TURBINE, NATURAL GAS FIRED | 585 MMBTU/HR | 0.0055 LB/MMBTU | CATALYTIC OXIDATION | 80 | BACT-PSD |
| TBG COGEN COGENERATION PLANT | NY | Aug-90 | GE LM2500 GAS TURBINE | 215 MMBTU/HR | 0.181 LB/MMBTU | CATALYTIC OXIDIZER | 80 | BACT |
| SC ELECTRIC AND GAS COMPANY - HAGOOD STATION | SC | Dec-89 | INTERNAL COMBUSTION TURBINE | 110 MEGAWATTS | 23 LBS/HR | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| PEABODY MUNICIPAL LIGHT PLANT | MA | Nov-89 | TURBINE, 38 MW NATURAL FAS FIRED | 412 MMBTU/HR | 40 PPM @ 15% O2 | GOOD COMBUSTION PRACTICES | 0 | BACT-OTHER |
| MEGAN-RACINE ASSOCIATES, INC | NY | Aug-89 | GE LM5000-N COMBINED CYCLE GAS TURBINE | 401 LB/MMBTU | 0.026 LB/MMBTU, 11 LB/HR | NO CONTROLS | 0 | BACT-OTHER |
| UNOCAL | CA | Jul-89 | TURBINE, GAS (SEE NOTES) | 0 | 10 PPM @ 15% O2 | OXIDATION CATALYST | 75 | BACT-OTHER |

Note: PSD= Prevention of Significant Deterioration
BACT= Best Available Control Technology
LAER= Lowest Achievable Emission Rate

Table 5-1c. Summary of Best Available Control Technology (BACT) Determinations for Sulfur Dioxide (SO2) Emissions, Less Than 100 MW

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size | SO2 Emission Limit | Control Method | Efficienc | Type |
|---|---|---|---|---|---|---|---|---|
| FLORIDA POWER AND LIGHT | FL | 3/14/91 | TURBINE, OIL, 4 EACH | 0.00 | 0.0000 | FUEL SPEC: NO. 2 FUEL OIL AS FUEL | 0.000 | BACT-PSD |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | 9/1/92 | GENERATOR, EMERGENCY (NATURAL GAS) | 1.50 MMBTU/HR | 0.0000 | FUEL SPEC: CLEAN FUEL | 0.000 | BACT-OTHER |
| CHARLES LARSEN POWER PLANT | FL | 7/25/91 | TURBINE, GAS, 1 EACH | 80.00 MW | 0.0000 | FUEL SPEC: LIMIT FUEL SULFUR CONTENT | 0.000 | BACT-PSD |
| CHARLES LARSEN POWER PLANT | FL | 7/25/91 | TURBINE, OIL, 1 EACH | 80.00 MW | 0.0000 | FUEL SPEC: LIMIT FUEL SULFUR CONTENT | 0.000 | BACT-PSD |
| SOUTHERN MARYLAND ELECTRIC COOPERATIVE (SMECO) | MD | 10/1/89 | TURBINE, OIL FIRED ELECTRIC | 90.00 MW | 0.0000 | FUEL SPEC: FUEL LIMITED AND 0.3 % S | 0.000 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION | NM | 11/4/96 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 SEE P2 | SWEET PIPELINE NATURAL GAS | 0.000 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM | NM | 2/15/97 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 SEE FACILITY NOTES | SWEET PIPELINE NATURAL GAS | 0.000 | BACT-PSD |
| UPF CORPORATION | CA | 12/2/91 | ENGINE, DIESEL, EMERGENCY POWER GENERATION | 410.00 HP | 0.0000 | FUEL SPEC: FUEL OIL W/ < 0.05% SULFUR CONTENT | 0.000 | BACT-PSD |
| SITHE/INDEPENDENCE POWER PARTNERS | NY | 11/24/92 | TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW) | 2133.00 MMBTU/HR (EACH) | 0.0000 | FUEL SPEC: USE OF NATURAL GAS | 0.000 | BACT-OTHER |
| MILLENNIUM POWER PARTNER, LP | MA | 2/2/98 | TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G | 2534.00 MMBTU/H | 0.0023 LB/MMBTU | DRY LOW NOX COMBUSTION TECHNOLOGY - SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617.00 MMBTU/HR (EACH) | 0.0026 LB/MMBTU | FUEL SPEC: USE OF NATURAL GAS | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 474.00 X10(6) BTU/HR N. GAS | 0.0032 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (NATURAL GAS) (2) | 1190.00 MMBTU/HR (EACH) | 0.0069 LB/MMBTU | FUEL SPEC: NAT GAS/LOW SULFUR NO.2 OIL | 0.000 | BACT-OTHER |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640.00 MMBTU/H (EACH) | 0.0400 LB/MMBTU | FUEL SPEC: USE OF LOW SULFUR OIL | 0.000 | BACT-PSD |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, FUEL OIL | 1765.00 MMBTU/H | 0.0480 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| ALGONQUIN GAS TRANSMISSION COMPANY | NJ | 3/31/95 | TURBINES COMBUSTION, TWO SOLAR CENTAUR | 3.10 MW EACH | 0.0500 LB/H | | 0.000 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 MMBTU\HR | 0.0500 %BY WEIGHT S CONTENT | LOW SULFUR CONTENT FUEL, & COMBUSTION CONTROL. | 0.000 | BACT-PSD |
| HARTWELL ENERGY LIMITED PARTNERSHIP | GA | 7/28/92 | TURBINE, OIL FIRED (2 EACH) | 1840.00 M BTU/HR | 0.0500 % S IN FUEL | FUEL SPEC: CLEAN BURNING FUELS | 0.000 | BACT-PSD |
| WEPCU, PARIS SITE | WI | 8/29/92 | TURBINES, COMBUSTION (4) | 0.00 | 0.0525 LB/MM BTU | | 0.000 | BACT-PSD |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | ENGINE, DIESEL, FIRE PUMP | 1.50 MMBTU/H | 0.0530 LB/MMBTU | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | 11/9/92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650.00 MMBTU/HR | 0.0800 % SULFUR OIL | FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, SYNGAS (COAL GASIFICATION) | 1755.00 MMBTU/H | 0.1700 LB/MMBTU | ACID GAS ABSORPTION | 0.000 | BACT-PSD |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | 9/1/92 | FIRE PUMP (DIESEL) | 1.30 MMBTU/HR | 0.2000 % SULFUR OIL | FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| PASNY/HOLTSVILLE COMBINED CYCLE PLANT | NY | 9/1/92 | TURBINE, COMBUSTION GAS (150 MW) | 1146.00 MMBTU/HR (GAS)* | 0.2000 % SULFUR OIL | FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | 6/18/92 | COMBUSTION TURBINES (2) (252 MW) | 1173.00 MMBTU/HR (EACH) | 0.2000 % SULFUR OIL | FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | 6/18/92 | COMBUSTION TURBINE (79 MW) | 1173.00 MMBTU/HR | 0.2000 % SULFUR OIL | FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 468.00 X10(6) BTU/HR #2 OIL | 0.2100 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (#2 FUEL OIL) (2) | 1190.00 MMBTU/HR (EACH) | 0.2100 LB/MMBTU | FUEL SPEC: USE OF LOW SULFUR NO.2 OIL | 0.000 | BACT-OTHER |
| RESOURCE RENEWAL TECHNOLOGIES, INC. | CA | 6/18/93 | ENGINE, I.C. | 951.00 BHP | 0.2380 G/B-HP-H | FUEL SPEC: USE OF LOW SULFUR FUEL (<= 0.05% S BY WEIGHT) | 75.000 | BACT-OTHER |
| HIGGINSVILLE MUNICIPAL POWER FACILITY | MO | 7/27/95 | ADD OF A DUAL FUEL FIRED TWIN-PAC TURBINE | 49.10 MW | 0.2500 % SULFUR BY WEIGHT | LOW SULFUR FUEL | 0.000 | BACT-PSD |
| NAPA SANITATION DISTRICT | CA | 3/26/93 | WAUKESHA 5900GL IC ENGINE DIGESTER GAS W/ SUPP NG | 0.00 | 0.3000 G/BHP-HR | ADD'N OF IRON SALTS (SEE NOTES) | 0.000 | BACT-OTHER |
| CITY UTILITIES OF SPRINGFIELD | MO | 3/4/91 | GENERATION OF ELECTRICAL POWER | 585.00 MMBTU/HR. | 0.4000 % SULFUR CONTENT | LOW SULFUR CONTENT FUEL | 0.000 | BACT-PSD |
| CITY UTILITIES OF SPRINGFIELD | MO | 3/6/91 | GENERATION OF ELECTRICAL POWER | 752.00 MMBTU/HR | 0.4000 % SULFUR CONTENT | LOW SULFUR CONTENT FUEL | 0.000 | BACT-PSD |
| OKLAHOMA MUNICIPAL POWER AUTHORITY | OK | 12/17/92 | TURBINE, COMBUSTION | 58.00 MW | 0.4300 LB/MMBTU | FUEL SPEC: USE OF DISTILLATE FUEL | 50.000 | BACT-OTHER |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.51 X10(9) BTU/HR N GAS | 0.5000 LB/HR/UNIT | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | 2/12/92 | TURBINES, 8 | 972.00 MMBTU/H, #2 OIL | 0.5000 % S MAX | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | 11/13/92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 0.6000 LB/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GAS | 0.000 | OTHER |
| CARDINAL FLAT GLASS | WI | 11/23/94 | GENERATOR, BACK-UP, DIESEL | 0.00 | 0.7000 LBS/HR | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | 0.000 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | 12/20/91 | TURBINE, COMBUSTION | 1313.00 MM BTU/HR | 0.7000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, NATURAL GAS (2) | 1510.00 MMBTU/H | 0.9900 LB/H | FUEL SPEC: LOW SULFUR IN NATURAL GAS | 0.000 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 MMBTU/HR | 1.0000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| SOUTH CAROLINA ELECTRIC AND GAS COMPANY | SC | 7/15/92 | GENERATOR, NO 2 OIL - EMERGENCY | 400.00 KILOWATTS | 1.2000 LB/HR | FUEL SPEC: 0.3% SULFUR CONTENT FUEL; LIMIT OPER <500 HOURS/YEAR | 0.000 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | 3/31/98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675.00 MMBTU/H TURBINE | 1.3500 LB/H NG | CATALYTIC OXIDATION, GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| NEVADA COGENERATION ASSOCIATES #1 | NV | 1/17/91 | COMBINED-CYCLE POWER GENERATION | 85.00 MW TOTAL OUTPUT | 2.1000 LBS/HR | FUEL SPEC: USE OF LOW SULFUR OIL AS THE STAND-BY FUEL | 0.000 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #2 | NV | 1/17/91 | COMBINED-CYCLE POWER GENERATION | 85.00 MW POWER OUTPUT | 2.1000 LB/HR | FUEL SPEC: USE OF LOW-SULFUR OIL AS STANDBY FUEL | 0.000 | BACT-PSD |
| COMINCO ALASKA INC. | AK | 7/26/93 | GENERATOR, CATERPILLAR #1, #2 & #3 | 0.00 | 2.3000 TPY | FUEL SPEC: 0.25% S IN FUEL | 0.000 | BACT-PSD |
| WEST CAMPUS COGENERATION COMPANY | TX | 5/2/94 | GAS TURBINES | 75.30 MW (TOTAL POWER) | 2.8000 TPY | INTERNAL COMBUSTION CONTROLS | 0.000 | BACT |
| LORDSBURG L.P. | NM | 6/18/97 | TURBINE, NATURAL GAS-FIRED, ELEC. GEN. | 100.00 MW | 2.8000 LBS/HR | USE OF SWEET NATURAL GAS AND NO.2 DIESEL FUEL WITHLESS THAN 0.05% BY WT. | 0.000 | BACT-PSD |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | TURBINE, COMBUSTION, ABB GT11N2 | 1327.00 MMBTU/H | 3.0500 LB/H | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| BRUSH COGENERATION PARTNERSHIP | CO | | TURBINE | 350.00 MMBTU/H | 3.2000 T/YR | | 0.000 | OTHER |
| COLORADO POWER PARTNERSHIP | CO | | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 385.00 MMBTU/H EACH TURBIN | 3.2000 T/YR | | 0.000 | OTHER |
| COMINCO ALASKA INC. | AK | 7/26/93 | GENERATOR, TRANSPORTABLE | 0.00 | 3.4000 TPY | FUEL SPEC: 0.25% S IN FUEL | 0.000 | BACT-PSD |
| TENASKA WASHINGTON PARTNERS, L.P. | WA | 5/29/92 | COGENERATION PLANT, COMBINED CYCLE | 1.83 MMBTU/HR | 4.0000 PPM @ 15% O2 (GAS) | FUEL SPEC: LIMITS ON FUEL USE, CONTENT. | 0.000 | BACT-PSD |
| BERKSHIRE POWER DEVELOPMENT, INC. | MA | 9/22/97 | TURBINE, COMBUSTION, ABB GT24 | 1792.00 MMBTU/H | 4.0000 LB/H | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | 12/3/93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 4.2000 TPY | FUEL SPEC: 0.20% S FUEL OIL | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | 5/16/94 | 5 ENGINE GENERATORS | 1600.00 KW | 4.2000 TPY | FUEL SPEC: 0.20% S FUEL OIL | 0.000 | NSPS |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 MMBTU\HR | 5.0000 TPY | LOW SULFUR CONTENT & COMBUSTION CONTROL | 0.000 | BACT-PSD |
| PORTSMOUTH NAVAL HOSPITAL | VA | 7/30/93 | GENERATORS, DIESEL, 6 | 748000.00 GAL/YR | 5.4000 LB/HR | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1117.00 MMBTU/H NO2 FUEL OIL | 6.8000 E-2 LB/MMBTU | FUEL SPEC: LOW SULFUR OIL | 91.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1175.00 MMBTU/H NAT. GAS | 9.0000 E-4 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL | 91.000 | BACT-PSD |
| FLEETWOOD COGENERATION ASSOCIATES | PA | 4/22/94 | NG TURBINE (GE LM6000) WITH WASTE HEAT BOILER | 360.00 MMBTU/HR | 11.3000 LB/HR | FUEL SPEC: 0.1 % SULFUR IN FUEL | 0.000 | BACT-OTHER |
| CAROLINA POWER AND LIGHT | SC | 8/31/94 | STATIONARY GAS TURBINE | 1520.00 MMBTU/H | 15.0000 PPMDV @ 15% O2 | | 0.000 | BACT-PSD |
| CAROLINA POWER AND LIGHT | SC | 8/31/94 | STATIONARY GAS TURBINE | 1520.00 MMBTU/H | 15.0000 PPMDV @ 15% O2 | FUEL SPEC: LOW SULFUR OIL. 0.2% MAX SULFUR CONTENT. | 0.000 | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | 1/28/93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 KW (EACH) | 18.1000 LB/HR | FUEL SPEC: USE OF 0.5% SULFUR FUEL | 0.000 | BACT-OTHER |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, FUEL OIL | 371.00 MMBTU/H | 20.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP | VA | 9/15/93 | TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3 | 10.20 X109 SCF/YR NAT GAS | 26.0000 LB/HR(GAS); 71 (OIL) | FUEL SPEC: LOW SULFUR FUELS (NAT.GAS/OIL .05% S) | 0.000 | BACT-PSD |
| NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT | NV | 9/16/92 | COMBUSTION TURBINE ELECTRIC POWER GENERATION | 600.00 MW (8 UNITS 75 EACH) | 27.1000 TPY (EACH TURBINE) | FUEL SPEC: S IN #2 DISTILLATE LIMITED TO 0.05% | 0.000 | BACT-PSD |
| GAINESVILLE REGIONAL UTILITIES - | FL | 4/11/95 | SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL B-UP | 74.00 MW | 29.0000 LB/HR AT 20 F (GAS) | FUEL SPEC: LOW SULFUR OIL BACKUP FUEL AND NAT GAS PRIMARY 0.05% S | 0.000 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | 3/31/98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675.00 MMBTU/H TURBINE | 32.3800 LB/H NG OIL | CATALYTIC OXIDATION, GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | 4/6/93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGINE | 8.30 MW | 40.0000 TPY | LOW SULFUR CONTENT FUEL | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE,GAS | 1214.00 MMBTU/H | 40.0000 LB/H | FUEL SPEC: LOW SULFUR IN NATURAL GAS | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | 4/6/93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 40.0000 TPY | LOW SULFUR CONTENT FUEL | 0.000 | BACT-PSD |
| COMINCO ALASKA INC. | AK | 7/26/93 | GENERATOR, WARTSILLA #2 & #6 | 0.00 | 49.2000 TPY | FUEL SPEC: 0.25% S IN FUEL | 0.000 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, FUEL OIL | 928.00 MMBTU/H | 52.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| GAINESVILLE REGIONAL UTILITIES | FL | 4/11/95 | OIL FIRED COMBUSTION TURBINE | 74.00 MW | 53.0000 LB/HR AT 20 F | FUEL SPEC: LOW S OIL 0.05% S | 0.000 | BACT-PSD |
| GEORGIA POWER COMPANY, ROBINS TURBINE PROJECT | GA | 5/13/94 | TURBINE, COMBUSTION, NATURAL GAS | 80.00 MW | 56.0000 PPM | FUEL SPEC: LOW SULFUR FUEL (.3% AVG) FUEL 0.1 | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | 8/22/95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 57.0000 TPY | SPECIFY TYPE OF FUEL BURNED | 0.000 | BACT |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.36 X10(9) BTU/H #2 OIL | 68.0000 LBS/HR/UNIT | FUEL SPEC: 0.2 WT LOW SULFUR FUEL | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE, OIL | 1170.00 MMBTU/H | 70.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY LIMITED | HI | 11/8/95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 76.0000 PPMVD | FUEL SPEC: SULFUR CONTENT .47 BY WEIGHT | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | 5/4/96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 76.0000 PPMVD | FUEL SPEC: SULFUR CONTENT 0.4% BY WEIGHT | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | 12/3/91 | TURBINE, FUEL OIL #2 | 28.00 MW | 79.0000 PPM | FUEL SPEC: 0.4 % SULFUR | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, FUEL OIL (2) | 1730.00 MMBTU/H | 94.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL OIL (MAX 0.05 % SULFUR) | 0.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | 11/25/91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 95.0000 PPMVD | FUEL SPEC: MAX FUEL S CONTENT 0.5% BY WEIGHT | 0.000 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 MW | 110.0000 LB/HR | COMBUSTOR WATER INJECTOR, FUEL SPEC: 0.4% SULFUR FUEL | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD./MAALAEA GENERATING STA | HI | 7/28/92 | TURBINE, COMBINED-CYCLE COMBUSTION | 28.00 MW | 110.0000 LB/HR | FUEL SPEC: 0.4 PERCENT SULFUR CONTENT | 0.000 | BACT-OTHER |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | 11/23/82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNITS | 12000.00 KW | 111.0000 TPY | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION, 2 | 0.00 | 138.8000 T/YR/UNIT | | 0.000 | BACT-PSD |
| GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP | MN | 7/9/92 | COMPRESSION/TRANSMISSION OF NATURAL GAS | 0.00 | 150.0000 PPMV @ 15% O2, DRY | ENGINE DESIGN AND FUEL SPEC: NATURAL GAS | 0.000 | NSPS |
| GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP | MN | 7/9/92 | COMPRESSION/TRANSMISSION OF NATURAL GAS | 0.00 | 150.0000 PPMV @ 15% O2, DRY | ENGINE DESIGN AND FUEL SPEC: NATURAL GAS | 0.000 | NSPS |
| FLORIDA POWER CORPORATION | FL | 8/17/92 | TURBINE, OIL | 1029.00 MMBTU/H | 222.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| CAROLINA POWER AND LIGHT CO. | SC | 9/23/91 | TURBINE, I.C. | 80.00 MW | 228.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | 12/20/91 | TURBINE, COMBUSTION | 1247.00 MM BTU/HR | 240.7000 LB/HR | FUEL SPEC: 0.2% SULFUR FUEL OIL | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 7.44 X10(7) GPY FUEL OIL | 249.9000 TOTAL TPY | FUEL SPEC: 0.2 WT LOW SULFUR FUEL | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 1331.13 X10(7) SCF/Y NAT GAS | 249.9000 TOTAL TPY | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| COMMONWEALTH CHESAPEAKE CORPORATION | VA | 5/21/96 | 3 COMBUSTION TURBINES (OIL-FIRED) | 6000.00 HRS/YR | 258.0000 TPY | 0.05% SULFURIC FUEL | 84.400 | BACT/NSPS |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 MMBTU/HR | 308.5000 LB/HR | FUEL SPEC: 0.15% S FUEL OIL | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | 8/17/92 | TURBINE, OIL | 1866.00 MMBTU/H | 407.0000 LB/H | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS (TOTAL) | 0.00 | 438.5000 TPY | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| KENTUCKY UTILITIES COMPANY | KY | 3/10/92 | TURBINE, #2 FUEL OIL/NATURAL GAS (8) | 1500.00 MM BTU/HR (EACH) | 444.0000 LB/HR (EACH) | FUEL SPEC: LOW SULFUR FUEL (0.3% SULFUR FUEL) | 0.000 | BACT-PSD |
| EAST KENTUCKY POWER COOPERATIVE | KY | 3/24/93 | TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED | 1492.00 MMBTU/H (EACH) | 500.0000 LBS/H (EACH) | FUEL SPEC: LOW SULFUR FUEL (0.3% SULFUR FUEL) | 0.000 | SEE NOTES |
| FLORIDA POWER GENERATION | FL | 10/18/91 | TURBINE, OIL, 6 EACH | 92.90 MW | 555.0000 LB/H | FUEL SPEC: #2 FUEL OIL | 0.000 | BACT-PSD |
| UNION ELECTRIC CO | MO | 5/6/79 | CONSTRUCTION OF A NEW OIL FIRED COMBUSTION TURBINE | 622.00 MM BTU/HR | 3145.0000 TPY | LOW SULFUR CONTENT FUEL OIL | 0.000 | BACT-PSD |

Source: EPA's RACT/BACT/LEAR Clearinghouse

Table 5-1d.  Summary of Best Available Control Technology (BACT) Determinations for Particulate Emission (PM) Emissions, Less Than 100 MW

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | PM Emission Limit | Pollutant Type | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|---|
| SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION | NM | 11/4/96 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 SEE P2 | PM10 | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM STA | NM | 2/15/97 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 | PM10 | | 0.000 | BACT-PSD |
| LEDERLE LABORATORIES | NY | | (2) GAS TURBINES (EP #S 00101&102) | 110.00 MMBTU/HR | 0.0000 SEE NOTE #2 | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.30% BY WEIGHT | 0.000 | BACT-OTHER |
| SOUTHERN CALIFORNIA GAS COMPANY | CA | 6/30/95 | EMERGENCY IC ENGINE DRIVING A GENERATOR | 132.00 HP | 0.0000 | PM10 | POSITIVE CRANKCASE VENTILATION | 0.000 | BACT-OTHER |
| KAMINE/BESICORP NATURAL DAM LP | NY | 12/31/91 | GE FRAME 6 GAS TURBINE | 500.00 MMBTU/HR | 0.0000 SEE NOTE #1 | PM,PM10 | FUEL SPECIFICATION | 0.000 | BACT-OTHER |
| MILAGRO, WILLIAMS FIELD SERVICE | NM | | TURBINE/COGEN, NATURAL GAS (2) | 900.00 MMCF/DAY | 0.0000 SEE P2 DESC. | PM10 | COMBUSTION AIR FILTERS; GOOD COMBUSTION PRACTICE AND MAINTENAN | 0.000 | BACT-PSD |
| TENASKA WASHINGTON PARTNERS, L.P. | WA | 5/29/92 | COGENERATION PLANT, COMBINED CYCLE | 1.83 MMBTU/HR | 0.0022 GR/DSCF @ 15% O2 | PM10 | FUEL SPEC: LIMITS ON FUEL USE, CONTENT. | 0.000 | BACT-PSD |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (NATURAL GAS) (2) | 1190.00 MMBTU/HR (EACH) | 0.0023 LB/MMBTU | PM | TURBINE DESIGN | 0.000 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | 6/18/92 | COMBUSTION TURSINES (2) (252 MW) | 1173.00 MMBTU/HR (EACH) | 0.0040 LB/MMBTU GAS (BASE) | PM/PM10 | COMBUSTION CONTROLS AND FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| SELKIRK COGENERATION PARTNERS, L.P. | NY | 6/18/92 | COMBUSTION TURBINE (79 MW) | 1173.00 MMBTU/HR | 0.0040 LB/MMBTU, GAS | PM/PM10 | COMBUSTION CONTROLS AND FUEL SPEC: LOW SULFUR OIL | 0.000 | BACT-OTHER |
| ANITEC COGEN PLANT | NY | 7/7/93 | GE LM5000 COMBINED CYCLE GAS TURBINE EP #00001 | 451.00 MMBTU/HR | 0.0050 LB/MMBTU, 2.0 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.1% BY WEIGHT | 0.000 | BACT-OTHER |
| KAMINE/BESICORP CARTHAGE L.P. | NY | 1/18/94 | GE FRAME 6 GAS TURBINE | 491.00 BTU/HR | 0.0050 LB/MMBTU, 3.0 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.20% BY WEIGHT | 0.000 | BACT-OTHER |
| KAMINE SOUTH GLENS FALLS COGEN CO | NY | 9/10/92 | GE FRAME 6 GAS TURBINE | 498.00 MMBTU/HR | 0.0050 LB/MMBTU, 3.0 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.20% BY WEIGHT | 0.000 | BACT-OTHER |
| NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO. | RI | 4/13/92 | TURBINE, GAS AND DUCT BURNER | 1360.00 MMBTU/H EACH | 0.0050 LB/MMBTU, GAS | PM | | 0.000 | BACT-PSD |
| MILLENNIUM POWER PARTNER, LP | MA | 2/2/98 | TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G | 2534.00 MMBTU/H | 0.0050 LB/MMBTU | PM10 | DRY LOW NOX COMBUSTION TECHNOLOGY IN CONJUNCTION WITH SCR ADD- | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 474.00 X10(6) BTU/HR N. GAS | 0.0053 LB/MMBTU | TSP | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 474.00 X10(6) BTU/HR N. GAS | 0.0053 LB/MMBTU | PM10 | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| CHARLES LARSEN POWER PLANT | FL | 7/25/91 | TURBINE, GAS, 1 EACH | 80.00 MW | 0.0060 LB/MMBTU | PM | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| LOCKPORT COGEN FACILITY | NY | 7/14/93 | (6) GE FRAME 6 TURBINES (EP #S 00001-00006) | 423.90 MMBTU/HR | 0.0060 LB/MMBTU, 2.5 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.20% BY WEIGHT | 0.000 | BACT-OTHER |
| TRIGEN MITCHEL FIELD | NY | 4/16/93 | GE FRAME 6 GAS TURBINE | 424.70 MMBTU/HR | 0.0060 LB/MMBTU, 2.9 LB/HR | PM,PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| INDECK ENERGY COMPANY | NY | 5/12/93 | GE FRAME 6 GAS TURBINE EP #00001 | 491.00 MMBTU/HR | 0.0060 LB/MMBTU, 2.5 LB/HR | PM,PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617.00 MMBTU/HR (EACH) | 0.0060 LB/MMBTU | TSP | TURBINE DESIGN | 0.000 | OTHER |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617.00 MMBTU/HR (EACH) | 0.0060 LB/MMBTU | PM10 | TURBINE DESIGN | 0.000 | BACT-PSD |
| SAVANNAH ELECTRIC AND POWER CO. | GA | 2/12/92 | TURBINES, 8 | 1032.00 MMBTU/H, NAT GAS | 0.0060 LB/MMBTU | PM | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| SARANAC ENERGY COMPANY | NY | 7/31/92 | TURBINES, COMBUSTION (2) (NATURAL GAS) | 1123.00 MMBTU/HR (EACH) | 0.0062 LB/MMBTU | PM/PM10 | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| NARTWELL ENERGY LIMITED PARTNERSHIP | GA | 7/28/92 | TURBINE, GAS FIRED (2 EACH) | 1817.00 M BTU/HR | 0.0084 LB/M BTU | PM | FUEL SPEC: CLEAN BURNING FUELS | 0.000 | BACT-PSD |
| LAKE COGEN LIMITED | FL | 11/20/91 | TURBINE, GAS, 2 EACH | 42.00 MW | 0.0065 LB/MMBTU | PM | COMBUSTION CONTROL, FUEL SPEC: CLEAN FUEL | 0.000 | BACT-PSD |
| INDECK-YERKES ENERGY SERVICES | NY | 6/24/92 | GE FRAME 6 GAS TURBINE (EP #00001) | 432.20 MMBTU/HR | 0.0070 LB/MMBTU, 2.5 LB/HR | TSP/PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| PILGRIM ENERGY CENTER | NY | | (2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&2) | 1400.00 MMBTU/HR | 0.0070 LB/MMBTU, 7.20 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.05% BY WEIGHT | 0.000 | BACT-OTHER |
| INDECK-OSWEGO ENERGY CENTER | NY | 10/8/94 | GE FRAME 6 GAS TURBINE | 533.00 LB/MMBTU | 0.0080 LB/MMBTU, 5.00 LB/HR | PM,PM10 | FUEL SPEC: BULFUR CONTENT NOT TO EXCEED 0.27% BY WEIGHT | 0.000 | BACT-OTHER |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | 11/9/92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650.00 MMBTU/HR | 0.0080 LB/MMBTU | PM/PM10 (F | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | SIEMENS V84.3 GAS TURBINE (EP #00001) | 650.00 MMBTU/HR | 0.0080 LB/MMBTU, 5.6 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.15% BY WEIGHT | 0.000 | BACT-OTHER |
| KAMINE/BESICORP CORNING L.P. | NY | 11/5/92 | TURBINE, COMBUSTION (79 MW) | 653.00 MMBTU/HR | 0.0080 LB/MMBTU | PM/PM10 | COMBUSTION CONTROL | 0.000 | BACT-OTHER |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | GENERATOR, COMBUSTION TURBINE & DUCT BURNER | 1966.00 MMBTU/H (CTG) | 0.0069 LB/MMBTU (NAT GAS) | PM | COMBUSTING NATURAL GAS | 0.000 | BACT-PSD |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | GENERATOR, COMBUSTION TURBINE & DUCT BURNER | 1968.00 MMBTU/H (CTG) | 0.0069 LB/MMBTU (NAT GAS) | PM10 | NATURAL GAS COMBUSTION | 0.000 | BACT-PSD |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, FUEL OIL | 1765.00 MMBTU/H | 0.0090 LB/MMBTU | PM | GOOD COMBUSTION | 0.000 | BACT-PSD |
| INTERNATIONAL PAPER CO.   RIVERDALE MILL | AL | 1/11/93 | TURBINE, STATIONARY (GAS-FIRED) WITH DUCT BURNER | 40.00 MW | 0.0100 LB/MMBTU (GAS) | PM10 | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-1 | 421.00 HP | 0.0100 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS7-5, 1 | 421.00 HP | 0.0100 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| TEMPO PLASTICS | CA | 12/31/98 | GAS TURBINE COGENERATION UNIT | 0.00 | 0.0120 LB/MMBTU | PM10 | LUBE OIL VENT COALESCER. OPACITY LIMIT APPLIES TO LUBE OIL VENTS. | 0.000 | LAER |
| LILCO SHOREHAM | NY | 5/10/93 | (3) GE FRAME 7 TURBINES (EP #S 00007-9) | 850.00 MMBTU/HR | 0.0120 LB/MMBTU, 10.2 LB/HR | PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| SAVANNAH ELECTRIC AND POWER CO. | GA | 2/12/92 | TURBINES, 8 | 972.00 MMBTU/H, #2 OIL | 0.0120 LB/MMBTU | PM | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| OKLAHOMA MUNICIPAL POWER AUTHORITY | OK | 12/17/92 | TURBINE, COMBUSTION | 58.00 MW | 0.0125 LB/MMBTU | PM | FUEL SPEC: USE OF DISTILLATE FUEL | 90.000 | BACT-OTHER |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, SYNGAS (COAL GASIFICATION) | 1755.00 MMBTU/H | 0.0130 LB/MMBTU | PM | GOOD COMBUSTION | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE,GAS | 1214.00 MMBTU/H | 0.0136 LB/MMBTU | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| NARTWELL ENERGY LIMITED PARTNERSHIP | GA | 7/28/92 | TURBINE, OIL FIRED (2 EACH) | 1840.00 M BTU/HR | 0.0158 LB/M BTU | PM | FUEL SPEC: CLEAN BURNING FUELS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINES, GAS-FIRED, 3 | 0.00 | 0.0200 LB/H 3 EACH | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-1 | 738.00 HP | 0.0200 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-2 | 738.00 HP | 0.0200 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-4 | 738.00 HP | 0.0200 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| TENASKA WASHINGTON PARTNERS, L.P. | WA | 5/29/92 | BOILERS, AUXILIARY | 90000.00 LBS STEAM/HR (EACH) | 0.0200 GR/DSCF @ 7% O2 | PM10 | FUEL SPEC: FUELS LIMITED TO N.G., NO. 2 FUEL OIL,REFINERY GAS | 0.000 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640.00 MMBTU/H (EACH) | 0.0230 LB/MMBTU | PM10 | TURBINE DESIGN | 0.000 | BACT-PSD |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | DIESEL GENERATOR (EP #00005) | 22.00 MMBTU/HR | 0.0240 LB/MMBTU, 0.53 LB/HR | PM,PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| TBG COGEN COGENERATION PLANT | NY | 8/5/90 | GE LM2500 GAS TURBINE | 214.90 MMBTU/HR | 0.0240 LB/MMBTU, 5.0 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.037%   BY WEIGHT | 0.000 | BACT-OTHER |
| FULTON COGEN PLANT | NY | 9/15/94 | GE LM5000 GAS TURBINE | 500.00 MMBTU/HR | 0.0240 LB/MMBTU, 12.0 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.3% BY WEIGHT | 0.000 | BACT-OTHER |
| CHARLES LARSEN POWER PLANT | FL | 7/25/91 | TURBINE, OIL, 1 EACH | 80.00 MW | 0.0250 LB/MMBTU | PM | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| LAKE COGEN LIMITED | FL | 11/20/91 | TURBINE, OIL, 2 EACH | 42.00 MW | 0.0260 LB/MMBTU | PM | COMBUSTION CONTROL, FUEL SPEC: CLEAN FUEL | 0.000 | BACT-PSD |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (#2 FUEL OIL) (2) | 1190.00 MMBTU/HR (EACH) | 0.0260 LB/MMBTU | PM | TURBINE DESIGN | 0.000 | BACT-OTHER |
| MEGAN-RACINE ASSOCIATES, INC | NY | 8/5/89 | GE LM5000-N COMBINED CYCLE GAS TURBINE | 401.00 LB/MMBTU | 0.0260 LB/MMBTU, 12 LB/HR | PM,PM10 | NO CONTROLS | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 4/1/97 | COMPRESSOR ENGINE, GAS-FIRED, 2 | 0.00 | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC | CO | 7/31/97 | COMPRESSOR ENGINE, GAS FIRED, 2 | 0.00 | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC | CO | 7/31/97 | IC ENGINES, WAUKESNA L5790-GSI, 2 @ 1215 HP | 0.00 | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, 2 | 0.00 | 0.0300 LB/H 2 EACH | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | 11/9/92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650.00 MMBTU/HR | 0.0300 LB/MMBTU | PM/PM10 (F | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 4/1/97 | IC ENGINE, WAUKESHA L5790-GSI, 2 | 1215.00 HP | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-3 | 1215.00 HP | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-3 | 1215.00 HP | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, 1 | 1478.00 HP | 0.0300 LB/H | PM10 | USE OF NATURAL GAS | 0.000 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640.00 MMBTU/H (EACH) | 0.0310 LB/MMBTU | TSP | TURBINE DESIGN | 0.000 | OTHER |
| CNG TRANSMISSION | OH | 8/12/92 | TURBINE (NATURAL GAS) (3) | 5500.00 HP (EACH) | 0.0350 LB/MMBTU | PM | FUEL SPEC: USE OF NATURAL GAS | 0.000 | OTHER |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 468.00 X10(6) BTU/HR #2 OIL | 0.0360 LB/MMBTU | TSP | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 468.00 X10(6) BTU/HR #2 OIL | 0.0360 LB/MMBTU | PM10 | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | 12/3/91 | TURBINE, FUEL OIL #2 | 28.00 MW | 0.0450 GR/DSCF | PM | FUEL SPEC: 0.4 % SULFUR | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE, OIL | 1170.00 MMBTU/H | 0.0472 LB/MMBTU | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| PEABODY MUNICIPAL LIGHT PLANT | MA | 11/30/89 | TURBINE, 38 MW OIL FIRED | 412.00 MMBTU/HR | 0.0500 LB/MMBTU | PM | FUEL SPECIFICATION: NO. 2 LIGHT OIL | 0.000 | BACT-OTHER |
| GORHAM ENERGY LIMITED PARTNERSHIP | ME | 12/4/98 | TURBINE, COMBINED CYCLE | 900.00 MW TOTAL | 0.0600 LB/MMBTU NAT GAS | PM | .05 % SULFUR DISTILLATE OIL #2 IS USED.   EMISSION IS FROM EACH 300 | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY LIMITED | HI | 11/8/95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 0.0780 GR/DSCF @ 12% CO2 | PM/PM10 | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | 5/4/98 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 0.0780 GR/DSCF @ 12% CO2 | PM | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| RVAN-MURPHY INCORPORATED | CA | 1/6/92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 0.0900 LB/H | PM10 | WATER INJECTION | 40.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | 11/25/91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 0.1000 LB/MMBTU FULL LOAD | PM | DIESEL FUEL OIL, HIGH COMB. EFF. | 0.000 | BACT-PSD |
| WESTERN ENVIRONMENTAL ENGINEERS COMPANY | CA | 5/2/95 | TWO FORD LSG-875 GAS FIRED IC ENGINES | 175.00 HP PER ENGINE | 0.1000 LBM/MMBTU | PM10 | FUEL SPEC: LPG AS AUXILIARY FUEL TO TANK VAPORS | 0.000 | BACT-OTHER |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | 11/4/92 | GENERATOR, STEAM | 450.00 MMBTU | 0.1000 LB/MMBTU* | PM | DRY LOW NOX BURNER, COMBUSTION CONTROL | 0.000 | BACT-OTHER |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | 11/4/92 | TURBINE (NATURAL GAS & OIL) | 1150.00 MMBTU | 0.1000 LB/MMBTU* | PM | DRY LOW NOX BURNER, COMBUSTION CONTROL | 0.000 | BACT-OTHER |
| CITY OF STOCKTON MUNICIPAL UTILITIES DEPT. | CA | 11/22/96 | GAS-FIRED IC ENGINE | 2760.00 HP | 0.1000 G/BHP-HR | PM10 | DIGESTER OR NATURAL GAS FUEL OR ANY BLEND OF   DIGESTER OR NATU | 0.000 | LAER |
| MOBIL EXPLORATION & PRODUCING U.S., INC. | CA | 7/2/96 | LEAN BURN NATURAL GAS-FIRED IC ENGINE | 280.00 BHP | 0.1800 G/BHP-HR | PM10 | NATURAL GAS/LPG FIRING, AIR/FUEL CONTROLLER, AND CLEANBURN COMBU | 0.000 | LAER |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | FIRE PUMP (EP #00007) | 1.50 MMBTU/HR | 0.2000 LB/MMBTU, 0.29 LB/HR | PM,PM10 | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.15% BY WEIGHT | 0.000 | BACT-OTHER |

Table 5-1d. Summary of Best Available Control Technology (BACT) Determinations for Particulate Emission (PM) Emissions, Less Than 100 MW

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity | (size) | PM Emission Limit | | Pollutant Type | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CITY OF CLOVIS | CA | 11/8/96 | CATERPILLAR MODEL G3408TA NATURAL GAS, IC ENGIN | 0.00 | | 0.2300 | G/BHP-HR | PM10 | NATURAL GAS FUEL AND PCV | 0.000 | LAER |
| KEARNY VENTURES, LIMITED | CA | 1/12/96 | INTERNAL COMBUSTION ENGINE | 208.00 | HP | 0.2500 | G/B-HP-HR | PM10 | FUEL SPEC: LOW-SULFUR DIESEL FUEL (0.05% BY WT S) | 0.000 | BACT-OTHER |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | ENGINE, DIESEL, EMERGENCY FIRE PUMP | 2.70 | MMBTU/H | 0.2600 | LB/MMBTU | PM | LIMITED TO BURN DIESEL 150 H/YR. | 0.000 | BACT-PSD |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | ENGINE, DIESEL, EMERGENCY FIRE PUMP | 2.70 | MMBTU/H | 0.2600 | LB/MMBTU | PM10 | LIMITED TO BURN DIESEL 150 H/YR. | 0.000 | BACT-PSD |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | ENGINE, DIESEL, FIRE PUMP | 1.50 | MMBTU/H | 0.3100 | LB/MMBTU | PM10 | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL | 0.000 | BACT-PSD |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (2) (NATURAL GAS) | 443.00 | KW (EACH) | 0.3200 | G/B-HP-H | PM | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (3) (NATURAL GAS) | 443.00 | KW (EACH) | 0.3200 | G/B-HP-H | PM | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (11) (DIESEL) | 1158.00 | KW (EACH) | 0.3200 | G/B-HP-H | PM | SCR | 0.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (7) (DIESEL) | 1635.00 | KW (EACH) | 0.3200 | G/B-HP-H | PM | SCR | 0.000 | BACT-OTHER |
| ARCHIE CRIPPEN | CA | 12/9/97 | IC ENGINE, DETROIT DIESEL MODEL 8V-92TA | 500.00 | BHP | 0.4100 | G/B-HP-H | PM10 | NO CONTROL | 0.000 | BACT |
| GRAIN PROCESSING CORP. | IN | 6/10/97 | EMERGENCY FIRE PUMP | 115.00 | HP | 0.5000 | LB/HR | PM10 | | 0.000 | BACT-PSD |
| LSP-COTTAGE GROVE, L.P. | MN | 3/1/95 | DIESEL ENGINE-DRIVEN FIRE PUMP | 2.70 | MMBTU/HR | 0.7000 | LB/HR | PM10 | FUEL SELECTION; GOOD COMBUSTION | 0.000 | BACT-PSD |
| LAKEWOOD COGENERATION, L.P. | NJ | 9/4/92 | COOLING TOWER, MECHANICAL DRAFT | 27000000.00 | LB/H H2O RECIRC. | 0.9090 | LB/HR | PM | DRIFT ELIMINATOR | 0.000 | BACT-PSD |
| PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP | VA | 9/15/93 | TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3 | 10.20 | X109 SCF/YR NAT GAS | 1.0000 | LB/HR | TSP/PM10 | FUEL SPEC: CLEAN BURNING FUELS | 0.000 | BACT-PSD |
| CUNNINGHAM DAVIS ENVIRONMENTAL | CA | 4/5/96 | COMPRESSION IGNITION IC ENGINE | 173.00 | HP | 1.0000 | G/B-HP-HR | PM10 | LOW-SULFUR DIESEL FUEL AND POSITIVE CRANKCASE VENTILATION OR CR | 0.000 | BACT-OTHER |
| PARKER HANNIFIN CORP - RACOR DIVISION | CA | 1/11/96 | IC ENGINE | 450.00 | HP | 1.0000 | G/B-HP-HR | PM10 | LOW-SULFUR DIESEL FUEL AND POSITIVE CRANXCASE VENTILATION OR CR | 0.000 | BACT-OTHER |
| NAVY PUBLIC WORKS CENTER | VA | 12/3/93 | GENERATOR, ENGINE, 5 | 1600.00 | KW | 1.6000 | LB/HR | TSP | FUEL SPEC: .20% S FUEL OIL | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | 12/3/93 | GENERATOR, ENGINE, 5 | 1600.00 | KW | 1.6000 | LB/HR | PM10 | FUEL SPEC: .20% S FUEL OIL | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | 5/16/94 | 5 ENGINE GENERATORS | 1600.00 | KW | 2.1000 | TPY | TSP | | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | 5/16/94 | 5 ENGINE GENERATORS | 1600.00 | KW | 2.1000 | TPY | PM10 | | 0.000 | NSPS |
| COMBINED HEAT & POWER, INC. | VA | 8/22/95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 | MM KWHR/YR | 2.5000 | TPY | PM10 | PROPER ENGINE MAINTENANCE PRACTICES | 0.000 | BACT |
| COMBINED HEAT & POWER, INC. | VA | 8/22/95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 | MM KWHR/YR | 2.5000 | TPY | TSP | PROPER ENGINE MAINTENANCE PRACTICES | 0.000 | BACT |
| SAGUARO POWER COMPANY | NV | 6/17/91 | COMBUSTION TURBINE GENERATOR | 34.50 | MW | 2.5000 | PPH | PM | COMBUSTION SYSTEM | 0.000 | LAER |
| MEAD COATED BOARD, INC. | AL | 3/12/97 | COMBINED CYCLE TURBINE (25 MW) | 568.00 | MMBTU/HR | 2.5000 | LBS/HR (GAS) | PM | PRIMARY FUEL IS NATURAL GAS WITH BACKUP FUEL AS DISTILLATE OIL. EF | 0.000 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #2 | NV | 1/17/91 | COMBINED-CYCLE POWER GENERATION | 85.00 | MW POWER OUTPUT | 3.0000 | LBS/HR | PM10 | FUEL SPEC: BURN NATURAL GAS | 0.000 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #1 | NV | 1/17/91 | COMBINED-CYCLE POWER GENERATION | 85.00 | MW TOTAL OUTPUT | 3.0000 | LBS/HR | PM10 | FUEL SPEC: BURN NATURAL GAS | 0.000 | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | 1/28/93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 | KW (EACH) | 3.4000 | LB/HR | TSP/PM10 | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| ALGONQUIN GAS TRANSMISSION COMPANY | NJ | 3/31/95 | TURBINES COMBUSTION, TWO SOLAR CENTAUR | 3.10 | MW EACH | 3.4400 | LB/H | PM10 | | 0.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1117.00 | MMBTU/H NO2 FUEL OIL | 3.5000 | E-2 LB/MMBTU | PM | FUEL SPEC: CLEAN BURN FUEL | 91.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1117.00 | MMBTU/H NO2 FUEL OIL | 3.5000 | E-2 LB/MMBTU | PM10 | FUEL SPEC: CLEAN BURN FUEL | 91.000 | BACT-PSD |
| PORTSMOUTH NAVAL HOSPITAL | VA | 7/30/93 | GENERATORS, DIESEL, 6 | 748000.00 | GAL/YR | 3.6000 | LB/HR | TSP/PM10 | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| BMW MANUFACTURING CORPORATION | SC | 1/7/94 | TURBINE, NAT.GAS FIRED (3 -1 SPARE) AND 2 BOILERS | 54.50 | MM BTU/HR TURBINES | 3.7900 | TPY | PM10 | EACH OF THE 2 BOILER-TURBINE USE A COMMON STACK | 0.000 | BACT-PSD |
| NORTHERN CALIFORNIA POWER AGENCY | CA | 10/2/97 | GE FRAME 5 GAS TURBINE | 325.00 | MMBTU/HR | 4.3000 | LB/DAY | PM10 | NATURAL GAS, AIR INTAKE COOLER, VENTING THE LUBE OIL VENT INTO THE | 0.000 | LAER |
| CARDINAL FLAT GLASS | WI | 11/23/94 | GENERATOR, BACK-UP, DIESEL | 0.00 | | 4.7500 | LBS/HR | PM | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | 0.000 | BACT-PSD |
| PORTSIDE ENERGY CORP. | IN | 5/13/96 | TURBINE, NATURAL GAS-FIRED | 63.00 | MEGAWATT | 5.0000 | LBS/HR | PM/PM10 | | 0.000 | BACT-PSD |
| ORANGE COGENERATION LP | FL | 12/30/93 | TURBINE, NATURAL GAS, 2 | 368.30 | MMBTU/H | 5.0000 | LB/H | PM | GOOD COMBUSTION | 0.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1175.00 | MMBTU/H NAT. GAS | 5.0000 | E-3 LB/MMBTU | PM | FUEL SPEC: CLEAN BURN FUEL | 91.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTHERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1175.00 | MMBTU/H NAT. GAS | 5.0000 | E-3 LB/MMBTU | PM10 | FUEL SPEC: CLEAN BURN FUEL | 91.000 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | 12/20/91 | TURBINE, COMBUSTION | 1313.00 | MM BTU/HR | 5.0000 | LB/HR | PM10 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| LORDSBURG L.P. | NM | 6/18/97 | TURBINE, NATURAL GAS-FIRED, ELEC. GEN. | 100.00 | MW | 5.3000 | LBS/HR | PM | HIGH COMBUSTION EFFICIENCY USE OF NO.2 LOW SULFUR FUEL OIL (LESS T | 0.000 | BACT-PSD |
| BASF CORPORATION | LA | 12/30/97 | TURBINE, COGEN UNIT 2, GE FRAME 6 | 42.40 | MW | 5.4000 | LB/H | PM10 | GOOD DESIGN, PROPER OPERATING PRACTICES, USE GASEOUS FUELS | 0.000 | BACT-PSD |
| CAROLINA POWER AND LIGHT | SC | 8/31/94 | STATIONARY GAS TURBINE | 1520.00 | MMBTU/H | 5.9000 | LB/H | PM (NG) | PROPER OPERATION TO ACHIEVE GOOD COMBUSTION | 0.000 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | 3/31/98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675.00 | MMBTU/H TURBINE | 6.2700 | LB/H NG | PM | GOOD COMBUSTION PRACTICES, COMBUSTION OF CLEAN FUELS. | 0.000 | BACT-OTHER |
| GAINESVILLE REGIONAL UTILITIES | FL | 4/11/95 | SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL B- | 74.00 | MW | 7.0000 | LB/HR AT 20 F | PM | FUEL SPEC: LOW SULFUR FUELS | 0.000 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, NATURAL GAS | 869.00 | MMBTU/H | 7.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CITY OF TULARE, PROJECT 960679 | CA | 3/13/98 | CLEAN BURN IC ENGINE | 8.77 | MMBTU/HR | 7.5200 | LB/MMSCF | PM10 | GASEOUS FUEL AND POSITIVE CRANKCASE VENTILATION | 0.000 | BACT-OTHER |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.51 | X10(9) BTU/HR N GAS | 8.0000 | LBS/HR/UNIT | TSP/PM10 | FUEL SPEC: CLEAN BURNING FUEL | 0.000 | BACT-PSD |
| FLEETWOOD COGENERATION ASSOCIATES | PA | 4/22/94 | NG TURBINE (GE LM6000) WITH WASTE HEAT BOILER | 360.00 | MMBTU/HR | 8.0000 | LB/HR | PM | | 0.000 | BACT-OTHER |
| SOUTH MISSISSIPPI ELECTRIC POWER ASSOC. | MS | 4/9/98 | COMBUSTION TURBINE, COMBINED CYCLE | 1299.00 | MMBTU/HR NAT GAS | 8.1000 | LB/HR, GAS | PM | GOOD COMBUSTION CONTROLS | 0.000 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, NATURAL GAS | 367.00 | MMBTU/H | 9.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, NATURAL GAS (2) | 1510.00 | MMBTU/H | 9.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| TIGER BAY LP | FL | 5/17/93 | TURBINE, GAS | 1614.80 | MMBTU/H | 9.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 | MMBTU/HR | 9.0000 | LB/HR | PM/PM10, G | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| BRUSH COGENERATION PARTNERSHIP | CO | | TURBINE | 350.00 | MMBTU/H | 9.9000 | T/YR | PM10 | | 0.000 | OTHER |
| BRUSH COGENERATION PARTNERSHIP | CO | | TURBINE | 350.00 | MMBTU/H | 9.6000 | T/YR | PM | | 0.000 | OTHER |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, FUEL OIL | 371.00 | MMBTU/H | 10.0000 | LB/H | PM | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | 11/13/92 | ENGINES, RECIPROCATING (6) | 2500.00 | HP (EACH) | 10.0000 | LB/MILLION SCF | PM10 | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GAS | 0.000 | OTHER |
| LSP-COTTAGE GROVE, L.P. | MN | 3/1/95 | COMBUSTION TURBINE/GENERATOR | 1970.00 | MMBTU/HR | 10.7000 | LB/HR GAS | PM10 | FUEL SELECTION; GOOD COMBUSTION | 0.000 | BACT-PSD |
| SOUTHERN NATURAL GAS | AL | 3/2/98 | 9160 HP GE MODEL MS3002G NATURAL GAS FIRED TURBI | 9160.00 | HP | 10.9500 | TPY | PM10 | FUEL SPEC: NATURAL GAS | 0.000 | BACT-PSD |
| SOUTHERN NATURAL GAS | AL | 3/4/98 | 2-9160 HP GE MODEL MS3002G NATURAL GAS TURBINES | 9160.00 | HP | 10.9500 | TPY | PM10 | FUEL SPEC: NATURAL GAS | 0.000 | BACT-PSD |
| WEPCU, PARIS SITE | WI | 8/29/92 | TURBINES, COMBUSTION (4) | 0.00 | | 12.0000 | LBS/HR | PM | GOOD COMBUSTION | 0.000 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 2/28/95 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 88.77 | MW | 12.2500 | TPY | PM10 | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |
| COLORADO POWER PARTNERSHIP | CO | | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 365.00 | MMBTU/H EACH TURBINE | 12.4000 | T/YR | PM10 | | 0.000 | OTHER |
| COLORADO POWER PARTNERSHIP | CO | | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 365.00 | MMBTU/H EACH TURBINE | 12.4000 | T/YR | PM | | 0.000 | OTHER |
| WILLIAM BOLTHOUSE FARMS | CA | 6/27/98 | IC ENGINE | 402.00 | HP | 12.4000 | LB/DAY | PM10 | LOW-SULFUR DIESEL FUEL (0.05% S) AND POSITIVE CRANKCASE VENTILATI | 0.000 | LAER |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | TURBINE, COMBUSTION, ABB GT11N2 | 1327.00 | MMBTU/H | 12.5000 | LB/H | PM10 | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.36 | X10(9) BTU/H #2 OIL | 13.0000 | LBS/HR/UNIT | TSP/PM10 | FUEL SPEC: CLEAN BURNING FUEL | 0.000 | BACT-PSD |
| ROSS ISLAND SAND AND GRAVEL | CA | 8/2/96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDG | 665.00 | HP | 14.4000 | LB/DAY | PM10 | POSITIVE CRANKCASE VENTILATION AND LOW SULFUR DIESEL FUEL (0.05% | 0.000 | LAER |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | 4/6/93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGI | 6.30 | MW | 15.0000 | TPY | PM10 | | 0.000 | BACT-PSD |
| CAROLINA POWER AND LIGHT CO. | SC | 9/23/91 | TURBINE, I.C. | 80.00 | MW | 15.0000 | LB/H | PM | | 0.000 | BACT-PSD |
| FLORIDA POWER GENERATION | FL | 10/18/91 | TURBINE, OIL, 6 EACH | 92.90 | MW | 15.0000 | LB/H | PM | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| KISSIMMEE UTILITY AUTHORITY | FL | 4/7/93 | TURBINE, FUEL OIL | 928.00 | MMBTU/H | 15.0000 | LB/H | PM | FUEL SPEC: LOW SULFUR FUEL | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | 6/17/92 | TURBINE, OIL | 1029.00 | MMBTU/H | 15.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | 4/6/93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 | HP | 15.0000 | TPY | PM10 | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, FUEL OIL (2) | 1730.00 | MMBTU/H | 17.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| TIGER BAY LP | FL | 5/17/93 | TURBINE, OIL | 1849.90 | MMBTU/H | 17.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | 6/17/92 | TURBINE, OIL | 1666.00 | MMBTU/H | 17.0000 | LB/H | PM | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 | MMBTU/HR | 17.0000 | LB/HR | PM/PM10, OI | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| BERKSHIRE POWER DEVELOPMENT, INC. | MA | 9/22/97 | TURBINE, COMBUSTION, ABB GT24 | 1792.00 | MMBTU/H | 17.4000 | LB/H | PM | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL | 0.000 | BACT-PSD |
| UNION CARBIDE CORPORATION | LA | 9/22/95 | GENERATOR, GAS TURBINE | 1313.00 | MM BTU/HR | 18.3000 | LB/HR | PM10 | NO CONTROL CLEAN FUEL | 0.000 | BACT-PSD |
| AIR LIQUIDE AMERICA CORPORATION | LA | 2/13/98 | TURBINE GAS, GE, 7ME 7 | 966.00 | MMBTU/H | 18.7000 | LB/H | PM10 | GOOD COMBUSTION PRACTICES AND USE CLEAN NATURAL GAS AS FUEL | 0.000 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 | MW | 19.7000 | LB/HR | PM | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD./MAALAEA GENERATING STA | HI | 7/28/92 | TURBINE, COMBINED-CYCLE COMBUSTION | 28.00 | MW | 19.7000 | LB/HR | PM | COMBUSTION TECHNOLOGY/DESIGN | 0.000 | BACT-OTHER |
| CAROLINA POWER AND LIGHT | SC | 8/31/94 | STATIONARY GAS TURBINE | 1520.00 | MMBTU/H | 22.0000 | LB/H | PM (OIL) | PROPER OPERATION TO ACHIEVE GOOD COMBUSTION | 0.000 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | 3/31/98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 875.00 | MMBTU/H TURBINE | 24.2100 | LB/H NG OIL | PM | GOOD COMBUSTION PRACTICES, COMBUSTION OF CLEAN FUELS. | 0.000 | BACT-OTHER |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 | MMBTU/HR | 24.5000 | TPY | PM10 (NATU | NONE | 0.000 | BACT-PSD |
| THERMO INDUSTRIES, LTD. | CO | 2/19/92 | TURBINE, GAS FIRED, 5 EACH | 248.00 | MMBTU/H | 25.6000 | LB/H | PM | FUEL SPEC: NATURAL GAS FIRED | 0.000 | OTHER |
| NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT | NV | 9/18/92 | COMBUSTION TURBINE ELECTRIC POWER GENERATION | 600.00 | MW (8 UNITS 75 EACH) | 30.6000 | TPY (EACH TURBINE) | PM10 | PRECISION CONTROL FOR THE COMBUSTOR | 0.000 | BACT-PSD |

Table 5-1d. Summary of Best Available Control Technology (BACT) Determinations for Particulate Emission (PM) Emissions, Less Than 100 MW

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity | (size) | PM Emission Limit | | Pollutant Type | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 7.44 | X10(7) GPY FUEL OIL | 50.6000 | TOTAL TPY | TSP/PM10 | FUEL SPEC: CLEAN BURNING FUEL | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 1331.13 | X10(7) SCF/Y NAT GAS | 50.6000 | TOTAL TPY | TSP/PM10 | FUEL SPEC: CLEAN BURNING FUEL | 0.000 | BACT-PSD |
| WEST CAMPUS COGENERATION COMPANY | TX | 5/2/94 | GAS TURBINES | 75.30 | MW (TOTAL POWER) | 52.0000 | TPY | PM10 | INTERNAL COMBUSTION CONTROLS | 0.000 | BACT |
| EAST KENTUCKY POWER COOPERATIVE | KY | 3/24/93 | TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED | 1492.00 | MMBTU/H (EACH) | 54.0000 | LBS/H (EACH) | PM/PM10 | PROPER COMBUSTION TECHNIOUES | 0.000 | BACT-OTHER |
| FLORIDA POWER AND LIGHT | FL | 3/14/91 | TURBINE, OIL, 4 EACH | 0.00 | | 58.0000 | LB/H | PM | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| KENTUCKY UTILITIES COMPANY | KY | 3/10/92 | TURBINE, #2 FUEL OIL/NATURAL GAS (6) | 1500.00 | MM BTU/HR (EACH) | 67.0000 | LB/HR (EACH) | PM/PM10 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS (TOTAL) | 0.00 | | 74.6000 | TPY | TSP | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS (TOTAL) | 0.00 | | 74.6000 | TPY | PM10 | FUEL SPEC: CLEAN BURN FUEL | 0.000 | BACT-PSD |
| MINNESOTA METHANE TAJIUAS CORPORATION | CA | 1/9/98 | EQUIPMENT, LANDFILL GAS TO ENERGY PRODUCTION | 43.88 | MMBTU/H | 78.5000 | LB/D | PM10 | LANDFILL GAS FUEL PRETREATMENT SYSTEM TO REMOVE GAS CONDENSA | 0.000 | BACT |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION, 2 | 0.00 | | 82.2000 | T/YR/UNIT | PM | | 0.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION, 2 | 0.00 | | 82.2000 | T/YR/UNIT | PM10 | | 0.000 | BACT-PSO |
| GEORGIA GULF CORPORATION | LA | 3/26/96 | GENERATOR, NATURAL GAS FIRED TURBINE | 1123.00 | MM BTU/HR | 92.0000 | TPY CAP FOR 3 TURB. | PM10 | GOOD COMBUSTION PRACTICE AND PROPER OPERATION | 0.000 | BACT-PSO |
| COMMONWEALTH CHESAPEAKE CORPORATION | VA | 5/21/96 | 3 COMBUSTION TURBINES (OIL-FIRED) | 6000.00 | HRS/YR | 96.3000 | TPY | TSP | USE OF CLEAN LOW ASH FUEL | 0.000 | BACT/NSPS |
| COMMONWEALTH CHESAPEAKE CORPORATION | VA | 5/21/96 | 3 COMBUSTION TURBINES (OIL-FIRED) | 6000.00 | HRS/YR | 96.3000 | TPY | PM10 | USE OF CLEAN LOW ASH FUEL | 0.000 | BACT/NSPS |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | 11/23/82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNIT | 12000.00 | KW | 119.0000 | TPY | PM10 | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 | MMBTU\HR | 163.5000 | TPY | PM10 (#2 OIL | NONE | 0.000 | BACT-PSD |
| UNION ELECTRIC CO | MO | 5/6/79 | CONSTRUCTION OF A NEW OIL FIRED COMBUSTION TUR | 622.00 | MM BTU/HR | 174.0000 | TPY | PM10 | | 0.000 | BACT-PSD |

Source: EPA's RACT/BACT/LEAR Clearinghouse

*Table 5-1e. Summary of Best Available Control Technology (BACT) Determinations for Volatile Organic Compounds (VOC) Emissions, Less Than 100 MW*

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | VOC Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| TEXACO EXPLORATION & PRODUCTION INCORPORATED | CA | 6/2/92 | COMPRESSOR, FIXED ROOF STOAGE VAPOR RECOVERY SYS. | 15.00 HP | 0.0000 | CRANKCASE BREATHER VENTED TO COMPRESSOR SUCTION INLET | 99.000 | BACT-PSD |
| TEXACO EXPLORATION & PRODUCTION INC. | CA | 6/2/92 | COMPRESSOR, GAS | 15.00 HP OUTPUT | 0.0000 | CRANKCASE BREATHER | 0.000 | BACT-OTHER |
| MAUI ELECTRIC COMPANY, LTD. | HI | 12/3/91 | TURBINE, FUEL OIL #2 | 28.00 MW | 0.0000 SEE NOTES | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION | NM | 11/4/96 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 SEE P2 | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM STA | NM | 2/15/97 | COMBUSTION TURBINE, NATURAL GAS | 100.00 MW | 0.0000 |  | 0.000 | BACT-PSD |
| SOUTHERN CALIFORNIA GAS COMPANY | CA | 6/30/95 | EMERGENCY IC ENGINE DRIVING A GENERATOR | 132.00 HP | 0.0000 | TWO-WAY CATALYST | 0.000 | BACT-OTHER |
| G.E.N.Y. OPERATIONS COMPANY | CA | 11/3/97 | IC ENGINE, NAT GAS FIRED, CATERPILLAR MODEL 333 | 145.00 BHP | 0.0000 | POSITIVE CRANKCASE VENTILATION | 0.000 | BACT |
| DE LA GUERRA POWER, INC | CA | 11/12/91 | ENGINE IC & GEN (1 OF 3) | 380.00 HP | 0.0000 UNOUANTIFIED CRANKCA | VENT CRANKCASE EMISSIONS TO INTAKE MANIFOLD | 100.000 | BACT-PSD |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (2) (NATURAL GAS) | 443.00 KW (EACH) | 0.0000 | LEAN BURN ENGINE | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (3) (NATURAL GAS) | 443.00 KW (EACH) | 0.0000 | LEAN BURN ENGINE | 0.000 | OTHER |
| BLUE LAKE GAS STORAGE CO. | MI | 5/7/92 | ENGINES, RECIPROCATING, 4 CYCLE | 1076.00 HP | 0.0000 | CATALYTIC OXIDIZER | 60.000 | BACT-PSD |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (11) (DIESEL) | 1156.00 KW (EACH) | 0.0000 | SCR | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | 10/15/92 | ENGINES (7) (DIESEL) | 1635.00 KW (EACH) | 0.0000 | SCR | 0.000 | OTHER |
| TEXACO INC. - ONSHORE DIVISION | LA | 9/25/92 | COMPRESSORS, RECIPROCATING (3) | 1642.00 HP (EACH) | 0.0000 | LEAN BURN ENGINE | 0.000 | BACT |
| BLUE LAKE GAS STORAGE CO. | MI | 5/7/92 | ENGINES, RECIPROCATING, 2 CYCLE | 6000.00 HP | 0.0000 | INTERNAL COMBUSTION DESIGN | 0.000 | BACT-PSD |
| MILLENNIUM POWER PARTNER, LP | MA | 2/2/98 | TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G | 2534.00 MMBTU/H | 0.0013 LB/MMBTU | DRY LOW NOX COMBUSTION TECHNOLOGY IN COJUNCTION WITH SCR ADD-O | 0.000 | BACT-PSD |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, SYNGAS (COAL GASIFICATION) | 1755.00 MMBTU/H | 0.0017 LB/MMBTU | GOOD COMBUSTION | 0.000 | BACT-PSD |
| PILGRIM ENERGY CENTER | NY |  | (2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&2) | 1400.00 MMBTU/HR | 0.0020 LB/MMBTU, 2.53 LB/HR |  | 0.000 | BACT-OTHER |
| SAVANNAH ELECTRIC AND POWER CO. | GA | 2/12/92 | TURBINES, 8 | 1032.00 MMBTU/H, NAT GAS | 0.0030 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | 11/4/92 | GENERATOR, STEAM | 450.00 MMBTU | 0.0033 LB/MMBTU* | COMBUSTION | 0.000 | BACT-OTHER |
| GRAYS FERRY CO. GENERATION PARTNERSHIP | PA | 11/4/92 | TURBINE (NATURAL GAS & OIL) | 1150.00 MMBTU | 0.0033 LB/MMBTU* | COMBUSTION | 0.000 | BACT-OTHER |
| FULTON COGEN PLANT | NY | 9/15/94 | GE LM5000 GAS TURBINE | 500.00 MMBTU/HR | 0.0040 LB/MMBTU, 2.0 LB/HR | NO CONTROLS | 0.000 | SEE NOTE #6 |
| SAVANNAH ELECTRIC AND POWER CO. | GA | 2/12/92 | TURBINES, 8 | 972.00 MMBTU/H, #2 OIL | 0.0042 LB/MMBTU | FUEL SPEC: LOW SULFUR FUEL OIL | 0.000 | BACT-PSD |
| SARANAC ENERGY COMPANY | NY | 7/31/92 | TURBINES, COMBUSTION (2) (NATURAL GAS) | 1123.00 MMBTU/HR (EACH) | 0.0045 LB/MMBTU | OXIDATION CATALYST | 0.000 | BACT-OTHER |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (NATURAL GAS) (2) | 1190.00 MMBTU/HR (EACH) | 0.0046 LB/MMBTU | TURBINE DESIGN | 0.000 | OTHER |
| KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY | NY | 11/9/92 | TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW) | 650.00 MMBTU/HR | 0.0070 LB/MMBTU | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | SIEMENS V64.3 GAS TURBINE (EP #00001) | 650.00 MMBTU/HR | 0.0070 LB/MMBTU, 4.8 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| LAKEWOOD COGENERATION, L.P. | NJ | 4/1/91 | TURBINES (#2 FUEL OIL) (2) | 1190.00 MMBTU/HR (EACH) | 0.0073 LB/MMBTU | TURBINE DESIGN | 0.000 | OTHER |
| TBG COGEN COGENERATION PLANT | NY | 8/5/90 | GE LM2500 GAS TURBINE | 214.90 MMBTU/HR | 0.0080 LB/MMBTU, 2.9 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| ANITEC COGEN PLANT | NY | 7/7/93 | GE LM5000 COMBINED CYCLE GAS TURBINE EP #00001 | 451.00 MMBTU/HR | 0.0080 LB/MMBTU, 3.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP NATURAL DAM LP | NY | 12/31/91 | GE FRAME 6 GAS TURBINE | 500.00 MMBTU/HR | 0.0080 LB/MMBTU, 4 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | GENERATOR, COMBUSTION TURBINE & DUCT BURNER | 1988.00 MMBTU/H (CTG) | 0.0080 LB/MMBTU (NAT GAS) | NATURAL GAS COMBUSTION | 0.000 | BACT-PSD |
| KAMINE/BESICORP CARTHAGE L.P. | NY | 1/18/94 | GE FRAME 6 GAS TURBINE | 491.00 BTU/HR | 0.0090 LB/MMBTU, 5.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE SOUTH GLENS FALLS COGEN CO | NY | 9/10/92 | GE FRAME 6 GAS TURBINE | 498.00 MMBTU/HR | 0.0090 LB/MMBTU, 5.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, 2 | 0.00 | 0.0100 LB/H 2 EACH | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-1 | 421.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS7-5, 1 | 421.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| INDECK-OSWEGO ENERGY CENTER | NY | 10/6/94 | GE FRAME 6 GAS TURBINE | 533.00 LB/MMBTU | 0.0100 LB/MMBTU, 5.00 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-1 | 738.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 50.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-2 | 738.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-4 | 738.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS4-3 | 1215.00 HP | 0.0100 LB/H | GOOD COMBUSTION | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS5-3 | 1215.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, TS7-6, 1 | 1215.00 HP | 0.0100 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| TRIGEN MITCHEL FIELD | NY | 4/16/93 | GE FRAME 6 GAS TURBINE | 424.70 MMBTU/HR | 0.0110 LB/MMBTU, 4.5 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| LOCKPORT COGEN FACILITY | NY | 7/14/93 | (6) GE FRAME 6 TURBINES (EP #S 00001-00006) | 423.90 MMBTU/HR | 0.0120 LB/MMBTU, 5.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | DIESEL GENERATOR (EP #00005) | 22.00 MMBTU/HR | 0.0160 LB/MMBTU, 0.34 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| ALGONQUIN GAS TRANSMISSION CO. | RI | 7/31/91 | TURBINE, GAS, 2 | 49.00 MMBTU/H | 0.0160 LB/MMBTU | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINES, GAS-FIRED, 3 | 0.00 | 0.0200 LB/H 3 EACH | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| MEGAN-RACINE ASSOCIATES, INC | NY | 6/5/89 | GE LM5000-N COMBINED CYCLE GAS TURBINE | 401.00 LB/MMBTU | 0.0200 LB/MMBTU, 8.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| VASTAR RESOURCES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, 1 | 1478.00 HP | 0.0200 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| TECO POLK POWER STATION | FL | 2/24/94 | TURBINE, FUEL OIL | 1765.00 MMBTU/H | 0.0280 LB/MMBTU | GOOD COMBUSTION | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 4/1/97 | COMPRESSOR ENGINE, GAS-FIRED, 2 | 0.00 | 0.0300 LB/H | GOOD COMBUSTION PRACTICES. | 0.000 | BACT-PSD |
| VASTAR RESOUCRES, INC. | CO | 7/31/97 | COMPRESSOR ENGINE, GAS-FIRED, 2 | 0.00 | 0.0300 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC | CO | 7/31/97 | COMPRESSOR ENGINE, GAS FIRED, 2 | 0.00 | 0.0300 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC | CO | 7/31/97 | IC ENGINES, WAUKESHA L5790-GSI, 2 @ 1215 HP | 0.00 | 0.0300 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| VASTAR RESOURCES, INC. | CO | 4/1/97 | IC ENGINE, WAUKESHA L5790-GSI, 2 | 1215.00 HP | 0.0300 LB/H | GOOD COMBUSTION TECHNIQUES | 0.000 | BACT-PSD |
| KAMINE/BESICORP SYRACUSE LP | NY | 12/10/94 | FIRE PUMP (EP #00007) | 1.50 MMBTU/HR | 0.0550 LB/MMBTU, 0.08 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| CITY OF CLOVIS | CA | 11/8/96 | CATERPILLAR MODEL G3406TA NATURAL GAS, IC ENGINE | 0.00 | 0.0680 G/BHP-HR | NATURAL GAS FUEL AND A HOUSTON INDUSTRIAL SILENCING MODEL DN/S | 0.000 | LAER |
| MM HACKENSACK ENERGY, LLC. | NJ | 4/9/98 | ENGINES, LANDFILL GAS-FIRED, 4 EACH | 3.80 MW | 0.0740 LB/MMBTU OF HHV | RECIPROCATING INTERNAL COMBUSTION ENGINE | 98.000 | NSPS |
| RYAN-MURPHY INCORPORATED | CA | 1/6/92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 0.0900 LB/H | 3-WAY CATALYTIC CONVERTER, POSITIVE CRANKCASE VENTILATION | 30.000 | BACT-PSD |
| CNG TRANSMISSION | OH | 8/12/92 | TURBINE (NATURAL GAS) (3) | 5500.00 HP (EACH) | 0.1000 G/HP-HR | FUEL SPEC: USE OF NATURAL GAS | 0.000 | OTHER |
| CITY OF TULARE, PROJECT 960679 | CA | 3/13/98 | CLEAN BURN IC ENGINE | 6.77 MMBTU/HR | 0.2500 G/B-HP-HR | GASEOUS FUEL AND POSITIVE CRANKCASE VENTILATION | 90.000 | BACT-OTHER |
| ALGONQUIN GAS TRANSMISSION COMPANY | NJ | 3/31/95 | TURBINES COMBUSTION, TWO SOLAR CENTAUR | 3.10 MW EACH | 0.2600 LB/H |  | 0.000 | BACT-PSD |
| SHELL PIPELINE CORPORATION | CA | 11/15/91 | GENERATOR, EMERGENCY, PROPANE FIRED | 82.00 BHP | 0.2800 LB/H | 3-WAY CATALYTIC CONVERTER | 10.000 | BACT-PSD |
| BERKSHIRE POWER DEVELOPMENT, INC. | MA | 9/22/97 | ENGINES, CHILLER, NATURAL GAS-FIRED, TWO | 23.40 MMBTU/H | 0.3000 LB/H | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| ARCHIE CRIPPEN | CA | 12/9/97 | IC ENGINE, DETROIT DIESEL MODEL 8V-92TA | 500.00 BHP | 0.3000 G/B-HP-H | NO CONTROL | 0.000 | BACT |
| KEARNY VENTURES, LIMITED | CA | 1/12/96 | INTERNAL COMBUSTION ENGINE | 208.00 HP | 0.3300 G/B-HP-HR | NO CONTROL | 0.000 | BACT-OTHER |
| RESOURCE RENEWAL TECHNOLOGIES, INC. | CA | 6/18/93 | ENGINE, I.C. | 951.00 BHP | 0.3300 G/B-HP-H | POSITIVE CRANKCASE VENTILLATION | 0.000 | BACT-OTHER |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | ENGINE, DIESEL, FIRE PUMP | 1.50 MMBTU/H | 0.3600 LB/MMBTU | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| MANCHESTER RENEWABLE PWR CORP/LANDFILL ENERGY SYST | NJ | 5/10/95 | I. C. ENGINES | 6.60 MMBTU/H | 0.3750 G/B-HP-H |  | 0.000 | LAER |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | 7/5/94 | 2 GAS-FIRED GENERATOR ENGINES | 385.00 HORSEPOWER | 0.4000 LBS/HR | GOOO COMBUSTION | 0.000 | BACT |
| ROSS ISLAND SAND AND GRAVEL | CA | 8/2/96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDGE | 685.00 HP | 0.4000 LB/DAY | CATALYTIC OXIDATION AND A POSITIVE CRANKCASE VENTILATION SYSTEM | 90.000 | LAER |
| NORTH STAR RECYCLING CO. | OH | 6/9/93 | RECIPROCATING ENGINES (NATURAL GAS) (3) | 1700.00 HP (EACH) | 0.4000 G/B-HP-H | 3-WAY CATALYST | 60.000 | BACT-OTHER |
| RICHMOND EXPLORATION CORP. | CA | 10/24/91 | ENGINE, I.C., NAT. GAS/PROPANE | 200.00 HP | 0.4400 LBM/H | THREE-WAY CATALYST | 0.000 | BACT-PSD |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | 7/5/94 | NATURAL GAS-FIRED COMPRESSOR ENGINE | 520.00 HORSEPOWER | 0.5000 LBS/HR | GOOD COMBUSTION | 0.000 | BACT |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | 7/5/94 | 1 GAS-FIRED GENERATOR ENGINE | 577.00 HORSEPOWER | 0.6000 LBS/HR | GOOD COMBUSTION | 0.000 | BACT |
| CHEVRON USA - PAINTER CENTRAL STATION | WY | 4/19/93 | ENGINES, COMPRESSOR, 2 EACH | 2650.00 BHP, EACH | 0.6000 G/B-HP-H | "CLEAN BURN" TECHNOLOGY | 0.000 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | 9/5/90 | ENGINES, COMPRESSOR, 2 | 2000.00 HP EACH | 0.6500 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| *NORTHERN NATURAL GAS COMPANY* | *IA* | *9/5/90* | *ENGINE, COMPRESSOR* | *4000.00 HP* | *0.6500 G/B-HP-H* | *GOOD COMBUSTION PRACTICES* | *0.000* | *BACT-PSD* |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | 4/6/93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGINE | 6.30 MW | 0.7000 GRAM/BRAKE HP HR |  | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | 4/6/93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 0.7000 G/B-HP-H | GOOD COMBUSTION | 0.000 | BACT-PSD |

*Table 5-1e. Summary of Best Available Control Technology (BACT) Determinations for Volatile Organic Compounds (VOC) Emissions, Less Than 100 MW*

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | VOC Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| MARSHALL MUNICIPAL UTILITIES | MO | 11/15/91 | ENGINE, I.C. (ELECTRICAL POWER GENERATION) | 8700.00 BHP | 0.7000 GM/BHP-H | | 0.000 | BACT |
| LSP - COTTAGE GROVE, L.P. | MN | 11/10/98 | ENGINE, DIESEL, EMERGENCY FIRE PUMP | 2.70 MMBTU/H | 0.7100 LB/MMBTU | LIMITED TO BURN DIESEL 150 H/YR. | 0.000 | BACT-PSD |
| CNG TRANSMISSION CORPORATION | WV | 5/3/93 | GENERATOR, AUXILARY | 614.00 HP | 0.7400 G/HP-HR | | 0.000 | BACT-OTHER |
| CITY OF STOCKTON MUNICIPAL UTILITIES DEPT. | CA | 11/22/96 | GAS-FIRED IC ENGINE | 2760.00 HP | 0.7500 G/BHP-HR | LEAN BURN ENGINE WITH A PRECOMBUSTION CHAMBER | 0.000 | LAER |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | 12/29/94 | I.C. ENGINE #1, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 0.7500 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM | 75.800 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | 12/29/94 | I.C. ENGINE #2, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 0.7500 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 50.000 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | 12/29/94 | I.C. ENGINE #3, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 0.7500 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 68.800 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | 12/29/94 | I.C. ENGINE #4, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 0.7500 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 74.100 | RACT |
| MERIDIAN OIL, INC./VALVERDE GAS PROCESSING FAC. | NM | 10/27/95 | RECIPROCATING ENGINE, NATURAL GAS (4) | 0.00 | 0.8000 G/B-HP-H | CLEAN BURN ENGINE MODEL #: 3612 TA/SW66 MANUFACTUR | 0.000 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 MW | 0.8000 LB/HR @ 100% PEAKLD | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD./MAALAEA GENERATING STA | HI | 7/28/92 | TURBINE, COMBINED-CYCLE COMBUSTION | 28.00 MW | 0.8000 LB/HR | COMBUSTION TECHNOLOGY/DESIGN | 0.000 | BACT-OTHER |
| SAGUARO POWER COMPANY | NV | 6/17/91 | COMBUSTION TURBINE GENERATOR | 34.50 MW | 0.8000 PPH | COMBUSTION SYSTEM | 0.000 | LAER |
| CGN TRANSMISSION | OH | 3/11/92 | ENGINE, NATURAL GAS COMPRESSOR | 3200.00 HP | 0.8000 G/B-HP-H | ENGINE TUNING (SEE NOTES) | 0.000 | BACT-PSD |
| CGN TRANSMISSION | OH | 5/28/92 | ENGINE, NATURAL GAS COMPRESSOR | 3200.00 HP | 0.8000 G/B-HP-H | ENGINE TUNING (SEE NOTES) | 0.000 | BACT-PSD |
| CNG TRANSMISSION CORP. | PA | 3/13/92 | ENGINES, RECIP I.C., 4, NAT. GAS | 3200.00 HP | 0.8000 G/B-HP-H | LEAN BURN TECHNOLOGY | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | 5/3/93 | ENGINE, NATURAL GAS COMPRESSOR | 6060.00 HP | 0.8200 G/B-HP-H | LEAN BURN COMBUSTION | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | 2/29/96 | NATURAL GAS FIRED ENGINE | 3400.00 HP | 0.8300 G/B-HP-H | | 0.000 | RACT |
| CGN TRANSMISSION | OH | 3/11/92 | ENGINES, NATURAL GAS COMPRESSOR (2) | 4200.00 HP (EACH) | 0.9000 G/B-HP-H | ENGINE TUNING (SEE NOTES) | 0.000 | BACT-PSD |
| CGN TRANSMISSION | OH | 5/28/92 | ENGINE, NATURAL GAS COMPRESSOR | 4200.00 HP | 0.9000 G/B-HP-H | ENGINE TUNING (SEE NOTES) | 0.000 | BACT-PSD |
| CNG TRANSMISSION CORPORATION | PA | 9/24/91 | ENGINE, I.C., RECIP., GAS-FIRED, 2 CYCLE | 4200.00 HP | 0.9000 G/B-HP-H | CLEAN BURN TECHNOLOGY | 0.000 | BACT-OTHER |
| PORTSMOUTH NAVAL HOSPITAL | VA | 7/30/93 | GENERATORS, DIESEL, 6 | 748000.00 GAL/YR | 0.9000 LB/HR | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| CGN TRANSMISSION | OH | 4/8/92 | ENGINES, NATURAL GAS COMPRESSOR (2) | 4200.00 HP (EACH) | 0.9800 G/B-HP-H | ENGINE TUNING (SEE NOTES) | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | 10/29/93 | ENGINE, GAS-FIRED, RECIPROCATING | 1000.00 HP | 1.0000 G/B-HP-H | CLEAN/LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | 4/6/98 | ENGINE, IC RECIPROCATING, NAT. GAS | 1374.00 HP | 1.0000 G/B-HP-H | CLEAN BURN COMBUSTION TECHNOLOGY | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | 7/24/98 | RECIPROCATING ENGINE, NAT. GAS | 1375.00 HP | 1.0000 G/B-HP-H | CLEAN BURN COMBUSTION TECHNOLOGY | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | 4/25/98 | NATURAL GAS RECIPROCATING ENGINE | 1478.00 HP | 1.0000 G/B-HP-H | LEAN BURN DESIGN | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES | NM | 9/23/98 | IC ENGINE, COMPRESSOR | 27240.00 HP | 1.0000 G/B-HP-H | LEAN-BURN ENGINE DESIGN | 0.000 | BACT-PSD |
| SACRAMENTO COGENERATION AUTHORITY P&G | CA | 8/19/94 | TURBINE, SIMPLE CYCLE LM6000 GAS | 421.40 MMBTU/H | 1.1000 LB/H | OXIDATION CATALYST | 0.000 | BACT |
| SACRAMENTO COGENERATION AUTHORITY P&G | CA | 8/19/94 | TURBINE, GAS, COMBINED CYCLE LM6000 | 421.40 MMBTU/H | 1.1000 LB/H | OXIDATION CATALYST | 0.000 | BACT |
| SACRAMENTO COGENERATION AUTHORITY P&G | CA | 8/19/94 | TURBINE, GAS, COMBINED CYCLE LM6000 | 421.40 MMBTU/H | 1.1000 LB/H | OXIDATION CATALYST | 0.000 | BACT |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | 2/29/96 | NATURAL GAS FIRED ENGINE | 1000.00 HP | 1.1000 G/B-HP-H | | 0.000 | RACT |
| FLORIDA GAS TRANSMISSION CO. | MS | 5/14/91 | ENGINE, 412 KVSR DRESSER | 2400.00 HP | 1.3300 G/B-HP-H | LEAN COMBUSTION | 0.000 | BACT-PSD |
| MOBIL EXPLORATION & PRODUCING U.S., INC. | CA | 7/2/96 | LEAN BURN NATURAL GAS-FIRED IC ENGINE | 280.00 BHP | 1.5000 G/BHP-HR | AIR/FUEL RATIO CONTROLLER AND CLEANBURN COMBUSTIONTECHNOLOGY WI | 0.000 | LAER |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | 2/29/96 | NATURAL GAS FIRED ENGINE | 2000.00 HP | 1.6500 G/B-HP-H | | 0.000 | RACT |
| LSP-COTTAGE GROVE, L.P. | MN | 3/1/95 | DIESEL ENGINE-DRIVEN FIRE PUMP | 2.70 MMBTU/HR | 1.9000 LB/HR | FUEL SELECTION; GOOD COMBUSTION | 0.000 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | 12/20/91 | TURBINE, COMBUSTION | 1313.00 MM BTU/HR | 2.0000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | 8/22/95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 2.2000 TPY | PROPER ENGINE MAINTENANCE | 0.000 | BACT |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1175.00 MMBTU/H NAT. GAS | 2.3000 LB/H/UNIT | FURNACE DESIGN | 91.000 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 MW | 2.6000 LB/H @ 75-<100% PKLD | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | 6/10/98 | RECIPROCATING ENGINES, NAT. GAS | 21920.00 HP | 2.6500 G/B-HP-H | LEAN BURN ENGINE DESIGN | 0.000 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 MMBTU/HR | 2.8000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES–MIDDLE MESA CDP | NM | 12/3/97 | NATURAL GAS COMPRESSOR STATION, 14 ENGINES | 1476.00 HP, EACH | 3.0000 LB/HR EACH ENGINE | CLEAN/LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| TENASKA WASHINGTON PARTNERS, L.P. | WA | 5/29/92 | BOILERS, AUXILIARY | 90000.00 LBS STEAM/HR (EACH) | 3.0000 LBS/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | 12/3/93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 3.2000 LB/HR | | 0.000 | NSPS |
| INTERNATIONAL PAPER | LA | 2/24/94 | TURBINE/HRSG, GAS COGEN | 338.00 MM BTU/HR TURBINE | 3.6000 LB/HR COMBINED | COMBUSTION CONTROLS, FUEL SELECTION | 0.000 | BACT |
| SEPCO | CA | 10/5/94 | TURBINE, GAS COMBINED CYCLE GE MODEL 7 | 920.00 MMBTU/H | 3.7000 LB/H | OXIDATION CATALYST | 0.000 | BACT |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, NATURAL GAS-FIRED (2) | 617.00 MMBTU/HR (EACH) | 4.0000 PPMDV | TURBINE DESIGN | 0.000 | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | 5/16/94 | 1 EMERGENCY GENERATOR | 1500.00 KW | 4.1000 TPY | RETARD TIMING 6 DEGREES | 0.000 | NSPS |
| FLEETWOOD COGENERATION ASSOCIATES | PA | 4/22/94 | NG TURBINE (GE LM6000) WITH WASTE HEAT BOILER | 360.00 MMBTU/HR | 4.4000 LB/HR | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| RW POWER PARTNERS, L.P. | VA | 1/28/93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 KW (EACH) | 4.6000 LB/HR | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| FLORIDA POWER GENERATION | FL | 10/18/91 | TURBINE, OIL, 6 EACH | 92.90 MW | 5.0000 LB/H | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 468.00 X10(6) BTU/HR #2 OIL | 5.0000 LBS/HR | GOOD COMBUSTION | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS | 474.00 X10(6) BTU/HR N. GAS | 5.0000 LBS/HR | GOOD COMBUSTION | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | 8/17/92 | TURBINE, OIL | 1029.00 MMBTU/H | 5.0000 LB/H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION | NC | 12/20/91 | TURBINE, COMBUSTION | 1247.00 MM BTU/HR | 5.0000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO. | RI | 4/13/92 | TURBINE, GAS AND DUCT BURNER | 1360.00 MMBTU/H EACH | 5.0000 PPM @ 15% O2 | | 0.000 | BACT-PSD |
| DIGHTON POWER ASSOCIATE, LP | MA | 10/6/97 | TURBINE, COMBUSTION, ABB GT11N2 | 1327.00 MMBTU/H | 5.1000 LB/H | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| SOUTH MISSISSIPPI ELECTRIC POWER ASSOC. | MS | 4/9/96 | COMBUSTION TURBINE, COMBINED CYCLE | 1299.00 MMBTU/HR NAT GAS | 5.2000 PPM @ 15% O2, GAS | GOOD COMBUSTION CONTROLS | 0.000 | BACT-PSD |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION | 1117.00 MMBTU/H NO2 FUEL OIL | 5.8000 LB/H/UNIT | FURNACE DESIGN | 91.000 | BACT-PSD |
| FLORIDA POWER AND LIGHT | FL | 3/14/91 | TURBINE, OIL, 4 EACH | 0.00 | 6.0000 PPM @ 15% O2 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE,GAS | 1214.00 MMBTU/H | 6.0000 LB/H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| COMINCO ALASKA INC. | AK | 7/26/93 | GENERATOR, WARTSILLA #2 & #6 | 0.00 | 6.1000 LBS/HR | 3 DEGREE TIMING RETARD | 0.000 | BACT-PSD |
| NEWARK BAY COGENERATION PARTNERSHIP, L.P. | NJ | 6/9/93 | TURBINES, COMBUSTION, KEROSENE-FIRED (2) | 640.00 MMBTU/H (EACH) | 6.1000 PPMDV | TURBINE DESIGN | 0.000 | OTHER |
| BERKSHIRE POWER DEVELOPMENT, INC. | MA | 9/22/97 | TURBINE, COMBUSTION, ABB GT24 | 1792.00 MMBTU/H | 6.3000 LB/H | DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL. | 0.000 | BACT-PSD |
| MERIDIAN OIL, INC. - FRANCIS MESA STA. | NM | 8/15/95 | COMPRESSOR ENGINES (8) & GLYCOL DEHYDRATOR | 2650.00 HP (EACH) | 6.6000 G/HP-HR | COMPRESSOR STATION, CLEAN BURN ENGINES | 0.000 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | 11/5/91 | TURBINE, GAS, 4 EACH | 35.00 MW | 7.0000 PPM @ 15% O2 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| ORLANDO UTILITIES COMMISSION | FL | 11/5/91 | TURBINE, OIL, 4 EACH | 35.00 MW | 7.0000 PPM @ 15% O2 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, NATURAL GAS (2) | 1510.00 MMBTU/H | 7.0000 PPMVW | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION POLK COUNTY SITE | FL | 2/25/94 | TURBINE, FUEL OIL (2) | 1730.00 MMBTU/H | 7.0000 PPMVW | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | 4/11/96 | COMBUSTION TURBINE, 4 EACH | 1907.60 MMBTU/HR | 7.0000 LB/HR | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| SWIFT ENERGY | OK | 9/5/91 | ENGINES, I.C. | 1132.00 HP EACH | 7.1000 T/YR | CATALYTIC CONVERTER | 70.000 | OTHER |
| DE LA GUERRA POWER, INC | CA | 11/12/91 | ENGINE IC & GEN (1 OF 3) | 380.00 HP | 7.6800 LB/D | NON-SELECTIVE CATALYTIC CONVERTER | 70.000 | BACT-PSD |
| DE LA GUERRA POWER, INC. | CA | 11/12/91 | ENGINE (I.C.) AND GENERATOR | 380.00 HP | 7.6800 LB/D | OXIDATION USING 3-WAY CATALYST & CRANKCASE RECIRC. | 70.000 | BACT-PSO |
| PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP | VA | 9/15/93 | TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3 | 10.20 X109 SCF/YR NAT GAS | 8.0000 LB/HR | GOOD COMBUSTION OPERATING PRACTICES | 0.000 | BACT-PSD |
| NORTHERN CALIFORNIA POWER AGENCY | CA | 10/2/97 | GE FRAME 5 GAS TURBINE | 325.00 MMBTU/HR | 8.0000 LB/HR | NATURAL GAS AS PRIMARY FUEL | 0.000 | LAER |
| INTERNATIONAL PAPER CO. RIVERDALE MILL | AL | 1/11/93 | TURBINE, STATIONARY (GAS-FIRED) WITH DUCT BURNER | 40.00 MW | 8.3000 LB/HR (GAS) | DESIGN | 0.000 | BACT-PSD |
| WEPCU, PARIS SITE | WI | 9/29/92 | TURBINES, COMBUSTION (4) | 0.00 | 9.0000 LBS/HR (SEE NOTES) | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| FLORIDA POWER CORPORATION | FL | 8/17/92 | TURBINE, OIL | 1866.00 MMBTU/H | 9.0000 LB/H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CAROLINA POWER AND LIGHT CO. | SC | 9/23/91 | TURBINE, I.C. | 80.00 MW | 10.0000 LB/H | | 0.000 | BACT-PSD |
| ORANGE COGENERATION LP | FL | 12/30/93 | TURBINE, NATURAL GAS, 2 | 368.30 MMBTU/H | 10.0000 PPMVD | GOOD COMBUSTION | 0.000 | BACT-PSD |
| AUBURNDALE POWER PARTNERS, LP | FL | 12/14/92 | TURBINE, OIL | 1170.00 MMBTU/H | 10.0000 LB/H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| WILLIAM BOLTHOUSE FARMS | CA | 6/27/96 | IC ENGINE | 402.00 HP | 14.1000 LB/DAY | POSITIVE CRANKCASE VENTILATION | 0.000 | LAER |
| BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP | VA | 3/3/92 | TURBINE, COMBUSTION, 2 | 0.00 | 14.9000 T/YR/UNIT | | 0.000 | BACT-PSD |

Table 5-1e. Summary of Best Available Control Technology (BACT) Determinations for Volatile Organic Compounds (VOC) Emissions, Less Than 100 MW

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | VOC Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 MMBTU/HR | 15.0000 TPY | NONE | 0.000 | BACT-PSD |
| THERMO INDUSTRIES, LTD. | CO | 2/19/92 | TURBINE, GAS FIRED, S EACH | 246.00 MMBTU/H | 16.7000 LB/H | | 0.000 | OTHER |
| LSP-COTTAGE GROVE, L.P. | MN | 3/1/95 | COMBUSTION TURBINE/GENERATOR | 1970.00 MMBTU/HR | 19.0000 LB/HR GAS | FUEL SELECTION, GOOD COMBUSTION | 0.000 | BACT-PSD |
| KENTUCKY UTILITIES COMPANY | KY | 3/10/92 | TURBINE, #2 FUEL OIL/NATURAL GAS (8) | 1500.00 MM BTU/HR (EACH) | 20.4000 LB/HR (EACH) | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.36 X10(9) BTU/H #2 OIL | 21.0000 LBS/HR/UNIT | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| BEAR ISLAND PAPER COMPANY, L.P. | VA | 10/30/92 | TURBINE, COMBUSTION GAS (TOTAL) | 0.00 | 21.9000 TPY | GOOD COMBUSTION | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINES (2) [EACH WITH A SF] | 1.S1 X10(9) BTU/HR N GAS | 22.0000 LBS/HR/UNIT | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| BUCKNELL UNIVERSITY | PA | 11/26/97 | NG FIRED TURBINE, SOLAR TAURUS T-7300S | S.00 MW | 25.0000 PPMV@15% O2 | GOOD COMBUSTION | 0.000 | BACT-OTHER |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 2/28/95 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 88.77 MW | 25.0000 TPY | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | 10/29/93 | TURBINE, GAS-FIRED | 11257.00 HP | 25.0000 PPM @ 1S% O2 | COMBUSTION CONTROL | 0.000 | BACT-PSD |
| EAST KENTUCKY POWER COOPERATIVE | KY | 3/24/93 | TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED | 1492.00 MMBTU/H (EACH) | 26.0000 LBS/H (EACH) | PROPER COMBUSTION TECHNIOUES | 0.000 | BACT-OTHER |
| BRUSH COGENERATION PARTNERSHIP | CO | | TURBINE | 350.00 MMBTU/H | 26.7000 T/YR | | 0.000 | OTHER |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 MW | 28.1000 LB/H @ 50-<7S% PKLD | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| TEMPLE UNIVERSITY | PA | 10/2/92 | ELECTRIC GENERATOR (NATURAL GAS) | 1.60 MW | 31.0000 LBS/HR | LEAN BURN GAS ENGINE | 0.000 | BACT-OTHER |
| COLORADO POWER PARTNERSHIP | CO | | TURBINES, 2 NAT GAS & 2 DUCT BURNERS | 385.00 MMBTU/H EACH TURBIN | 35.2000 T/YR | | 0.000 | OTHER |
| WEST CAMPUS COGENERATION COMPANY | TX | 5/2/94 | GAS TURBINES | 75.30 MW (TOTAL POWER) | 38.0000 TPY | INTERNAL COMBUSTION CONTROLS | 0.000 | BACT |
| COMMONWEALTH CHESAPEAKE CORPORATION | VA | 5/21/98 | 3 COMBUSTION TURBINES (OIL-FIRED) | 6000.00 HRS/YR | 38.9000 TPY | GOOD COMBUSTION OPERATING PRACTICES | 0.000 | BACT/NSPS |
| BMW MANUFACTURING CORPORATION | SC | 1/7/94 | TURBINE, NAT.GAS FIRED (3 -1 SPARE) AND 2 BOILERS | 54.50 MM BTU/HR TURBINES | 77.8600 LBS/DAY | EACH OF THE 2 BOILER-TURBINE USE A COMMON STACK | 0.000 | LAER |
| EMPIRE DISTRICT ELECTRIC CO. | MO | 5/17/94 | INSTALL TWO NEW SIMPLE-CYCLE TURBINES | 1345.00 MMBTU/HR | 80.0000 TPY | NONE | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY LIMITED | HI | 11/8/95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 81.0000 PPMVD | COMBUSTION DESIGN (INCLUDING FITR) | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | 5/4/96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 81.0000 PPMVD | COMBUSTION DESIGN, INCLUDING FITR | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 7.44 X10(7) GPY FUEL OIL | 97.1000 TOTAL TPY | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | 9/25/92 | TURBINE FACILITY, GAS | 1331.13 X10(7) SCF/Y NAT GAS | 97.1000 TOTAL TPY | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| WESTERN ENVIRONMENTAL ENGINEERS COMPANY | CA | 5/2/95 | TWO FORD LSG-875 GAS FIRED IC ENGINES | 175.00 HP PER ENGINE | 100.0000 PPMV AT 15% OXYGEN | CARSOUND TWO-STAGE, THREE WAY CATALYST AND AIR- FUEL MONITORING | 95.000 | BACT-OTHER |
| NORTHERN CONSOLIDATED POWER | PA | 5/3/91 | TURBINES, GAS, 2 | 34.60 KW EACH | 105.0000 PPM @ 15% O2 | OXIDATION CATALYST | 50.000 | OTHER |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | 11/13/92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 141.3000 LBS/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GAS | 0.000 | BACT-OTHER |
| KAISER PERMANENTE MEDICAL CENTER | CA | 9/2/97 | JOHN DEERE MODEL 6076AFN30 IC ENGINE | 160.00 BHP | 150.0000 PPMV @ 15% O2 | NATURAL GAS FUEL | 0.000 | LAER |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | 11/25/91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 228.0000 PPMVD FULL LOAD | HIGH COMBUSTION EFFICIENCY | 0.000 | BACT-PSD |
| HAWAII ELECTRIC LIGHT CO., INC. | HI | 2/12/92 | TURBINE, FUEL OIL #2 | 20.00 MW | 297.6000 LB/H @ 25-<50% PKLD | COMBUSTION DESIGN | 0.000 | BACT-PSD |

Source: EPA's RACT/BACT/LEAR Clearinghouse

Table 5-2a. Summary of Best Available Control Technology (BACT) Determinations for Nitrogen Oxide (NOx) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| KAISER PERMANENTE MEOICAL CENTER | CA | Sep-97 | JOHN DEERE MODEL 6076AFN30 IC ENGINE | 160.00 BHP | 55.0000 PPMV @ 15% O2 | NATURAL GAS FUEL | 0.000 | LAER |
| TOYS "R" US | CA | Nov-96 | NATURAL GAS FIRED EMERGENCY IC ENGINE | 0.00 | 14.5600 G/BHP-HR | NO CONTROL | 0.000 | LAER |
| CITY OF CLOVIS | CA | Nov-96 | CATERPILLAR MOOEL G3406TA NATURAL GAS, IC ENGINE | 0.00 | 0.3300 G/BHP-HR | NATURAL GAS FUEL, A HOUSTON INDUSTRIAL SILENCING MODEL DN/S- | 0.000 | LAER |
| MONTEREY REGIONAL WASTE MANAGEMENT DISTRICT | CA | Nov-96 | JENBACHER LEAN BURN, MODEL JGS 320 GS-LL IC ENGIN | 1274.00 HP | 213.4500 LB/DAY | LEAN BURN COMBUSTION JENBACHER | 0.000 | LAER |
| VAUGHAN FURNITURE COMPANY | VA | Aug-96 | DIESEL FIRE PUMP (INTERNAL COMBUSTION ENGINE) | 231.00 HP | 1.1000 TPY | 300 HOURS/YEAR LIMIT | 0.000 | BACT |
| ROSS ISLAND SAND AND GRAVEL | CA | Aug-96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDGE | 685.00 HP | 28.8000 LB/DAY | SELECTIVE CATALYTIC REDUCTION (SCR) WITH AMMONIA INJECTION. | 85.000 | LAER |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | INTERNAL COMBUSTION | 3.40 MW | 427.0000 TPY | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATORS(2) | 1100.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATOR | 650.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATORS (2) | 830.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATOR | 600.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATOR | 200.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF ST.PAUL POWER PLANT | AK | Jun-96 | DIESEL GENERATOR | 300.00 KW | 0.0000 | AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | INTERNAL COMBUSTION | 6.50 MW | 632.6000 TPY | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | STANDBY GENERATORS (2) | 300.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 600.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 830.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 620.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 1440.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 1160.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| CITY OF UNALASKA | AK | Jun-96 | DIESEL GENERATOR | 1230.00 KW | 0.0000 | LIMIT OF OPERATION HOURS AND AFTERCOOLERS | 0.000 | BACT-PSD |
| MAUI ELECTRIC COMPANY, LTD. | HI | May-96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 656.0000 PPMVD | FUEL INJECTION TIMING RETARD WITH INTAKE AIR COOLING | 0.000 | BACT-PSD |
| CUNNINGHAM DAVIS ENVIRONMENTAL | CA | Apr-96 | COMPRESSION IGNITION IC ENGINE | 173.00 HP | 10.4000 G/B-HP-HR | TURBOCHARGER AND TIMING RETARDED 4 DEGREES RELATIVE TO | 0.000 | BACT-OTHER |
| CITY OF TULARE, PROJECT 960679 | CA | Mar-96 | CLEAN BURN IC ENGINE | 8.77 MMBTU/HR | 1.0000 G/B-HP-HR | GASEOUS FUEL AND CLEAN COMBUSTION. CLEAN COMBUS- TION ACHI | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | Feb-96 | NATURAL GAS FIRED ENGINE | 3400.00 HP | 4.0000 G/B-HP-H | INSTALL L-E4 TECHNOLOGY WITH REPLACEMENT OF THE EXISTING TU | 75.000 | RACT |
| CNG *TRANSMISSION CORPORATION-LEIDY* | PA | *Feb-96* | *NATURAL GAS FIRED ENGINE* | 2000.00 *HP* | *4.0000 G/B-HP-N* | *INSTALL L-E4 TECH. W/ REPLACEMENT OF THE EXISTING TURBOCHARG* | 75.000 | *RACT* |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | Feb-96 | NATURAL GAS FIRED ENGINE | 1000.00 HP | 7.0000 G/B-HP-H | INSTALLATION OF L-E-7 TECHNOLOGY | 59.000 | RACT |
| KEARNY VENTURES, LIMITED | CA | Jan-96 | INTERNAL COMBUSTION ENGINE | 208.00 HP | 6.6300 G/B-HP-HR | TURBOCHARGER AND AFTERCOOLER | 0.000 | BACT-OTHER |
| PARKER HANNIFIN CORP - RACOR DIVISION | CA | Jan-96 | IC ENGINE | 450.00 HP | 9.5000 G/B-HP-HR | TURBOCHARGER AND AFTERCOOLER ALONG WITH 4 DEGREES RETARD | 0.000 | BACT-OTHER |
| MINNESOTA METHANE | AZ | Nov-95 | ENGINES, COGENERATION (4) | 800.00 KW | 99.0000 TPY | AIR/FUEL CONTROLLER ADJUSTED TO OBTAIN LOW NOX | 0.000 | BACT |
| MAUI ELECTRIC COMPANY LIMITEO | HI | Nov-95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 656.0000 PPMVD | FUEL INJECTION TIMING RETARD WITH INTAKE AIR COOLING | 0.000 | BACT-PSD |
| MERIOIAN OIL, INC./VALVERDE GAS PROCESSING FAC. | NM | Oct-95 | RECIPROCATING ENGINE, NATURAL GAS (4) | 0.00 | 0.7000 G/B-HP-H | CLEAN BURN ENGINE MODEL #: 3612 TA/SW66 MANUF | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 191.0000 TPY | INLET CHARGE AIR HUMIDIFICATION BY WATER INJECTION | 0.000 | BACT |
| BROOKLYN NAVY YARD COGENERATION PARTNERS L.P. | NY | Jun-95 | GENERATOR, 3000 KW EMERGENCY | 3000.00 KW | 2.6000 LB/MMBTU |  | 0.000 | LAER |
| TRANSCONTINENTAL GAS PIPELINE CORP. | PA | Jun-95 | I.C. ENGINES, NATURAL GAS, UNITS 1-6 | 2050.00 HP | 18.1000 LB/HR | LOW EMISSION COMBUSTION (LEC) TECHNOLOGY | 80.000 | RACT |
| TRANSCONTINENTAL GAS PIPELINE CORP. | PA | Jun-95 | I.C. ENGINES, NATURAL GAS, UNITS 7-9, 13 | 2100.00 HP | 18.5400 LB/HR | LOW EMISSION COMBUSTION (LEC) TECHNOLOGY | 52.000 | RACT |
| TRANSCONTINENTAL GAS PIPELINE CORP. | PA | Jun-95 | I.C. ENGINES, NATURAL GAS, UNITS 10-11 | 3400.00 HP | 30.0000 LB/HR | LOW EMISSION COMBUSTION (LEC) TECHNOLOGY | 56.000 | RACT |
| TRANSCONTINENTAL GAS PIPELINE CORP. | PA | Jun-95 | I.C. ENGINES, NATURAL GAS, UNIT 12 | 5500.00 HP | 48.5600 LB/HR | LOW EMISSION COMBUSTION (LEC) TECHNOLOGY | 67.000 | RACT |
| LSP-COTTAGE GROVE, L.P. | MN | Mar-95 | DIESEL ENGINE-DRIVEN FIRE PUMP | 2.70 MMBTU/HR | 5.0000 LB/HR | RETARDATION OF ENGINE TIMING; TURBOCHARGER AFTERCOOLIN | 0.000 | BACT-PSD |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #1, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 1.9000 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COO | 60.400 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #2, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 1.9000 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BES | 40.600 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #3, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 1.9000 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BES | 66.700 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #4, NATURAL GAS/#2 FUEL OIL | 8386.00 HP | 1.9000 G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BES | 54.800 | RACT |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | DIESEL GENERATOR (EP #00005) | 22.00 MMBTU/HR | 1.1660 LB/MMBTU, 26.0 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | FIRE PUMP (EP #00007) | 1.50 MMBTU/HR | 4.2500 LB/MMBTU, 6.25 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| CARDIHAL FLAT GLASS | WI | Nov-94 | GENERATOR, BACK-UP, DIESEL | 0.00 | 67.5000 LBS/HR | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | 0.000 | BACT-PSD |
| SNYDER OIL CORPORATION-RIVERTON OOME GAS PLANT | WY | Jul-94 | 2 GAS-FIRED GENERATOR ENGINES | 385.00 HORSEPOWER | 1.7000 LBS/HR | RETROFIT W/AN AIR TO FUEL RATIO CONTROL W/ NON-SELECTIVE C | 0.000 | BACT |
| SNYDER OIL CORPORATION-RIVERTON OOME GAS PLANT | WY | Jul-94 | 1 GAS-FIRED GENERATOR ENGINE | 577.00 HORSEPOWER | 2.5000 LBS/HR | RETROFIT W/AN AIR TO FUEL RATIO CONTROL W/ NON-SELECTIVE C | 0.000 | BACT |
| TENNECO GAS | TN | Jun-94 | IC ENGINE, NATURAL GAS | 5500.00 HP | 160.0000 TPY | CLEAN BURN RETROFIT | 0.000 | RACT |
| TENNECO GAS | TN | Jun-94 | IC ENGINES, NATURAL GAS (2) | 3400.00 HP | 946.0000 TPY | PARAMETRIC CONTROL | 0.000 | OTHER |
| TENNECO GAS | TN | Jun-94 | IC ENGINE, NATURAL GAS | 408.00 HP | 2.0000 G/B-HP-HR | NON-SELECTIVE CATALYTIC REDUCTION (NSCR) | 0.000 | OTHER |
| TENNECO GAS | TN | Jun-94 | IC ENGINE, NATURAL GAS | 408.00 HP | 2.0000 G/B-HP-HR | PRE-STRATIFIED CHARGE | 0.000 | OTHER |
| MIOWESTERN GAS | TN | Jun-94 | IC ENGINE, NATURAL GAS | 2000.00 HP | 58.0000 TPY | CLEAN BURN RETROFIT | 0.000 | OTHER |
| MIOWESTERN GAS | TN | Jun-94 | IC ENGINE, NATURAL GAS | 2700.00 HP | 79.0000 TPY | CLEAN BURN RETROFIT | 0.000 | OTHER |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 1 EMERGENCY GENERATOR | 1500.00 KW | 45.5000 TPY | RETARD TIMING 6 DEGREES | 0.000 | NSPS |
| INTEL CORPORATION | AZ | Apr-94 | GENERATORS, BACKUP, 5 | 2220.00 BHP | 0.0000 | CYANURIC ACID INJECTION TAILPIPE CONTROL | 80.000 | BACT |
| *NAVY PUBLIC WORKS CENTER* | VA | *Dec-93* | *GENERATOR, ENGINE, 5* | *1600.00 KW* | *45.4000 TPY* |  | *0.000* | *NSPS* |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | Oct-93 | ENGINE, GAS-FIRED, RECIPROCATING | 1000.00 HP | 1.4000 G/B-HP-H | CLEAN/LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| FLORIDA GAS TRANSMISSION | FL | Sep-93 | ENGINE, RECIPROCATING, GAS | 4000.00 BHP/H | 2.0000 G/B-HP-H | LEAN BURN ENGINE | 0.000 | BACT-PSD |
| PORTSMOUTH NAVAL HOSPITAL | VA | Jul-93 | GENERATORS, DIESEL, 6 | 748000.00 GAL/YR | 33.2000 LB/HR | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, WARTSILLA #2 & #6 | 0.00 | 135.0000 LB/HR | 3 DEGREE TIMING RETARD | 66.000 | BACT-PSD |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, TRANSPORTABLE | 0.00 | 26.3000 LB/HR | RESTRICTED TO 3,000 HRS/YR AND MANUF.INSTALLED CTL | 0.000 | BACT-PSD |
| COMINCO ALASKA *INC.* | AK | *Jul-93* | *GENERATOR, CATERPILLAR #1, #2 & #3* | *0.00* | *71.1000 LB/YR* | *RESTRICTED TO 1,690,000 KWH/YR* | *0.000* | *BACT-PSD* |
| RESOURCE RENEWAL TECHNOLOGIES, INC. | CA | Jun-93 | ENGINE, I.C. | 951.00 BHP | 6.6000 G/B-HP-H | TURBOCHARGER, AFTERCOOLER, INJECTION TIMING RETARD OF >= 4 D | 40.000 | BACT-OTHER |
| ROBISON, CARLON AND CARLON | CA | Jun-93 | GENERATOR, DIESEL | 0.00 | 4.0000 DEGREE TIMING RETARD | 4 DEGREE TIMING RETARD | 0.000 | BACT-OTHER |
| NORTH STAR RECYCLING CO. | OH | Jun-93 | RECIPROCATING ENGINES (NATURAL GAS) (3) | 1700.00 HP (EACH) | 1.9500 G/B-HP-H | 3-WAY CATALYST | 65.000 | BACT-OTHER |
| CNG TRANSMISSIDN CORPORATION | WV | May-93 | ENGINE, NATURAL GAS COMPRESSOR | 6060.00 HP | 2.0000 G/B-HP-H | LEAN BURN COMBUSTION | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | May-93 | GENERATOR, AUXILARY | 814.00 HP | 2.0000 G/HP-HR |  | 0.000 | BACT-OTHER |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | Apr-93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 2.0000 G/B-HP-H | INCREASED AIR/FUEL RATIO, REDUCTION IN AIR INTAKE MANIFOLD TEM | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | Apr-93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGIN | 6.30 MW | 2.0000 GRAM/BRAKE HP HR | INCREASED AIR/FUEL RATIO, REDUCTION IN THE AIR INTAKE MANIFOL | 0.000 | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | Jan-93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 KW (EACH) | 137.3000 LB/HR | TURBOCHARGER AND INNER COOLER | 0.000 | BACT-OTHER |
| SITHE/INOEPENDENCE POWER PARTNERS | NY | Nov-92 | GENERATOR, EMERGENCY (OIL) | 25.00 MMBTU/HR | 3.4000 LB/MMBTU | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | Nov-92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 563.6000 LBS/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE OUALITY NAT. GA | 0.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (11) (DIESEL) | 1156.00 KW (EACH) | 2.0000 G/B-HP-H | SCR | 80.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (7) (DIESEL) | 1635.00 KW (EACH) | 2.0000 G/B-HP-H | SCR | 80.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (2) (NATURAL GAS) | 443.00 KW (EACH) | 2.0000 G/B-HP-H | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (3) (NATURAL GAS) | 443.00 KW (EACH) | 2.0000 G/B-HP-H | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| SOUTH CAROLINA ELECTRIC AND GAS COMPANY | SC | Jul-92 | GENERATOR, NO 2 OIL - EMERGENCY | 400.00 KILOWATTS | 13.1000 LB/HR |  | 0.000 | BACT-PSD |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 2 CYCLE | 6000.00 HP | 0.0000 | LEAN COMBUSTION | 83.000 | BACT-PSD |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 4 CYCLE | 1076.00 HP | 0.0000 | LEAN COMBUSTION | 83.000 | BACT-PSD |
| CNG TRANSMISSION CORP. | PA | Mar-92 | ENGINES, RECIP I.C., 4, NAT. GAS | 3200.00 HP | 2.0000 G/B-HP-H | LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |

Table 5-2a. Summary of Best Available Control Technology (BACT) Determinations for Nitrogen Oxide (NOx) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| PACIFIC ENERGY, OTAY MESA LANDFILL | CA | Feb-92 | ENGINE GENERATOR SET | 2650.00 HP | 0.8000 G/B-HP-HR | PRECHAMBER COMBUSTION & AUTO AIR/FUEL RATIO CTRL. | 0.000 | BACT-OTHER |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | HEATERS, 2, CAROTEK | 7.80 MMBTU/H | 0.0000 | EMISSION OFFSET LIMITS IMPOSED | 0.000 | OTHER |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | HEATERS, 2, BURNHAM | 1.30 MMBTU/H | 0.0000 | EMISSION OFFSET LIMITS IMPOSED | 0.000 | OTHER |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | GENERATORS, GAS, 2, ROLLS AVON | 24.60 MEGHP | 89.0000 PPMVD @ 15% O2 | INSTALL RIM COOLING CONFIGURATION | 0.000 | BACT-PSD |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | SOLAR CENTAUR, 3 | 800.00 KW | 150.0000 PPMVD @ 15% O2 | LOW NOX BURNERS | 0.000 | NSPS |
| RYAN-MURPHY INCORPORATED | CA | Jan-92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 2.8800 LB/H | TIMING RETARDED, TURBOCHARGED WATER INJECTION* | 64.000 | BACT-PSD |
| UPF CORPORATION | CA | Dec-91 | ENGINE, DIESEL, EMERGENCY POWER GENERATION | 410.00 HP | 0.0000 | TURBOCHARGER WITH AFTERCOOLER, TIMING RETARD > OR = TO 4 DE | 40.000 | BACT-PSD |
| UPF CORPORATION | CA | Dec-91 | ENGINE, DIESEL | 410.00 HP | 0.0000 | TURBOCHARGER W/ AFTERCOOLER | 40.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | Nov-91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 590.0000 PPMVD FULL LOAD | VARIABLE FITR, TURBOCHARGING AND INTERCOOLING | 18.600 | BACT-PSD |
| SHELL PIPELINE CORP. | CA | Nov-91 | ENGINE-GENERATOR, I.C. EMERGENCY (PROPANE) | 82.00 HP | 0.0000 | 3-WAY CATALYTIC CONVERTER | 60.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES | MO | Nov-91 | ENGINE, I.C. (ELECTRICAL POWER GENERATION) | 8700.00 BHP | 1150.0000 PPM* |  | 0.000 | BACT |
| DE LA GUERRA POWER, INC | CA | Nov-91 | ENGINE IC & GEN (1 OF 3) | 380.00 HP | 6.3400 LB/D | NON-SELECTIVE CATALYTIC CONVERTER | 90.000 | BACT-PSD |
| DE LA GUERRA POWER, INC. | CA | Nov-91 | ENGINE (I.C.) AND GENERATOR | 380.00 HP | 6.3400 LB/D | NON-SELECTIVE CATALYTIC CONVERTER W/ 3-WAY CATAL. | 90.000 | BACT-PSD |
| RICHMOND EXPLORATION CORP. | CA | Oct-91 | ENGINE, I.C., NAT. GAS/PROPANE | 200.00 HP | 90.0000 PPMVD AT 15% O2 | NSCR WITH THREE-WAY CATALYST | 0.000 | BACT-PSD |
| NUGGET OIL CO. | CA | Oct-91 | GENERATOR, STEAM, GAS FIRED | 62.50 MMBTU/H | 0.0430 LB/MMBTU | LOW NOX BURNER AND FLUE GAS RECIRCULATION* | 57.000 | BACT-PSD |
| CNG TRANSMISSION CORPORATION | PA | Sep-91 | ENGINE, I.C., RECIP., GAS-FIRED, 2 CYCLE | 4200.00 HP | 2.0000 G/B-HP-H | CLEAN BURN TECHNOLOGY | 0.000 | BACT-OTHER |
| SWIFT ENERGY | OK | Sep-91 | ENGINES, I.C. | 1132.00 HP EACH | 23.8000 T/YR | CATALYTIC CONVERTER | 78.000 | OTHER |
| MOJAVE PIPELINE OPERATING COMPANY | AZ | Jun-91 | ENGINES, RECIPROCATING, 5, FULL BUILD-OUT | 17500.00 HP | 491.7000 T/YR | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| MOJAVE PIPELINE OPERATING COMPANY | AZ | Jun-91 | ENGINES, INTERIM BUILD-OUT, 3 | 13800.00 HP | 347.8200 T/YR | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| NORTHERN CONSOLIDATED POWER | PA | May-91 | GENERATORS, DIESEL, 2 | 1135.00 KW EACH | 36.0000 LB/H EACH |  | 0.000 | OTHER |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINE, COMPRESSOR | 4000.00 HP | 1.8000 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINES, COMPRESSOR, 2 | 2000.00 HP EACH | 1.8000 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | Nov-82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNITS | 12000.00 KW | 1672.0000 TPY | THE ENGINES OF CONTEMPORARY DESIGN WITH GOOO COMBUSTIO | 0.000 | BACT-PSD |

Table 5-2b. *Summary of Best Available Control Technology (BACT) Determinations for Carbon Monoxide (CO) Emissions*

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| KAISER PERMANENTE MEDICAL CENTER | CA | Sep-97 | JOHN DEERE MODEL 6076AFN30 IC ENGINE | 160.00 BHP | 148.0000 PPMV @ 15% O2 | NATURAL GAS FUEL | 0.000 | LAER |
| TOYS "R" US | CA | Nov-96 | NATURAL GAS FIRED EMERGENCY IC ENGINE | 0.00 | 0.7800 G/BHP-HR | GOOD COMBUSTION | 0.000 | LAER |
| CITY OF CLOVIS | CA | Nov-96 | CATERPILLAR MODEL G3406TA NATURAL GAS, IC ENGINE | 0.00 | 2.0000 G/BHP-HR | NATURAL GAS FUEL, A HOUSTON INDUSTRIAL SILENCING MODEL DN/S- | 0.000 | LAER |
| MAUI ELECTRIC COMPANY, LTD. | HI | May-96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 210.0000 PPMVD | COMBUSTION TECHNOLOGY/DESIGN | 0.000 | BACT-PSD |
| MINNESOTA METHANE | AZ | Nov-95 | ENGINES, COGENERATION (4) | 800.00 KW | 99.9000 TPY | AIR/FUEL CONTROLLER | 0.000 | BACT |
| MAUI ELECTRIC COMPANY LIMITED | HI | Nov-95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 210.0000 PPMVD | COMBUSTION TECHNOLOGY/DESIGN | 0.000 | BACT-PSD |
| MERIDIAN OIL, INC./VALVERDE GAS PROCESSING FAC. | NM | Oct-95 | RECIPROCATING ENGINE, NATURAL GAS (4) | 0.00 | 2.2000 G/B-HP-H | CLEAN BURN ENGINE MODEL #: 3612 TA/SW66 MANUF | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 20.0000 TPY | PROPER ENGINE MAINTENANCE | 0.000 | BACT |
| BROOKLYN NAVY YARD COGENERATION PARTNERS L.P. | NY | Jun-95 | GENERATOR, 3000 KW EMERGENCY | 3000.00 KW | 0.2500 LB/MMBTU | | 0.000 | LAER |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | DIESEL GENERATOR (EP #00005) | 22.00 MMBTU/HR | 0.3710 LB/MMBTU, 8.27 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | FIRE PUMP (EP #00007) | 1.50 MMBTU/HR | 2.8800 LB/MMBTU, 4.23 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| CARDINAL FLAT GLASS | WI | Nov-94 | GENERATOR, BACK-UP, DIESEL | 0.00 | 12.3500 LBS/HR | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | 0.000 | BACT-PSD |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 2 GAS-FIRED GENERATOR ENGINES | 385.00 HORSEPOWER | 1.3000 LBS/HR | GODD COMBUSTION | 0.000 | BACT |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 1 GAS-FIRED GENERATOR ENGINE | 577.00 HORSEPOWER | 1.9000 LBS/HR | GODD COMBUSTION | 0.000 | BACT |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 1 EMERGENCY GENERATOR | 1500.00 KW | 14.4000 TPY | RETARD TIMING 6 DEGREES | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | Dec-93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 14.4000 TPY | RETARD TIMING 6 DEGREES | 0.000 | NSPS |
| WILLIAMS FIELD SERVICES CO. - EL CEORO COMPRESSOR | NM | Oct-93 | ENGINE, GAS-FIRED, RECIPROCATING | 1000.00 HP | 2.5000 G/B-HP-H | CLEAN/LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| PORTSMOUTH NAVAL HOSPITAL | VA | Jul-93 | GENERATORS, DIESEL, 8 | 748000.00 GAL/YR | 6.4000 LB/HR | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| NORTH STAR RECYCLING CO. | OH | Jun-93 | RECIPROCATING ENGINES (NATURAL GAS) (3) | 1700.00 HP (EACH) | 2.2000 G/B-HP-H | 3-WAY CATALYST | 80.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | May-93 | ENGINE, NATURAL GAS COMPRESSOR | 6060.00 HP | 2.6000 G/B-HP-H | LEAN BURN COMBUSTION | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | May-93 | GENERATOR, AUXILARY | 814.00 HP | 1.6000 G/HP-HR | | 0.000 | BACT-OTHER |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | Apr-93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 2.0000 G/B-HP-H | GOOD COMBUSTION | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | Apr-93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGIN | 8.30 MW | 2.0000 GRAM/BRAKE HP HR | | 0.000 | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | Jan-93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 KW (EACH) | 3.4000 LB/HR | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| SITHE/INDEPENDENCE POWER PARTNERS | NY | Nov-92 | GENERATOR, EMERGENCY (OIL) | 25.00 MMBTU/HR | 0.9200 LB/MMBTU | COMBUSTION CONTROLS | 0.000 | BACT-OTHER |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | Nov-92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 635.1000 LBS/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE OUALITY NAT. GA | 0.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (11) (DIESEL) | 1156.00 KW (EACH) | 0.0000 | SCR | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (7) (DIESEL) | 1635.00 KW (EACH) | 0.0000 | SCR | 0.000 | OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (2) (NATURAL GAS) | 443.00 KW (EACH) | 0.0000 | LEAN BURN ENGINE | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (3) (NATURAL GAS) | 443.00 KW (EACH) | 0.0000 | LEAN BURN ENGINE | 0.000 | OTHER |
| SOUTH CAROLINA ELECTRIC AND GAS COMPANY | SC | Jul-92 | GENERATOR, NO 2 OIL - EMERGENCY | 400.00 KILOWATTS | 1.0000 LB/HR | | 0.000 | BACT-PSD |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 2 CYCLE | 6000.00 HP | 0.0000 | INTERNAL COMBUSTION DESIGN | 0.000 | BACT-PSD |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 4 CYCLE | 1076.00 HP | 0.0000 | CATALYTIC OXIDIZER | 63.000 | BACT-PSD |
| CNG TRANSMISSION CORP. | PA | Mar-92 | ENGINES, RECIP I.C., 4, NAT. GAS | 3200.00 HP | 2.6000 G/B-HP-H | LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| ALYESKA PIPELINE SERVICE COMPANY | AK | Jan-92 | GENERATORS, GAS, 2, ROLLS AVON | 24.60 MEGHP | 141.0000 PPMVD | NO INCREASE IN EMISSIONS | 0.000 | BACT-OTHER |
| RYAN-MURPHY INCORPORATED | CA | Jan-92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 0.0000 LB/H | 3-WAY CATALYTIC CONVERTER | 90.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | Nov-91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 156.0000 PPMVD FULL LOAD | HIGH COMBUSTION EFFICIENCY | 0.000 | BACT-PSD |
| SHELL PIPELINE CORP. | CA | Nov-91 | ENGINE-GENERATOR, I.C. EMERGENCY (PROPANE) | 82.00 HP | 0.0000 | 3-WAY CATALYTIC CONVERTER | 96.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES | MO | Nov-91 | ENGINE, I.C. (ELECTRICAL POWER GENERATION) | 8700.00 BHP | 2.0000 GM/BHP-H | | 0.000 | BACT |
| DE LA GUERRA POWER, INC | CA | Nov-91 | ENGINE IC & GEN (1 OF 3) | 380.00 HP | 2.4600 LB/D | NON-SELECTIVE CATALYTIC CONVERTER | 70.000 | BACT-PSD |
| DE LA GUERRA POWER, INC. | CA | Nov-91 | ENGINE (I.C.) AND GENERATOR | 380.00 HP | 2.4600 LB/D | OXIDATION USING 3-WAY CATALYST | 70.000 | BACT-PSD |
| CNG TRANSMISSION CORPORATION | PA | Sep-91 | ENGINE, I.C., RECIP., GAS-FIRED, 2 CYCLE | 4200.00 HP | 2.6000 G/B-HP-H | CLEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| SWIFT ENERGY | OK | Sep-91 | ENGINES, I.C. | 1132.00 HP EACH | 35.7000 T/YR | CATALYTIC CONVERTER | 67.000 | OTHER |
| MOJAVE PIPELINE OPERATING COMPANY | AZ | Jun-91 | ENGINES, RECIPROCATING, 5, FULL BUILD-OUT | 17500.00 HP | 548.5100 T/YR | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| MOJAVE PIPELINE OPERATING COMPANY | AZ | Jun-91 | ENGINES, INTERIM BUILD-OUT, 3 | 13800.00 HP | 441.8100 T/YR | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| NORTHERN CONSOLIDATED POWER | PA | May-91 | GENERATORS, DIESEL, 2 | 1135.00 KW EACH | 7.9000 LB/H EACH | | 0.000 | OTHER |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINE, COMPRESSOR | 4000.00 HP | 2.5000 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINES, COMPRESSOR, 2 | 2000.00 HP EACH | 2.5000 G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | Nov-82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNITS | 12000.00 KW | 364.0000 TPY | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |

Table 5-2c. Summary of Best Available Control Technology (BACT) Determinations for Particulate Emission (PM) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| CITY OF CLOVIS | CA | Nov-96 | CATERPILLAR MODEL G3406TA NATURAL GAS, IC ENGINE | 0.00 | 0.2300 G/BHP-HR | NATURAL GAS FUEL AND PCV | 0.000 | LAER |
| ROSS ISLAND SAND AND GRAVEL | CA | Aug-96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDGE | 685.00 HP | 14.4000 LB/DAY | POSITIVE CRANKCASE VENTILATION AND LOW SULFUR DIESEL FUEL ( | 0.000 | LAER |
| MAUI ELECTRIC COMPANY, LTD. | HI | May-96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 0.0760 GR/DSCF @ 12% CO2 | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| CUNNINGHAM DAVIS ENVIRONMENTAL | CA | Apr-96 | COMPRESSION IGNITION IC ENGINE | 173.00 HP | 1.0000 G/B-HP-HR | LOW-SULFUR DIESEL FUEL AND POSITIVE CRANKCASE VENTILATION | 0.000 | BACT-OTHER |
| CITY OF TULARE, PROJECT 960679 | CA | Mar-96 | CLEAN BURN IC ENGINE | 8.77 MMBTU/HR | 7.5200 LB/MMSCF | GASEOUS FUEL AND POSITIVE CRANKCASE VENTILATION | 0.000 | BACT-OTHER |
| KEARNY VENTURES, LIMITED | CA | Jan-96 | INTERNAL COMBUSTION ENGINE | 208.00 HP | 0.2500 G/B-HP-HR | FUEL SPEC: LOW-SULFUR DIESEL FUEL (0.05% BY WT S) | 0.000 | BACT-OTHER |
| PARKER HANNIFIN CORP - RACOR DIVISION | CA | Jan-96 | IC ENGINE | 450.00 HP | 1.0000 G/B-HP-HR | LOW-SULFUR DIESEL FUEL AND POSITIVE CRANKCASE VENTILATION | 0.000 | BACT-OTHER |
| MAUI ELECTRIC COMPANY LIMITED | HI | Nov-95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 0.0760 GR/DSCF @ 12% CO2 | COMBUSTION DESIGN | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 2.5000 TPY | PROPER ENGINE MAINTENANCE PRACTICES | 0.000 | BACT |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KW HR/YR | 2.5000 TPY | PROPER ENGINE MAINTENANCE PRACTICES | 0.000 | BACT |
| LSP-COTTAGE GROVE, L.P. | MN | Mar-95 | DIESEL ENGINE-DRIVEN FIRE PUMP | 2.70 MMBTU/HR | 0.7000 LB/HR | FUEL SELECTION; GOOD COMBUSTION | 0.000 | BACT-PSD |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | DIESEL GENERATOR (EP #00005) | 22.00 MMBTU/HR | 0.0240 LB/MMBTU, 0.53 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | FIRE PUMP (EP #00007) | 1.50 MMBTU/HR | 0.2000 LB/MMBTU, 0.29 LB/HR | FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.15% BY WEIGHT | 0.000 | BACT-OTHER |
| CARDINAL FLAT GLASS | WI | Nov-94 | GENERATOR, BACK-UP, DIESEL | 0.00 | 4.7500 LBS/HR | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | 0.000 | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 5 ENGINE GENERATORS | 1600.00 KW | 2.1000 TPY |  | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 5 ENGINE GENERATORS | 1600.00 KW | 2.1000 TPY |  | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | Dec-93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 1.6000 LB/HR | FUEL SPEC: .20% S FUEL OIL | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | Dec-93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 1.6000 LB/HR | FUEL SPEC: .20% S FUEL OIL | 0.000 | NSPS |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | Apr-93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 15.0000 TPY | FUEL SPECIFICATION | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | Apr-93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGIN | 6.30 MW | 15.0000 TPY |  | 0.000 | BACT-PSD |
| *RW POWER PARTNERS, L.P.* | VA | *Jan-93* | *GENERATORS*, ELECTRIC *(DIESEL)* (3) | 1200.00 *KW (EACH)* | 3.4000 *LB/HR* | *GOOD COMBUSTION PRACTICES* | 0.000 | *BACT-OTHER* |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | Nov-92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 10.0000 LB/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GA | 0.000 | OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (11) (DIESEL) | 1156.00 KW (EACH) | 0.3200 G/B-HP-H | SCR | 0.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (7) (DIESEL) | 1635.00 KW (EACH) | 0.3200 G/B-HP-H | SCR | 0.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (2) (NATURAL GAS) | 443.00 KW (EACH) | 0.3200 G/B-HP-H | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (3) (NATURAL GAS) | 443.00 KW (EACH) | 0.3200 G/B-HP-H | LEAN BURN ENGINE | 0.000 | BACT-OTHER |
| RYAN-MURPHY INCORPORATED | CA | Jan-92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 0.0900 LB/H | WATER INJECTION | 40.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | Nov-91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 MW EACH | 0.1000 LB/MMBTU FULL LOAD | DIESEL FUEL OIL, HIGH COMB. EFF. | 0.000 | BACT-PSD |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | Nov-82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNITS | 12000.00 KW | 119.0000 TPY | GOOD COMBUSTION CONTROL | 0.000 | BACT-PSD |

Table 5-2d. Summary of Best Available Control Technology (BACT) Determinations for Sulfur Dioxide (SO2) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity (size) | CO Emission Limit | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|
| CITY OF CLOVIS | CA | Nov-96 | CATERPILLAR MODEL G3406TA NATURAL GAS, IC ENGINE | 0.00 | 0.0000 SEE P2 | NATURAL GAS FUEL | | LAER |
| ROSS ISLAND SAND AND GRAVEL | CA | Aug-96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDGE | 685.00 HP | 2.5000 LB/DAY | LOW SULFUR DIESEL FUEL (0.05% BY WT) | | LAER |
| MAUI ELECTRIC COMPANY, LTD. | HI | May-96 | ENGINE GENERATORS (3), DIESEL | 2.20 MW | 76.0000 PPMVD | FUEL SPEC: SULFUR CONTENT 0.4% BY WEIGHT | | BACT-PSD |
| MAUI ELECTRIC COMPANY LIMITED | HI | Nov-95 | ENGINE GENERATOR, DIESEL (3) | 2.20 MW | 76.0000 PPMVD | FUEL SPEC: SULFUR CONTENT .47 BY WEIGHT | | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 MM KWHR/YR | 57.0000 TPY | SPECIFY TYPE OF FUEL BURNED | | BACT |
| CARDINAL FLAT GLASS | WI | Nov-94 | GENERATOR, BACK-UP, DIESEL | 0.00 | 0.7000 LBS/HR | FUEL SPEC: LOW SULFUR (0.05%) DIESEL FUEL | | BACT-PSD |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 5 ENGINE GENERATORS | 1600.00 KW | 4.2000 TPY | FUEL SPEC: 0.20% S FUEL OIL | | NSPS |
| INTEL CORPORATION | AZ | Apr-94 | GENERATORS, BACKUP, 5 | 2220.00 BHP | 0.0000 | FUEL SPEC: .055 WT % S FUEL OIL | | BACT |
| NAVY PUBLIC WORKS CENTER | VA | Dec-93 | GENERATOR, ENGINE, 5 | 1600.00 KW | 4.2000 TPY | FUEL SPEC: .20% S FUEL OIL | | NSPS |
| PORTSMOUTH NAVAL HOSPITAL | VA | Jul-93 | GENERATORS, DIESEL, 6 | 748000.00 GAL/YR | 5.4000 LB/HR | RETARDING THE TIMING BY 5 DEGREES | | NSPS |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, WARTSILLA #2 & #6 | 0.00 | 49.2000 TPY | FUEL SPEC: 0.25% S IN FUEL | | BACT-PSD |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, TRANSPORTABLE | 0.00 | 3.4000 TPY | FUEL SPEC: 0.25% S IN FUEL | | BACT-PSD |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, CATERPILLAR #1, #2 & #3 | 0.00 | 2.3000 TPY | FUEL SPEC: 0.25% S IN FUEL | | BACT-PSD |
| RESOURCE RENEWAL TECHNOLOGIES, INC. | CA | Jun-93 | ENGINE, I.C. | 951.00 BHP | 0.2380 G/B-HP-H | FUEL SPEC: USE OF LOW SULFUR FUEL (<= 0.05% S BY WEIGHT) | | BACT-OTHER |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | Apr-93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 HP | 40.0000 TPY | LOW SULFUR CONTENT FUEL | | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | Apr-93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGIN | 6.30 MW | 40.0000 TPY | LOW SULFUR CONTENT FUEL | | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | Jan-93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 KW (EACH) | 18.1000 LB/HR | FUEL SPEC: USE OF 0.5% SULFUR FUEL | | BACT-OTHER |
| SITHE/INDEPENDENCE POWER PARTNERS | NY | Nov-92 | GENERATOR, EMERGENCY (OIL) | 25.00 MMBTU/HR | 0.0500 % SULFUR OIL | FUEL SPEC: LOW SULFUR OILS | | BACT-OTHER |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | Nov-92 | ENGINES, RECIPROCATING (6) | 2500.00 HP (EACH) | 0.6000 LB/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GAS | | OTHER |
| SOUTH CAROLINA ELECTRIC AND GAS COMPANY | SC | Jul-92 | GENERATOR, NO 2 OIL - EMERGENCY | 400.00 KILOWATTS | 1.2000 LB/HR | FUEL SPEC: 0.3% SULFUR CONTENT FUEL; LIMIT OPER <500 HOURS/YEAR | | BACT-PSD |
| RYAN-MURPHY INCORPORATED | CA | Jan-92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 BHP @ 1800 RPM | 0.0200 LB/H AS SO4 | FUEL SPEC: 0.05% DIESEL FUEL SULFUR CONTENT | | BACT-PSD |
| UPF CORPORATION | CA | Dec-91 | ENGINE, DIESEL, EMERGENCY POWER GENERATION | 410.00 HP | 0.0000 | FUEL SPEC: FUEL OIL W/ < 0.05% SULFUR CONTENT | | BACT-PSD |
| UPF CORPORATION | CA | Dec-91 | ENGINE, DIESEL | 410.00 HP | 0.0000 | FUEL SPEC: FUEL OIL W/ < 0.05% SULFUR CONTENT | | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | Nov-91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.66 MW EACH | 95.0000 PPMVD | FUEL SPEC: MAX FUEL S CONTENT 0.5% BY WEIGHT | | BACT-PSD |
| CITY OF JACKSON MUNICIPAL UTILITIES | MO | Nov-82 | ADDITION OF TWO DIESEL ELECTRIC GENERATING UNITS | 12000.00 KW | 111.0000 TPY | GOOD COMBUSTION CONTROL | | BACT-PSD |

Table 5-2e. Summary of Best Available Control Technology (BACT) Determinations for Volatile Organic Compounds (VOC) Emissions

| Facility Name | State | Permit Issue Date | Unit/Process Description | Capacity | (size) | CO Emission Limit | | Control Method | Efficiency (%) | Type |
|---|---|---|---|---|---|---|---|---|---|---|
| KAISER PERMANENTE MEDICAL CENTER | CA | Sep-97 | JOHN DEERE MODEL 6076AFN30 IC ENGINE | 160.00 | BHP | 150.0000 | PPMV @ 15% O2 | NATURAL GAS FUEL | 0.000 | LAER |
| CITY OF CLOVIS | CA | Nov-96 | CATERPILLAR MODEL G3406TA NATURAL GAS, IC ENGIN | 0.00 | | 0.0680 | G/BHP-HR | NATURAL GAS FUEL AND A HOUSTON INDUSTRIAL SILENCING MODEL DN/S-3 | 0.000 | LAER |
| ROSS ISLAND SAND AND GRAVEL | CA | Aug-96 | DIESEL-FIRED IC ENGINE SERVING DEEP WATER DREDG | 685.00 | HP | 0.4000 | LB/DAY | CATALYTIC OXIDATION AND A POSITIVE CRANKCASE VENTILATION SYSTEM | 90.000 | LAER |
| MAUI ELECTRIC COMPANY, LTD. | HI | May-96 | ENGINE GENERATORS (3), DIESEL | 2.20 | MW | 81.0000 | PPMVD | COMBUSTION DESIGN, INCLUDING FITR | 0.000 | BACT-PSD |
| CITY OF TULARE, PROJECT 960679 | CA | Mar-96 | CLEAN BURN IC ENGINE | 8.77 | MMBTU/HR | 0.2500 | G/B-HP-HR | GASEOUS FUEL AND POSITIVE CRANKCASE VENTILATION | 90.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | Feb-96 | NATURAL GAS FIRED ENGINE | 3400.00 | HP | 0.8300 | G/B-HP-H | | 0.000 | RACT |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | Feb-96 | NATURAL GAS FIRED ENGINE | 2000.00 | HP | 1.6500 | G/B-HP-H | | 0.000 | RACT |
| CNG TRANSMISSION CORPORATION-LEIDY | PA | Feb-96 | NATURAL GAS FIRED ENGINE | 1000.00 | HP | 1.1000 | G/B-HP-H | | 0.000 | RACT |
| KEARNY VENTURES, LIMITED | CA | Jan-96 | INTERNAL COMBUSTION ENGINE | 208.00 | HP | 0.3300 | G/B-HP-HR | NO CONTROL | 0.000 | BACT-OTHER |
| MAUI ELECTRIC COMPANY LIMITED | HI | Nov-95 | ENGINE GENERATOR, DIESEL (3) | 2.20 | MW | 81.0000 | PPMVD | COMBUSTION DESIGN (INCLUDING FITR) | 0.000 | BACT-PSD |
| MERIDIAN OIL, INC./VALVERDE GAS PROCESSING FAC. | NM | Oct-95 | RECIPROCATING ENGINE, NATURAL GAS (4) | 0.00 | | 0.8000 | G/B-HP-H | CLEAN BURN ENGINE MODEL #: 3612 TA/SW66 MANUFACTURER: | 0.000 | BACT-PSD |
| COMBINED HEAT & POWER, INC. | VA | Aug-95 | I.C. ENGINES (16), DISTIL OIL & NAT GAS FIRED | 27.60 | MM KW HR/YR | 2.2000 | TPY | PROPER ENGINE MAINTENANCE | 0.000 | BACT |
| LSP-COTTAGE GROVE, L.P. | MN | Mar-95 | DIESEL ENGINE-DRIVEN FIRE PUMP | 2.70 | MMBTU/HR | 1.9000 | LB/HR | FUEL SELECTION; GOOD COMBUSTION | 0.000 | BACT-PSD |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #1, NATURAL GAS/#2 FUEL OIL | 8386.00 | HP | 0.7500 | G/B-HP-H | CLEANBURN COMBUSTION SYSTEM | 75.800 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #2, NATURAL GAS/#2 FUEL OIL | 8386.00 | HP | 0.7500 | G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 50.000 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #3, NATURAL GAS/#2 FUEL OIL | 8386.00 | HP | 0.7500 | G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 68.800 | RACT |
| INDIANA UNIV. OF PA (SW JACK COGENERATION FAC.) | PA | Dec-94 | I.C. ENGINE #4, NATURAL GAS/#2 FUEL OIL | 8386.00 | HP | 0.7500 | G/B-HP-H | CLEANBURN COMBUSTION SYSTEM MANUFACTURER: COOPER-BESSEMER | 74.100 | RACT |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | DIESEL GENERATOR (EP #00005) | 22.00 | MMBTU/HR | 0.0160 | LB/MMBTU, 0.34 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| KAMINE/BESICORP SYRACUSE LP | NY | Dec-94 | FIRE PUMP (EP #00007) | 1.50 | MMBTU/HR | 0.0550 | LB/MMBTU, 0.08 LB/HR | NO CONTROLS | 0.000 | BACT-OTHER |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 2 GAS-FIRED GENERATOR ENGINES | 385.00 | HORSEPOWER | 0.4000 | LBS/HR | GOOD COMBUSTION | 0.000 | BACT |
| SNYDER OIL CORPORATION-RIVERTON DOME GAS PLANT | WY | Jul-94 | 1 GAS-FIRED GENERATOR ENGINE | 577.00 | HORSEPOWER | 0.6000 | LBS/HR | GOOD COMBUSTION | 0.000 | BACT |
| NAVY PUBLIC WORKS CENTER | VA | May-94 | 1 EMERGENCY GENERATOR | 1500.00 | KW | 4.1000 | TPY | RETARD TIMING 8 DEGREES | 0.000 | NSPS |
| NAVY PUBLIC WORKS CENTER | VA | Dec-93 | GENERATOR, ENGINE, 5 | 1600.00 | KW | 3.2000 | LB/HR | | 0.000 | NSPS |
| WILLIAMS FIELD SERVICES CO. - EL CEDRO COMPRESSOR | NM | Oct-93 | ENGINE, GAS-FIRED, RECIPROCATING | 1000.00 | HP | 1.0000 | G/B-HP-H | CLEAN/LEAN BURN TECHNOLOGY | 0.000 | BACT-PSD |
| PORTSMOUTH NAVAL HOSPITAL | VA | Jul-93 | GENERATORS, DIESEL, 6 | 748000.00 | GAL/YR | 0.9000 | LB/HR | RETARDING THE TIMING BY 5 DEGREES | 21.700 | NSPS |
| COMINCO ALASKA INC. | AK | Jul-93 | GENERATOR, WARTSILLA #2 & #6 | 0.00 | | 6.1000 | LBS/HR | 3 DEGREE TIMING RETARD | 0.000 | BACT-PSD |
| RESOURCE RENEWAL TECHNOLOGIES, INC. | CA | Jun-93 | ENGINE, I.C. | 951.00 | BHP | 0.3300 | G/B-HP-H | POSITIVE CRANKCASE VENTILLATION | 0.000 | BACT-OTHER |
| NORTH STAR RECYCLING CO. | OH | Jun-93 | RECIPROCATING ENGINES (NATURAL GAS) (3) | 1700.00 | HP (EACH) | 0.4000 | G/B-HP-H | 3-WAY CATALYST | 60.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | May-93 | ENGINE, NATURAL GAS COMPRESSOR | 6060.00 | HP | 0.8200 | G/B-HP-H | LEAN BURN COMBUSTION | 0.000 | BACT-OTHER |
| CNG TRANSMISSION CORPORATION | WV | May-93 | GENERATOR, AUXILARY | 814.00 | HP | 0.7400 | G/HP-HR | | 0.000 | BACT-OTHER |
| MARSHALL MUNICIPAL UTILITIES (BD. OF PUBLIC WORKS) | MO | Apr-93 | ENGINE, I.C. (RECIPROCATING) | 8500.00 | HP | 0.7000 | G/B-HP-H | GOOD COMBUSTION | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES (BOARD OF PUBLIC WORK | MO | Apr-93 | NEW COOPER-BESSEMER INTERNAL COMBUSTION ENGI | 6.30 | MW | 0.7000 | GRAM/BRAKE HP HR | | 0.000 | BACT-PSD |
| RW POWER PARTNERS, L.P. | VA | Jan-93 | GENERATORS, ELECTRIC (DIESEL) (3) | 1200.00 | KW (EACH) | 4.6000 | LB/HR | GOOD COMBUSTION PRACTICES | 0.000 | BACT-OTHER |
| SNYDER OIL CORP. / ENTERPRISE STATION | CO | Nov-92 | ENGINES, RECIPROCATING (6) | 2500.00 | HP (EACH) | 141.3000 | LBS/MILLION SCF | LEAN COMBUSTION & FUEL SPEC: FIRING RESIDUE QUALITY NAT. GAS | 0.000 | BACT-OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (11) (DIESEL) | 1156.00 | KW (EACH) | 0.0000 | | SCR | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (7) (DIESEL) | 1635.00 | KW (EACH) | 0.0000 | | SCR | 0.000 | OTHER |
| PHILADELPHIA SOUTHWEST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (2) (NATURAL GAS) | 443.00 | KW (EACH) | 0.0000 | | LEAN BURN ENGINE | 0.000 | OTHER |
| PHILADELPHIA NORTHEAST WATER TREATMENT PLANT | PA | Oct-92 | ENGINES (3) (NATURAL GAS) | 443.00 | KW (EACH) | 0.0000 | | LEAN BURN ENGINE | 0.000 | OTHER |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 2 CYCLE | 6000.00 | HP | 0.0000 | | INTERNAL COMBUSTION DESIGN | 0.000 | BACT-PSD |
| BLUE LAKE GAS STORAGE CO. | MI | May-92 | ENGINES, RECIPROCATING, 4 CYCLE | 1076.00 | HP | 0.0000 | | CATALYTIC OXIDIZER | 60.000 | BACT-PSD |
| CNG TRANSMISSION CORP. | PA | Mar-92 | ENGINES, RECIP I.C., 4, NAT. GAS | 3200.00 | HP | 0.8000 | G/B-HP-H | LEAN BURN TECHNOLOGY | 0.000 | BACT-OTHER |
| RYAN-MURPHY INCORPORATED | CA | Jan-92 | GENERATOR, DIESEL-FIRED, NON-EMERGENCY | 211.00 | BHP @ 1600 RPM | 0.0900 | LB/H | 3-WAY CATALYTIC CONVERTER, POSITIVE CRANKCASE VENTILATION | 30.000 | BACT-PSD |
| CITIZENS UTILITIES CO., KAUAI ELECT. DIV. | HI | Nov-91 | ENGINE, I.C. DIESEL-FIRED, 4 EACH | 7.86 | MW EACH | 228.0000 | PPMVD FULL LOAD | HIGH COMBUSTION EFFICIENCY | 0.000 | BACT-PSD |
| MARSHALL MUNICIPAL UTILITIES | MO | Nov-91 | ENGINE, I.C. (ELECTRICAL POWER GENERATION) | 8700.00 | BHP | 0.7000 | GM/BHP-H | | 0.000 | BACT |
| DE LA GUERRA POWER, INC | CA | Nov-91 | ENGINE IC & GEN (1 OF 3) | 380.00 | HP | 7.6800 | LB/D | NON-SELECTIVE CATALYTIC CONVERTER | 70.000 | BACT-PSD |
| DE LA GUERRA POWER, INC | CA | Nov-91 | ENGINE IC & GEN (1 OF 3) | 380.00 | HP | 0.0000 | UNQUANTIFIED CRANKCA | VENT CRANKCASE EMISSIONS TO INTAKE MANIFOLD | 100.000 | BACT-PSD |
| DE LA GUERRA POWER, INC. | CA | Nov-91 | ENGINE (I.C.) AND GENERATOR | 380.00 | HP | 7.6800 | LB/D | OXIDATION USING 3-WAY CATALYST & CRANKCASE RECIRC. | 70.000 | BACT-PSD |
| RICHMOND EXPLORATION CORP. | CA | Oct-91 | ENGINE, I.C., NAT. GAS/PROPANE | 200.00 | HP | 0.4400 | LBM/H | THREE-WAY CATALYST | 0.000 | BACT-PSD |
| CNG TRANSMISSION CORPORATION | PA | Sep-91 | ENGINE, I.C., RECIP., GAS-FIRED, 2 CYCLE | 4200.00 | HP | 0.9000 | G/B-HP-H | CLEAN BURN TECHNOLOGY | 0.000 | BACT-OTHER |
| SWIFT ENERGY | OK | Sep-91 | ENGINES, I.C. | 1132.00 | HP EACH | 7.1000 | T/YR | CATALYTIC CONVERTER | 70.000 | OTHER |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINE, COMPRESSOR | 4000.00 | HP | 0.6500 | G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |
| NORTHERN NATURAL GAS COMPANY | IA | Sep-90 | ENGINES, COMPRESSOR, 2 | 2000.00 | HP EACH | 0.6500 | G/B-HP-H | GOOD COMBUSTION PRACTICES | 0.000 | BACT-PSD |

Table 5-3. BACT Cost Calculation for Water Injection on CPF Turbines

| **Capital Costs** | Cost for 1 turbine | Total cost 3 Turbines |
|---|---|---|
| Solar cost adder | $43,130 | $129,390 |
| Turbine controls integration (controlling water injection rate and water quality) | $20,000 | $60,000 |
| Reverse Osmosis (RO) unit fabrication and installation (backup added for 3 turbines) | $150,000 | $300,000 |
| Deck fabrication for RO unit (30 x 30 ft space @ $200/sq-ft) | $180,000 | $180,000 |
| Water storage tank and pump skid | $25,000 | $25,000 |
| Deck fabrication for tank/pump skid (20 x 20 ft space @ $200/sq-ft) | $80,000 | $80,000 |
| Deck fabrication for DI skid (30 x 30 ft space @ $200/sq-ft) | $180,000 | $180,000 |
| **Total Capital** | **$678,130** | **$954,390** |
| **Annual Costs** | | |
| Reverse Osmosis cartridges/filters | $25,000 | $75,000 |
| De-ionizing skids ($1535/skid and provide 7,200 gal/day) [a] | $224,110 | $672,330 |
| Additional personnel maintenance cost ( 2 personnel/2 days per week - $50/hr, 12 hr/day) | $124,800 | $124,800 |
| Capital Recovery at 16.3% | $110,535 | $155,566 |
| **Total Annual Expense** | **$484,445** | **$1,027,696** |
| **Tons Removed[b]** | **21.2** | **63.6** |
| **Cost Effectiveness** | **$22,865** | **$16,168** |

[a] Solar specifications call for each turbine consuming 1.7 gpm/turbine of deionized water, or 2,400 gpd. Each DI skid makes 6,000 gallons of DI water; each turbine requires 876,000 gallons/year; 146 DI skids/year/turbine.

[b] Emissions based on 110 ppmvd corrected to 15% $O_2$ ; 7.82 lb/hr; see Table A-4a; control at 42 ppmvd (corrected); 2.16 lb/hr; difference is 4.84 lb/hr and 21.2 tons/year/turbine.

Table 5-4. BACT Cost Calculation and Emission Estimates for CPF Engines
Nitrogen Oxides - Alternative Engine Adjustments and Controls

**Emissions:**

| Engine Setting/Control | Emissions (g/hp-hr) $NO_x$ | CO | VOCs |
|---|---|---|---|
| Lowest Manifold (Best Power) | 8.5 | 35 | 0.4 |
| Equal $NO_x$ and CO | 12 | 12 | 0.3 |
| Standard (Best Economy) | 20 | 1 | 0.2 |
| Catalytic Converter | 1.1 | 1.2 | 0.13 |

Engine Rating: 166 hp; (a larger engine has been used for emission estimates and modeling purposes)[a]

| Engine Setting/Control | Emissions (lb/hr) $NO_x$ | CO | VOCs |
|---|---|---|---|
| Lowest Manifold (Best Power) | 3.11 | 12.81 | 0.15 |
| Equal $NO_x$ and CO | 4.39 | 4.39 | 0.11 |
| Standard (Best Economy) | 7.32 | 0.37 | 0.07 |
| Catalytic Converter | 0.40 | 0.44 | 0.05 |

Capacity Factor: 80.00%

| Engine Setting/Control | Emissions (tons/year) $NO_x$ | CO | VOCs | Total |
|---|---|---|---|---|
| Lowest Manifold (Best Power) | 10.90 | 44.88 | 0.51 | 56.29 |
| Equal $NO_x$ and CO | 15.39 | 15.39 | 0.38 | 31.16 |
| Standard (Best Economy) | 25.65 | 1.28 | 0.26 | 27.19 |
| Catalytic Converter | 1.41 | 1.54 | 0.17 | 3.12 |

**Cost Calculations:**

| | | |
|---|---|---|
| Capital Costs | | |
| Capital Costs | $11,800.00 | includes spare catalyst |
| Capital Recovery | $1,920.39 | Fixed costs at 16.3% |
| Operating Costs | | |
| Cleaning | $250.00 | Once every 2 years |
| Catalyst Replacement | $450.00 | Once every 4 years |
| Changeout Labor | $210.00 | 8 hours per engine @ $35/hour |
| Total: | $910.00 | |
| Annualized Costs | $2,830.39 | |

Table 5-4. BACT Cost Calculation and Emission Estimates for CPF Engines
Nitrogen Oxides - Alternative Engine Adjustments and Controls

**Cost Effectiveness Calculations:**

| | Cost Effectiveness ($/ton) | | | |
|---|---|---|---|---|
| Engine Setting/Control | $NO_x$ | CO | VOCs | Total |
| Lowest Manifold (Best Power) | $298 | $65 | $8,175 | $53 |
| Equal $NO_x$ and CO | $202 | $204 | $12,984 | $101 |
| Standard (Best Economy) | $117 | -$11,036 | $31,532 | $118 |

| Catalytic Converter Input | $NO_x$ | CO | VOCs | Total |
|---|---|---|---|---|
| grams/hp-hr | 11 | 8 | 0.25 | |
| lb/hr | 4.03 | 2.93 | 0.09 | |
| tons/year | 14.11 | 10.26 | 0.32 | 24.68 |
| Cost Effectiveness | $223 | $325 | $18,394 | $131 |

| Total Cost | Number | Engines |
|---|---|---|
| Single Satellites | 11 | 11 |
| Double Satellites | 5 | 10 |
| Total: | | 21 |

| | |
|---|---|
| Capital Costs | $247,800.00 |
| Operating Costs | $19,110.00 |
| Annualized Costs | $59,438.21 |

| Single Engine | Emissions Reductions (tons/year) | | | |
|---|---|---|---|---|
| Engine Setting/Control | $NO_x$ | CO | VOCs | Total |
| Lowest Manifold (Best Power) | 9.49 | 43.34 | 0.35 | 53.18 |
| Equal $NO_x$ and CO | 13.98 | 13.85 | 0.22 | 28.04 |
| Standard (Best Economy) | 24.24 | -0.26 | 0.09 | 24.07 |

| All Engines | Emissions Reductions (tons/year) | | | |
|---|---|---|---|---|
| Engine Setting/Control | $NO_x$ | CO | VOCs | Total |
| Lowest Manifold (Best Power) | 199.27 | 910.20 | 7.27 | 1116.74 |
| Equal $NO_x$ and CO | 293.52 | 290.83 | 4.58 | 588.93 |
| Standard (Best Economy) | 508.96 | -5.39 | 1.89 | 505.46 |

| | Cost Effectiveness ($/ton) | | | |
|---|---|---|---|---|
| Control | $NO_x$ | CO | VOCs | Total |
| Lowest Manifold (Best Power) | $298 | $65 | $8,175 | $53 |
| Equal $NO_x$ and CO | $202 | $204 | $12,984 | $101 |
| Standard (Best Economy) | $117 | -$11,036 | $31,532 | $118 |

[a] The BACT Evaluation used data from a specific engine. To provide flexibility in the development, larger engines were assumed for emission estimates and modeling as shown in Table A-4a. The emissions in Table A-4a are "controlled" values with a catalyst and a margin.

Table 5-5. BACT Cost Evaluation of Alternative Technologies for Sulfur Dioxide - Alternative Fuels

| Fuel Usage | Usage (gallons) | Emissions (tons) | | |
|---|---|---|---|---|
| OCS Source | | 0.5% S | 0.05%-S | Difference |
| 2 Drilling Rigs | 1,431,556 | 51.536 | 5.1536 | -46.3824 |
| CPF | 213,889 | 7.7 | 0.77 | -6.93 |
| Total: | 1,645,444 | 59.24 | 5.92 | -53.31 |
| | | | | |
| Associated Facilities | | | | |
| Pipelaying Barge | 359,444 | | | |
| Vessels | 381,111 | | | |
| Other Gulf of Mexico based facilities using same fuel supply[a] | 5,000,000 | | | |
| Total: | 5,740,556 | | | |
| Grand Total: | 7,386,000 | | | |

| Cost | | |
|---|---|---|
| Operational Costs | $221,580 | Based on $0.03 per gallon |
| Capital Costs for Fuel Handling Facilities | $300,000 | New Tank for Support Facilities |
| Annualized Capital | $48,824 | Fixed Costs at 16.3% |
| | | |
| Total Annual Costs | $270,404 | |
| Cost Effectiveness | $5,072 | |
| Cost Basis | $0.03 | per gallon |

[a] Conservative estimate based on Mobile and VK associated fuel usage from the same shore base:

| | | |
|---|---|---|
| Support Vessels | 1,531,700 | field support, 2 rig operation |
| Rig Usage | 4,100,000 | 5 wells/year |
| Total: | 5,631,700 | |

# 6.0 MODELING EVALUATION

## 6.1 REGULATORY REQUIREMENTS

### 6.1.1 PSD IMPACT ANALYSIS

A source impact analysis must be performed for a proposed major source subject to PSD review for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 1-2). The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated EPA models normally must be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the EPA publication Guideline on Air Quality Models (Revised). The source impact analysis for criteria pollutants to address compliance with AAQS and PSD Class II increments may be limited to the new or modified source if the net increase in impacts as a result of the new or modified source is above significance levels, as presented in Table 1-2.

If the project's impacts are above the significant impact levels, then a more detailed air modeling analysis that includes background sources is performed. Current FDEP policies stipulate that the highest annual average and highest short-term (i.e., 24 hours or less) concentrations are to be compared to the applicable significant impact levels. Based on the screening modeling analysis results, additional modeling refinements with a denser receptor grid are performed, as necessary, to obtain the maximum concentration. Modeling refinements are performed with a receptor grid spacing of 100 meters (m) or less.

In general, when 5 years of meteorological data are used in the analysis, the highest annual and the highest, second-highest (HSH) short-term concentrations are compared to the applicable AAQS and allowable PSD increments. The HSH concentration is calculated for a receptor field by:

- Eliminating the highest concentration predicted at each receptor,
- Identifying the second-highest concentration at each receptor, and
- Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with air quality standards and allowable PSD increments, which permit a short-term average concentration to be exceeded once per year at each receptor.

The EPA has proposed significant impact levels for Class I areas. The National Park Service (NPS) is the designated agency for oversight for air quality impacts to Class I areas. The EPA levels are as follows:

| Pollutant | Averaging Time | Proposed EPA PSD Class I Significant Impact Levels ($\mu g/m^3$) |
|---|---|---|
| $SO_2$ | 3-hour | 1 |
| | 24-hour | 0.2 |
| | Annual | 0.1 |
| $PM_{10}$ | 24-hour | 0.3 |
| | Annual | 0.2 |
| $NO_2$ | Annual | 0.1 |

Note: $\mu g/m^3$ = micrograms per cubic meter.

Although these levels have not been officially promulgated as part of the PSD review process and may not be binding for states in performing PSD review, the proposed levels serve as a guideline in assessing a source's impact in a Class I area. The EPA action to incorporate Class I significant impact levels in the PSD process is part of implementing NSR provisions of the 1990 CAA Amendments. Because the process of developing the regulations will be lengthy, EPA believes that the proposed rules concerning the significant impact levels is appropriate in order to assist states in implementing the PSD permit process.

Generally, if a new project also is within 150 km of a PSD Class I area, then a significant impact analysis is also performed for the PSD Class I area.

Various lengths of record for meteorological data can be used for impact analysis. A 5-year period can be used with corresponding evaluation of highest-, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term *highest-, second-highest* (HSH) refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specifies that the standard should not be exceeded at any location more than once a year. If fewer than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor normally must be used for comparison to air quality standards.

The term *baseline concentration* evolves from federal and state PSD regulations and refers to a concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition, in the PSD regulations as amended August 7, 1980, baseline concentration means the ambient concentration level that exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

- The actual emissions representative of facilities in existence on the applicable baseline date; and
- The allowable emissions of major stationary facilities that commenced construction before January 6, 1975, for $SO_2$ and PM(TSP) concentrations, or February 8, 1988, for $NO_2$ concentrations, but that were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

- Actual emissions from any major stationary facility on which construction commenced after January 6, 1975, for $SO_2$ and PM(TSP) concentrations, and after February 8, 1988, for $NO_2$ concentrations; and
- Actual emission increases and decreases at any stationary facility occurring after the baseline date.

In reference to the baseline concentration, the term "baseline date" actually includes three different dates:

- The major facility baseline date, which is January 6, 1975, in the cases of $SO_2$ and PM(TSP), and February 8, 1988, in the case of $NO_2$.
- The minor facility baseline date, which is the earliest date after the trigger date on which a major stationary facility or major modification subject to PSD regulations submits a complete PSD application.

- The trigger date, which is August 7, 1977, for $SO_2$ and PM(TSP), and February 8, 1988, for $NO_2$.

The minor source baseline date for $SO_2$ and PM(TSP) has been set as December 27, 1977, for the entire State of Florida (Rule 62-275.700(1)(a), F.A.C.). The minor source baseline for $NO_2$ has been set as March 28, 1988 (Rule 62-275.700(3)(a), F.A.C.). It should be noted that references to PM(TSP) are also applicable to PM10.

Since the applicable regulations for the evaluation of the Destin Dome OCS source permit are the regulations promulgated by the FDEP, the appropriate location for determining impacts are the state boundary. Chapter 62-204 F.A.C. establishes the AAQS and PSD increments for Florida. The Chapter designates in Rule 62-204.100(2) F.A.C., that this promulgation affects "all areas of the state". The areas outside Florida's boundary would not be located within the State of Florida as defined in Chapter 62-204 F.A.C. and required to under go a PSD modeling analysis under 62-212.400 F.A.C. Therefore the modeling analysis only addresses impacts to Florida and the nearest Class I area.

### 6.1.2 AIR QUALITY MONITORING REQUIREMENTS

In accordance with requirements of 40 CFR 52.21(m) and Rule 62-212.400(5)(f), F.A.C., any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility or major modification. For a new major facility, the affected pollutants are those that the facility potentially would emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 1-2).

Ambient air monitoring for a period of up to 1 year generally is appropriate to satisfy the PSD monitoring requirements. A minimum of 4 months of data is required. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA, 1987).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that FDEP may exempt a proposed major stationary facility or major modification from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility or modification would cause, in any area, air quality impacts less than the *de minimis* levels presented in Table 1-2 (Rule 62-212.400-3, F.A.C.).

The impacts are less than the de minimis monitoring values (refer to Section 6.9) and monitoring is not required.

### 6.1.3 SOURCE INFORMATION/GOOD ENGINEERING PRACTICE STACK HEIGHT

Source information must be provided to adequately describe the proposed project. The general type of information required for this project is presented in Section 2.0.

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (EPA, 1985a). Identical regulations have been adopted by FDEP (Rule 62-210.550, F.A.C.). GEP stack height is defined as the highest of:

1. 65 meters (m); or
2. A height established by applying the formula:

   $Hg = H + 1.5L$

   where: $Hg$ = GEP stack height,

   $H$ = Height of the structure or nearby structure, and

   $L$ = Lesser dimension (height or projected width) of nearby structure(s); or
3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to 5 times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula.

All the stacks associated with the Destin Dome development are less than 65 meters and the emission limitations are unaffected by the stack heights.

### 6.1.4 ADDITIONAL IMPACT ANALYSIS

In addition to air quality impact analyses, federal and State of Florida PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21(o); Rule 62-212.400(5)(e), F.A.C.]. These analyses are to be conducted primarily for PSD Class I areas. Impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 1-2).

## 6.2 MODEL SELECTION

Ambient air quality impacts were determined by the Offshore and Coastal Dispersion (OCD) Version 5.0 model. The OCD model was developed for the Minerals Management Service (MMS) by Sigma Research Corporation in 1989 and has been approved by MMS for determining impacts of OCS sources on the air quality of coastal regions. The OCD model is a Gaussian plume model constructed from the framework of the Multiple Point Gaussian Dispersion Algorithm With Terrain Adjustment (MPTER) model, developed by the Environmental Protection Agency (EPA). The OCD model has also been recommended by the EPA as a preferred model (i.e., included in Appendix A of EPA's Guideline on Air Quality Models) for regulatory applications involving the evaluation of onshore impacts from OCS facilities in simple terrain.

The modeling that was performed is identical to the modeling provided to EPA Region IV for the EIS prepared for the Destin Dome. The exception is the incorporation of vessels which are not considered a part of the OCS source except in determining the potential-to-emit.

## 6.3 OCD MODEL OPTIONS

The following modeling options within the OCD model were selected to be consistent with EPA and MMS regulatory requirements. These options include:

- Final plume rise at all receptor locations,
- Stack-tip downwash,
- Buoyancy-induced dispersion, and
- Consideration of platform downwash effects.

In addition, the following model-specific options were set within the OCD model for this analysis:

- Use of over-water wind direction and wind speed data for estimating over-water plume dispersion,
- Use of over-water air and sea surface temperatures to describe the low-level stability over the water,
- Assume constant over-water relative humidity of 80 percent,
- Assume constant over-water mixing height of 500 meters, and
- Assume a 1 percent pollutant decay factor for $SO_2$ emissions.

## 6.4 METEOROLOGICAL DATA

The OCD model requires concurrent hourly over-water and over-land meteorological data. The ideal over-water data set for the OCD model is an hourly surface record consisting of wind direction, wind speed, sea surface and air temperature, mixing height, relative humidity, wind direction shear, turbulence intensity, and vertical potential temperature gradient data. Of these, the sea surface and air temperature, mixing height, and humidity are mandatory variables (i.e., a valid value must be provided to the OCD model each hour). However, two of the mandatory variables (i.e., mixing height and humidity or dewpoint) are generally not available from off-shore. In the absence of these variables, the MMS has recommended default values of 500 meters (m) for mixing height and 80 percent for relative humidity be used with a 1 percent decay factor for $SO_2$. The OCD User's Guide also recommends the use of available over-water wind speed and direction in lieu of the over-land data.

The determination of an over-water atmospheric stability class is accomplished by the classification scheme of Golder (1972), which uses the hourly over-water values of air temperature, sea surface temperature, relative humidity, and wind speed to compute the Monin-Obukhov length (L). The OCD model assumes an over-water roughness length of 0.001 to 0.0001 m to determine the following stability classification, based on the computed value of L, as follows:

| L Value | Stability Class |
|---|---|
| $-10 \text{ m} \le L < 0 \text{ m}$ | B |
| $-25 \text{ m} \le L < -10 \text{ m}$ | C |
| $\|L\| > 25 \text{ m}$ | D |
| $10 \text{ m} < L \le 25 \text{ m}$ | E |
| $0 \text{ m} < L \le 10 \text{ m}$ | F |

For this analysis, data collected at the Destin Dome site in 1993 was available for the over-water meteorological data base. For each hour, the following data were available:

- Wind Direction,
- Wind Speed,
- Air Temperature,
- Water Temperature,
- Pressure, and
- Standard deviation of the horizontal wind direction fluctuation (i.e., sigma theta).

A computer program was developed to read the on-site meteorological data and rewrite it in a format suitable for input to the OCD model.

To complement the over-water data set, over-land meteorological data were obtained from the National Weather Service (NWS) office at Pensacola Regional Airport. Twice-daily mixing height data were obtained from the NWS office at Tallahassee Regional Airport. The rawinsonde station at Tallahassee was moved from Apalachicola in June, 1991. Pensacola's surface observations include wind direction, wind speed, temperature, cloud cover, and cloud ceiling height. These data plus the twice-daily mixing height data, were input to the ISCST model's meteorological preprocessor program, PCRAMMET, to calculate atmospheric stability using the Pasquill-Turner stability classification scheme. Because the observed hourly wind directions at the NWS stations are classified into one of thirty-six 10-degree sectors, PCRAMMET randomizes the wind direction within each sector to account for the expected variability in air flow. These calculations are performed by PCRAMMET our output in a binary format that the OCD model inputs for the over-land meteorological station.

The OCD model requires an over-land anemometer height above-ground level and surface roughness length that is representative of the wind flow within 3 km of the over-land anemometer site. An anemometer height of 6.7 m and a surface roughness length of 0.1.

All of the receptors in this application of the OCD model are either offshore or on barrier islands. Therefore, the OCD model results reflect over-water dispersion processes. The land-based meteorological data are primarily used in this study to help define the land-sea interface and to provide substituted data for any missing over-water data values.

## 6.5 EMISSION INVENTORY

Proposed emission sources at the drilling rig will be three main electric power engines, two cranes plus logging and auxiliary diesels, and a well-testing flare. A summary of the estimated emissions for the main engines, crane and auxiliary diesels, and flares are provided in Table 3-1.

Sources of emissions due to facility operation include the CPF and satellite platforms. Proposed emission sources at the production facility will be three Saturn turbines, a diesel crane, a standby diesel generator, a direct fired glycol reboiler, flares [(3) high-pressure, (3) low-pressure, and an atmospheric], a diesel firewater pump, and an atmospheric vent. The maximum air impacts due to all permanent emission sources were included in the air modeling analysis.

Stack and operating parameters for each type of source are provided in Table 6-1. The stacks heights for platform-based sources do not include the platform deck heights, which are assumed as 78 feet (ft) above the non-hurricane sea surface.

## 6.6 BUILDING DOWNWASH EFFECTS

In accordance with EPA modeling policy, the effects of building wake on ambient pollutant levels were considered in the modeling analysis. The OCD model contains a building downwash algorithm to take into account the aerodynamic effects of downwash on the emission sources. The

OCD model inputs one height and width for each source considered to be affected by downwash effects.

It should be noted that although the platform deck can potentially causes wake effects to occur, the OCD model specifies that the input building structure be considered to be above the base elevation (i.e., above the platform deck) for each source. Therefore, potential downwash from the platform itself was not considered. Only the turbines and crane diesel sources were considered to be affected by downwash because these sources discharge horizontally. To account for downwash in the modeling analysis, a building height of 10 m and a building width of 8 m were input to OCD model. These dimensions are considered representative of the typical solid structures that extend above the production facility's platform deck.

## 6.7 RECEPTOR LOCATIONS

Receptors were selected in the modeling analysis to determine the maximum impacts from the proposed facility at the nearest shoreline locations in Florida, at Florida's seaward boundary and the Breton National Wildlife Refuge (BNWR), the nearest PSD Class I area to the Destin Dome site. The BNWR encompasses the Chandeleur Islands, a crescent-like chain of islands approximately 90 miles (140 km) west of the Destin Dome site. The islands are nearly due south of Biloxi, Mississippi, but are part of Louisiana.

The next closest PSD Class I areas are:

- The St. Marks NWR in Florida, located approximately 190 mi (307 km) east of the proposed site.
- The Bradwell Bay NWR in Florida, located approximately 163 mi (263 km) east-northeast of the proposed site.

Because of their distance from the Destin Dome site, these two PSD Class I areas were not considered in the air modeling analysis.

A listing of all 84 receptors used in the modeling analysis is presented in Table 6-2. The shoreline and seaward receptors are spaced approximately every 5 km from the Alabama-Florida border to

St. Joseph Island near Panama City, Florida. All receptors are considered to be at sea-level elevation.

## 6.8 SPECIFICATION OF THE LAND-SEA INTERFACE

The OCD model requires that a description of the shoreline position be input. This is accomplished through an array of rectangles covering the area of interest. Each rectangle indicates if mostly water or mostly land is present within it. The following limitations apply in the current OCD model:

- The maximum number of rectangles that can be specified for either the east-west or north-south direction is 60.
- The maximum rectangle size is 0.4 km in the east-west direction and 0.3 km in the north-south direction. Therefore, the maximum array size is currently limited to a maximum model domain area of 24 by 18 km.

The modeling domain array extended from the Breton NWR to the St. Joseph peninsula in Florida, a distance of 350 km, and out from the shoreline approximately 70 km.

The following land-sea interface array was used in the modeling analysis:

- The upper left-hand corner of the array was located at (320.0, 3380.0) UTM coordinates.
- The grid size used for the modeling analysis was 10 by 10 km.
- The number of grids in the east-west and north-south direction was 35 and 10, respectively, for a total array size of 350 by 100 km.
- The minimum along wind width for a land or water body to be considered significant is 1.0 km.
- The average distance from the source to the shoreline is 50 km.

A summary of the land-sea interface rectangles input to the OCD model are presented in Figure 6-1. The OCD model considers only one transition from water to land. However, for the treatment of barrier islands, where the plume moves from water onto land, back over water, then ultimately back over land again, two transitions occur. The OCD User's Guide recommends that over-water dispersion characteristics be used for barrier if they are narrow enough and at a considerable distance offshore. Also, for barrier islands near the shoreline, a minimum island width of 1.0 km was used in determining whether a barrier island should be considered as the beginning of the actual shoreline. The 1.0-km distance was based on the example application provided in the OCD User's Guide.

As all receptors are along the shoreline or on barrier islands, the over-water plume dispersion characteristics dominate the entire dispersion process. For the present modeling application, the land-sea interface is not as critical in the modeling results. The same is true for the Breton NWR receptors, which are located on small barrier islands that are well offshore.

## 6.9 MODELING RESULTS

Worst-case operating-related impacts include only emissions from permanent structures or facilities (i.e., platforms). Impacts were determined at all on-shore coastal areas from Mississippi to St. Joseph's peninsula in Florida and at the Breton NWR. Maximum $SO_2$, $NO_x$, and PM impacts from the OCD analysis are summarized in Table 6-3. The results indicate that the maximum predicted impacts, which were predicted to occur on the boundary of the nearest on-shore area in Florida, will be less than the EPA and State of Florida significant impact levels. Impacts to other states will be lower. At the Breton NWR, maximum predicted impacts, when compared to the proposed EPA PSD Class I significant impact levels, are lower.

The results of the impact analysis determined that the worst case impacts, which were predicted to occur at Florida's seaward boundary, would be below the EPA significant impact levels. Impacts at Florida's shoreline are lower. At the Breton NWR, the impacts are below the proposed EPA Class I significant impact levels.

Table 6-1. Summary of Stack Parameters for Sources Used in Modeling of Destin Dome

| Descriptive Name | Stack Height |  | Stack Diameter |  | Temperature |  | Velocity |  | Platform Elevation |  | Stack Discharge Orientation |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | (ft) | (m) | (ft) | (m) | (F) | (K) | (ft/s) | (m/s) | (ft) | (m) | (degree) |
| <u>Drilling Rig and Associated Boats</u> |  |  |  |  |  |  |  |  |  |  |  |
| Drilling Rig main | 75.0 | 22.86 | 1.50 | 0.46 | 800.0 | 699.8 | 107.7 | 32.83 | 78.00 | 23.77 | 90 |
| Crane & Auxiliary Diesels | 89.0 | 27.13 | 0.50 | 0.15 | 770.0 | 683.2 | 123.6 | 37.67 | 78.00 | 23.77 | 90 |
| Well testing flare | 61.0 | 18.59 | 0.30 | 0.09 | 1,000.0 | 810.9 | 3,684.0 | 1,122.88 | 78.00 | 23.77 | 90 |
| <u>CPF Operation</u> |  |  |  |  |  |  |  |  |  |  |  |
| Turbine Generator | 21.5 | 6.55 | 2.00 | 0.61 | 670.0 | 627.6 | 124.50 | 37.95 | 78.00 | 23.77 | 90 |
| Standby Diesel Generator - Exhaust | 65.6 | 20.00 | 1.64 | 0.50 | 350.0 | 449.8 | 3.30 | 1.00 | 78.00 | 23.77 | 0 |
| H.P. Flare | 149.0 | 45.42 | 1.00 | 0.30 | 1,000.0 | 810.9 | 3.50 | 1.06 | 78.00 | 23.77 | 45 |
| L.P., Atmospheric Flare | 149.0 | 45.42 | 3.00 | 0.91 | 1,000.0 | 810.9 | 17.30 | 5.28 | 78.00 | 23.77 | 45 |
| Diesel Crane | 28.0 | 8.53 | 0.50 | 0.15 | 770.0 | 683.2 | 123.60 | 37.67 | 78.00 | 23.77 | 90 |
| Direct Fired Glycol Reboiler | 68.0 | 20.74 | 4.00 | 1.22 | 560.0 | 566.5 | 15.50 | 4.72 | 78.00 | 23.77 | 0 |
| <u>Satellite Operation</u> |  |  |  |  |  |  |  |  |  |  |  |
| Platforms - Single Well | 15.1 | 4.60 | 0.62 | 0.19 | 600.0 | 588.7 | 100.00 | 30.48 | 78.00 | 23.77 | 90 |
| Double Well | 15.1 | 4.60 | 0.62 | 0.19 | 600.0 | 588.7 | 100.00 | 30.48 | 78.00 | 23.77 | 90 |

Table 6-2. Receptor Locations Used in the Air Modeling Analysis (Page 1 of 2)

**FLORIDA SEAWARD BOUNDARY**

| | | Receptor Location[a] | |
|---|---|---|---|
| Receptor | ID Name | UTM-E | UTM-N |
| 1 | FLIM-1 | 450.00 | 3333.00 |
| 2 | FLIM-2 | 455.00 | 3334.00 |
| 3 | FLIM-3 | 460.00 | 3335.00 |
| 4 | FLIM-4 | 465.00 | 3336.00 |
| 5 | FLIM-5 | 470.00 | 3337.00 |
| 6 | FLIM-6 | 475.00 | 3337.00 |
| 7 | FLIM-7 | 480.00 | 3337.00 |
| 8 | FLIM-8 | 485.00 | 3338.00 |
| 9 | FLIM-9 | 490.00 | 3339.00 |
| 10 | FLIM-10 | 495.00 | 3340.00 |
| 11 | FLIM-11 | 500.00 | 3341.00 |
| 12 | FLIM-12 | 505.00 | 3342.00 |
| 13 | FLIM-13 | 510.00 | 3343.00 |
| 14 | FLIM-14 | 515.00 | 3344.00 |
| 15 | FLIM-15 | 520.00 | 3345.00 |
| 16 | FLIM-16 | 525.00 | 3346.00 |
| 17 | FLIM-17 | 530.00 | 3346.00 |
| 18 | FLIM-18 | 535.00 | 3346.00 |
| 19 | FLIM-19 | 540.00 | 3346.00 |
| 20 | FLIM-20 | 545.00 | 3345.00 |
| 21 | FLIM-21 | 550.00 | 3345.00 |
| 22 | FLIM-22 | 555.00 | 3345.00 |
| 23 | FLIM-23 | 560.00 | 3344.00 |
| 24 | FLIM-24 | 565.00 | 3342.00 |
| 25 | FLIM-25 | 570.00 | 3341.00 |
| 26 | FLIM-26 | 575.00 | 3340.00 |
| 27 | FLIM-27 | 580.00 | 3339.00 |
| 28 | FLIM-28 | 585.00 | 3337.00 |
| 29 | FLIM-29 | 590.00 | 3335.00 |
| 30 | FLIM-30 | 595.00 | 3333.00 |
| 31 | FLIM-31 | 600.00 | 3331.00 |
| **FLORIDA SHORELINE** | | | |
| 32 | FL-1 | 450.00 | 3350.00 |
| 33 | FL-2 | 455.00 | 3351.00 |
| 34 | FL-3 | 460.00 | 3352.00 |
| 35 | FL-4 | 465.00 | 3353.00 |
| 36 | FL-5 | 470.00 | 3354.00 |
| 37 | FL-6 | 475.00 | 3354.00 |
| 38 | FL-7 | 480.00 | 3354.00 |
| 39 | FL-8 | 485.00 | 3355.00 |
| 40 | FL-9 | 490.00 | 3356.00 |
| 41 | FL-10 | 495.00 | 3357.00 |
| 42 | FL-11 | 500.00 | 3358.00 |
| 43 | FL-12 | 505.00 | 3359.00 |
| 44 | FL-13 | 510.00 | 3360.00 |
| 45 | FL-14 | 515.00 | 3361.00 |

Table 6-2. Receptor Locations Used in the Air Modeling Analysis (Page 2 of 2)

| | | Receptor Location[a] | |
|---|---|---|---|
| Receptor | ID Name | UTM-E | UTM-N |
| 46 | FL-15 | 520.00 | 3362.00 |
| 47 | FL-16 | 525.00 | 3363.00 |
| 48 | FL-17 | 530.00 | 3363.00 |
| 49 | FL-18 | 535.00 | 3363.00 |
| 50 | FL-19 | 540.00 | 3363.00 |
| 51 | FL-20 | 545.00 | 3362.00 |
| 52 | FL-21 | 550.00 | 3362.00 |
| 53 | FL-22 | 555.00 | 3362.00 |
| 54 | FL-23 | 560.00 | 3361.00 |
| 55 | FL-24 | 565.00 | 3359.00 |
| 56 | FL-25 | 570.00 | 3358.00 |
| 57 | FL-26 | 575.00 | 3357.00 |
| 58 | FL-27 | 580.00 | 3356.00 |
| 59 | FL-28 | 585.00 | 3354.00 |
| 60 | FL-29 | 590.00 | 3352.00 |
| 61 | FL-30 | 595.00 | 3350.00 |
| 62 | FL-31 | 600.00 | 3348.00 |
| **BRETON (PSD CLASS I) NWA** | | | |
| 63 | BRETWPT | 287.80 | 3261.60 |
| 64 | BRETNPT | 290.00 | 3264.80 |
| 65 | GRGOSS3 | 297.80 | 3267.80 |
| 66 | GRGOSS2 | 299.00 | 3269.40 |
| 67 | GRGOSS1 | 301.30 | 3271.60 |
| 68 | CURLEWIS | 308.30 | 3279.40 |
| 69 | PALOSIS | 317.60 | 3290.80 |
| 70 | CHAND15 | 319.00 | 3292.20 |
| 71 | CHAND14 | 320.60 | 3295.10 |
| 72 | CHAND13 | 321.60 | 3297.00 |
| 73 | CHAND12 | 322.20 | 3298.90 |
| 74 | CHAND11 | 323.20 | 3301.60 |
| 75 | CHAND10 | 323.80 | 3304.10 |
| 76 | CHAND9 | 324.10 | 3306.70 |
| 77 | CHAND8 | 324.40 | 3309.20 |
| 78 | CHAND7 | 324.40 | 3311.60 |
| 79 | CHAND6 | 324.10 | 3314.10 |
| 80 | CHAND5 | 323.70 | 3316.40 |
| 81 | CHAND4 | 322.50 | 3320.00 |
| 82 | CHAND3 | 321.60 | 3322.00 |
| 83 | CHAND2 | 321.00 | 3323.50 |
| 84 | CHAND1 | 320.00 | 3325.00 |

[a] All receptors are in Universal Transverse Mercator (UTM) coordinates.
The proposed development site is located at 482.5 3312.8 km.

Table 6-3. Maximum Predicted Pollutant Impacts for the Proposed Destin Dome Development

| Pollutant | Averaging Time | At Nearest Shoreline | At Florida Seaward Boundary | EPA Significant Impact Levels ($\mu g/m^3$)[a] | Operating Sources At Breton NWA | EPA Proposed PSD Class I Significant Impact Levels ($\mu g/m^3$)[b] |
|---|---|---|---|---|---|---|
| Sulfur Dioxide | | | | | | |
| | Annual | 0.04 | 0.06 | 1 | 0.01 | 0.01 |
| | 24-Hour | 0.45 | 0.82 | 5 | 0.11 | 0.2 |
| | 3-Hour | 2.14 | 2.33 | 25 | 0.42 | 1.0 |
| Nitrogen Dioxide | | | | | | |
| | Annual | 0.09 | 0.13 | 1 | 0.02 | 0.1 |
| Particulate Matter | | | | | | |
| | Annual | 0.01 | 0.01 | 1 | <0.005 | 0.2 |
| | 24-Hour | 0.10 | 0.17 | 5 | 0.02 | 0.3 |

Note: EPA = Environmental Protection Agency.
All impacts are highest predicted with OCD Version 5 model and 1993 site-collected meteorological data.

[a] 40 CFR 52.21

[b] 61 FR 38250-38336

Figure 6-1 Summary of the Land-Sea Interface Rectangles Used in the OCD Modeling Analysis by UTM Coordinates

---

UTM North (km)

```
       MISSIS- |-----ALABAMA-----|-----------------FLORIDA------------------
3380—    SIPPI
        L L L L L L L L W L L L L L L L W L L L L L L L L L L L L L L L L L L
3370—
        L L L L L L L W W L L L L L L L W W L L L L W W W W L L L L L L L L L
3360—                                          CHOCTAWATCHEE BAY
        W W W W W W W W W W L L L L L W W W W W W W W W W W L L L L L L L L L
3350—                MOBILE BAY     PENSACOLA BAY
        W W W W W W W W W W W W W W W W W W W W W W W W W W W W L W W L L L L
3340—
        W                                                     W W W W L L L L
3330—
        W         GULF OF MEXICO (OPEN OCEAN)                         W L L L
3320—
        W                               X                               W L L
3310—
        W                                                                 W L
3300—
        W                                                                 W L
3290—
        W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W W
3280—   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
       320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660
                                        UTM East (km)
```

---

Note: X = Approximate facility location.
L = Rectangle is mostly land mass.
W = Rectangle is mostly water.

# REFERENCES

Golder, D., 1972. Relations Among Stagbility Parameters in the Surface Layer. Bound. Lay. Meterology., 3, 47-58.

U.S. Environmental Protection Agency. 1978. Guidelines for Determining Best Available Control Technology (BACT). Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency. 1980. Prevention of Significant Deterioration Workshop Manual.

U.S. Environmental Protection Agency. 1985a. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document For the Stack Height Regulations (revised). Office of Air Quality Planning and Standards. EPA 450/4-80-023R

U.S. Environmental Protection Agency. 1987. Ambient Monitoring Guidelines for Prevention of Significant Deterioration. EPA Report No. EPA 450/4-87-007.

U.S. Environmental Protection Agency. 1990. "Top-Down" Best Available Control Technology Guidance Document (Draft). Research Triangle Park, North Carolina.

# APPENDIX A

# EMISSION CALCULATIONS

Table A-1. Source Operating Parameters and Estimated Emissions for Destin Dome Drilling Rigs (Page 1 of 2)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Source Characteristics: | | | |
| Type | | Diesel | Diesel |
| Number | | 3 | 5 |
| Brake Horsepower | | 1,650 | 250 |
| RPP | | 900 | 900 |
| Fuel Characteristics: | | | |
| Heat Content | Btu/lb | 19,200 | 19,200 |
| Density | Lb/gal | 7.2 | 7.2 |
| Fuel Usage: | | | |
| Maximum | gal/hr | 90 | 14 |
| | lb/hr/eng. | 650 | 100 |
| | MMBtu/hr | 12.48 | 1.92 |
| Average[a] | lb/hr | 850 | 144 |
| | gal/hr | 118 | 20 |
| | gal/day | 2,833 | 480 |
| | $10^3$ lb/yr | 6,264 | 155.5 |
| | $10^3$ BHP/yr | 15,901 | 389 |
| | MMBtu/yr | 120,268 | 2,986 |
| | gal/yr | 870,000 | 21,600 |
| Criteria Pollutant Emissions: | | | |
| Particulates (PM10) | | | |
| Basis | | AP-42 | AP-42 |
| Rate | g/BHP | 0.16 | 0.16 |
| Maximum[b] | lb/hr/eng. | 0.6 | 0.09 |
| | lb/hr/rig | 1.7 | 0.26 |
| Annual[c] | TPY | 2.8 | 0.07 |
| Sulfur Dioxide | | | |
| Basis | | 0.5% Sulfur | 0.5% Sulfur |
| Rate | g/BHP | 1.8 | 1.8 |
| Maximum | lb/hr/eng. | 6.5 | 1.0 |
| | lb/hr/rig | 19.5 | 3.0 |
| Annual | TPY | 31.3 | 0.8 |
| Nitrogen Oxides | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 12.1 | 11.00 |
| Maximum | lb/hr/eng. | 43.9 | 6.06 |
| | lb/hr/rig | 131.6 | 18.17 |
| Annual | TPY | 211.3 | 4.71 |

Table A-1. Source Operating Parameters and Estimated Emissions for Destin Dome Drilling Rigs (Page 2 of 2)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Carbon Monoxide | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 4.4 | 2.40 |
| Maximum | lb/hr/eng. | 15.9 | 1.32 |
| | lb/hr/rig | 47.6 | 3.96 |
| Annual | TPY | 76.4 | 1.03 |
| Hydrocarbons | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 0.4 | 0.32 |
| Maximum | lb/hr/eng. | 1.53 | 0.18 |
| | lb/hr/rig | 4.6 | 0.53 |
| Annual | TPY | 7.4 | 0.14 |

---

[a] Annual fuel usage based on 870,000 gal/yr.

[b] Maximum lb/hr/rig based on 3 main electric operating at full load and 3 crane/logging/auxiliary engines operating at full load. Calculations on lb/hr/eng. based on emission rate (example for PM: 0.16 g/BHP x 1,650 BHP-hr x 1/454 g/lb = 0.6 lb/hr; lb/hr/rig based on number of engines).

[c] Annual emissions based on average fuel usage.Calculations of tons/year based on emission rate times annual fuel usage (example for PM: 0.16 g/BHP-hr x 14,5000 $10^3$ BHP/yr x 1/454 g/lb x 1/2,000 lb/ton = 2.6 tons/yr)

Table A-2. Estimated Emissions for Well Test Flare Associated with Destin Dome Drilling Rig (Page 1 of 2)

| | Units | Data | Basis or Calculation |
|---|---|---|---|
| Volume | | | |
| Total | MMcf | 68 | Test Criteria |
| Maximum/day | MMcf/day | 22.5 | Test Criteria |
| Maximum/hr | MMcf/hr | 2.5 | Test Criteria |
| Gas Characteristics | | | |
| Density | lb/cf | 0.0546 | From Block 56 Data |
| Heat Content | Btu/cf | 1,019 | From Block 56 Data |
| $H_2S$ Concentration | | | |
| AP-42 | Percent | 3.3 | AP-42 |
| | MMcf | 2.24 | Total Volume x Percent |
| | MMcf/day | 0.74 | Maximum/day x Percent |
| | MMcf/hr | 0.08 | Maximum/hr x Percent |
| Test Data Block 56 | Percent | 0.005 | From Data |
| | MMcf | 0.003 | Total Volume x Percent |
| | MMcf/day | 0.001 | Maximum/day x Percent |
| | MMcf/hr | 1.25E-04 | Maximum/hr x Percent |
| $H_2S$ Mass | | | |
| AP-42 | lb | 201,025 | See Note 1 |
| | tons | 101 | lb x 1/2,000 lb/ton |
| | lb/hr | 7,391 | See Note 2 |
| | lb/day | 66,516 | See Note 3 |
| Test Data Block 56 | lb | 304.6 | See Note 1 |
| | tons | 0.2 | lb x 1/2,000 lb/ton |
| | lb/hr | 11.2 | See Note 2 |
| | lb/day | 100.8 | See Note 3 |
| Criteria Pollutant Emissions | | | |
| Sulfur Dioxide | | | |
| AP-42 | lb/hr | 13,912 | lb $H_2S$/hr x 64/34 |
| | lb/day | 125,206 | lb $H_2S$/hr x 64/34 |
| | tons/yr | 189.2 | lb $H_2S$/hr x 64/34 |
| Test Data Block 56 | lb/hr | 21.1 | lb $H_2S$/hr x 64/34 |
| | tons/day | 0.1 | lb $H_2S$/hr x 64/34 |
| | tons/yr | 0.3 | lb $H_2S$/hr x 64/34 |
| Particulate Matter (PM) | | | |
| Emission Factor | lb/$10^6$ Btu | 0.01 | Engineering Assumption |
| Maximum Rate | lb/hr | 25.48 | MMCF/hr x BTU/CF x lb/$10^6$ BTU |
| Maximum Rate | lb/day | 229.3 | MMCF/day x BTU/CF x lb/$10^6$ BTU |
| Average | tons/yr | 0.35 | MMCF x BTU/CF x lb/$10^6$ BTU |
| Nitrogen Oxides ($NO_x$) | | | |
| Emission Factor | lb/$10^6$ Btu | 0.068 | AP-42 |
| Maximum Rate | lb/hr | 173.2 | MMCF/hr x BTU/CF x lb/$10^6$ BTU |
| Maximum Rate | lb/day | 1,559.1 | MMCF/day x BTU/CF x lb/$10^6$ BTU |
| Average | tons/yr | 2.36 | MMCF x BTU/CF x lb/$10^6$ BTU |
| Carbon Monoxide (CO) | | | |
| Emission Factor | lb/$10^6$ Btu | 0.37 | AP-42 |
| Maximum Rate | lb/hr | 942.6 | MMCF/hr x BTU/CF x lb/$10^6$ BTU |
| Maximum Rate | lb/day | 8,483.2 | MMCF/day x BTU/CF x lb/$10^6$ BTU |
| Average | tons/yr | 12.82 | MMCF x BTU/CF x lb/$10^6$ BTU |

Table A-2. Estimated Emissions for Well Test Flare Associated with Destin Dome Drilling Rig (Page 2 of 2)

| | Units | Data | Basis or Calculation |
|---|---|---|---|
| Total Hydrocarbons (THC) | | | |
| Emission Factor | lb/$10^6$ Btu | 0.14 | AP-42 |
| Maximum Rate | lb/hr | 356.65 | MMCF/hr x BTU/CF x lb/$10^6$ BTU |
| Maximum Rate | lb/day | 3,209.9 | MMCF/day x BTU/CF x lb/$10^6$ BTU |
| Average | tons/yr | 4.85 | MMCF x BTU/CF x lb/$10^6$ BTU |

Notes:

1. MMCF/hr of $H_2S$ x 2,116.8 lb/ft$^2$ x 34/1,545 ft/mole °R x 1/520°R
2. MMCF/day of $H_2S$ x 2,116.8 lb/ft$^2$ x 34/1,545 ft/mole °R x 1/520°R
3. MMCF of $H_2S$ x 2,116.8 lb/ft$^2$ x 34/1,545 ft/mole °R x 1/520°R

Table A-3. Estimated Emission for Vessels.

| Source | Emissions (Tons)^a | | | | |
|---|---|---|---|---|---|
| | PM | SO2 | NOx | CO | VOC |
| VESSEL OPERATIONS: | | | | | |
| Crew Boat | | | | | |
| Travel | 2.23 | 4.87 | 37.18 | 4.12 | 1.62 |
| Maneuvering | 0.084 | 0.183 | 1.394 | 0.155 | 0.061 |
| Hotelling | 0.080 | 0.337 | 1.287 | 0.285 | 0.112 |
| Supply Boat | | | | | |
| Travel | 2.36 | 5.15 | 39.33 | 4.36 | 1.72 |
| Maneuvering | 0.071 | 0.154 | 1.180 | 0.131 | 0.051 |
| Hotelling | 0.159 | 0.674 | 2.574 | 0.571 | 0.225 |
| Utility Boat | | | | | |
| Travel | 0.17 | 0.37 | 2.86 | 0.32 | 0.12 |
| Maneuvering | 0.042 | 0.092 | 0.699 | 0.078 | 0.031 |
| Hotelling | 0.45 | 1.89 | 7.21 | 1.60 | 0.63 |
| Total: | 5.64 | 13.72 | 93.71 | 11.62 | 4.57 |
| g/s emissions each site (6) | 0.215 | 0.522 | 3.566 | 0.442 | 0.174 |
| TUG OPERATIONS: Travelling | | | | | |
| Pipelay | | | | | |
| 100A to CPF | 0.44 | 0.96 | 7.33 | 0.81 | 0.32 |
| 99A/B to CPF | 0.44 | 0.96 | 7.33 | 0.81 | 0.32 |
| 13B to CPF | 0.44 | 0.96 | 7.33 | 0.81 | 0.32 |
| TUG OPERATIONS: Maneuvering/Hotelling | | | | | |
| Pipelay | | | | | |
| 100A to CPF | 0.087 | 0.246 | 1.443 | 0.209 | 0.082 |
| 99A/B to CPF | 0.095 | 0.269 | 1.574 | 0.228 | 0.090 |
| 13B to CPF | 0.057 | 0.160 | 0.938 | 0.136 | 0.053 |
| BARGE OPERATIONS: | | | | | |
| Pipelay | | | | | |
| 100A to CPF | 0.24 | 0.51 | 3.93 | 0.44 | 0.17 |
| 99A/B to CPF | 0.25 | 0.55 | 4.21 | 0.47 | 0.18 |
| 13B to CPF | 0.17 | 0.37 | 2.85 | 0.32 | 0.12 |
| TOTAL PIPELINE DEVELOPMENT: | | | | | |
| Pipelay | | | | | |
| 100A to CPF | 0.76 | 1.72 | 12.70 | 1.46 | 0.57 |
| 99A/B to CPF | 0.79 | 1.78 | 13.11 | 1.51 | 0.59 |
| 13B to CPF | 0.67 | 1.49 | 11.12 | 1.26 | 0.50 |
| g/s emissions 100A ^b | 1.096 | 2.470 | 0.365 | 2.093 | 0.823 |
| g/s emissions 99A/B ^b | 1.038 | 2.344 | 0.377 | 1.986 | 0.781 |
| g/s emissions 13B ^b | 1.476 | 3.300 | 0.320 | 2.796 | 1.100 |

[a] Based on the following emission factors: (lb/1,000 gal.)

[b] NOx g/s emission rate is annualized to 8,760 hours/year.

| | | PM | SO2 | NOx | CO | VOC |
|---|---|---|---|---|---|---|
| Travel/Maneuvering | (lb/1,000 gal) | 33 | 72 | 550 | 61 | 24 |
| Hotelling | (lb/1,000 gal) | 17 | 72 | 275 | 61 | 24 |
| Travel/Maneuvering | (lb/mmBtu) | 0.239 | 0.521 | 3.979 | 0.441 | 0.174 |
| Hotelling | (lb/mmBtu) | 0.123 | 0.521 | 1.989 | 0.441 | 0.174 |

Source: EPA, 1991, Nonroad Engine and Vehicle Emission Study - Report, Table I-12, Average Emission Factors for Ocean-Going Commercial Vessels, Motor Propulsion, PB92-126960.

0.303561

Table A-4a. Estimated Emissions for Central Production Facility (CPF) Destin Dome Development

| | Units | CPF Source | | | | Satellite Platforms | |
|---|---|---|---|---|---|---|---|
| | | CT | LP-Flare | HP-Flare | Glycol Boiler | 2 Wells | 1 Well |
| Source Characteristics | | | | | | | |
| Type | | Saturn^a | Purge | Purge | Package | | |
| Number | | 3 | 1 | 1 | 1 | 1 | 1 |
| Capacity | | | | | | | |
| (kW) | kW | 1,171 | | | | 344 | 197 |
| (Brake Horsepower) | BHP | 1,570 | | | | 462 | 264 |
| (heat rate) | Btu/kWhr | 14,823 | | | | | |
| (SFC) | Btu/bhp-hr | | | | | 7500 | 7500 |
| Fuel - Natural Gas | | 100.0% | | | 100.0% | | |
| Fuel Characteristics | | | | | | | |
| Natural Gas | | | | | | | |
| Heat Content | Btu/scf | 950 | 856.92 | 559 | 950 | 950 | 950 |
| Sulfur Content | ppm | 100 | 461 | 850 | 100 | 100 | 100 |
| Operation | hr/yr | 8,760 | 8,760 | 8,760 | 8,760 | 8,760 | 8,760 |
| Capacity Factor | % of full load | 100.0% | 100.0% | 100.0% | 80.0% | 80.0% | 80.0% |
| Fuel Usage | | | | | | | |
| Maximum | MMBtu/hr/unit | 17.9 | 17.3 | 0.3 | 10.355 | 3.5 | 2.0 |
| | scf/hr/unit | 18,789 | 20,180 | 500 | 10,900 | 3,646 | 2,083 |
| | Mscf/day/unit | 451 | 484 | 12 | 262 | 88 | 50 |
| Average - 2 units @ 100% and 1 unit @ 50% for CT | % of full load | 83.33% | | | | | |
| | MMBtu/hr | 44.6 | 17.3 | 0.3 | 8.3 | 2.8 | 1.6 |
| | MMBtu/yr | 390,915 | 151,486 | 2,448 | 72,568 | 24,273 | 13,870 |
| | Mscf/day | 1127 | 484 | 12 | 209 | 70 | 40 |
| CRITERIA POLLUTANT EMISSIONS: | | | | | | | |
| Particulates (PM10) | | | | | | | |
| Basis | | AP-42 | Eng. Ass. | Eng. Ass. | AP-42 | Eng. Ass. | Eng. Ass. |
| Rate | lb/MMBtu | 0.020 | 0.010 | 0.010 | 0.0080 | 0.010 | 0.010 |
| Maximum - from basis | lb/hr/unit | 0.36 | 0.17 | 0.0028 | 0.083 | 0.035 | 0.020 |
| - as BACT | lb/hr/unit | 0.36 | 0.17 | 0.0028 | 0.0828 | 0.0346 | 0.0198 |
| Annual | TPY | 3.91 | 0.76 | 0.012 | 0.29 | 0.12 | 0.069 |
| Sulfur Dioxide | | | | | | | |
| Basis | | Calc. | Calc. | Calc. | Calc. | Calc. | Calc. |
| Rate | lb/MMBtu | 0.017 | 0.089 | 0.253 | 0.017 | 0.006 | 0.002 |
| Maximum - from basis | lb/hr/unit | 0.312 | 1.545 | 0.071 | 0.181 | 0.061 | 0.017 |
| - as BACT | lb/hr/unit | 0.312 | 1.545 | 0.071 | 0.181 | 0.061 | 0.017 |
| Annual | TPY | 3.417 | 6.767 | 0.309 | 0.634 | 0.212 | 0.061 |
| Nitrogen Oxides | | | | | | | |
| Basis | | Vendor | AP-42 | AP-42 | AP-42 | Vendor | Vendor |
| Rate | lb/MMBtu | 0.438 | 0.068 | 0.068 | 0.105 | 3.5 | 3.5 |
| Maximum - from basis | lb/hr/unit | 7.82 | 1.18 | 0.019 | 1.09 | 12.12 | 6.93 |
| - as BACT | lb/hr/unit | 7.82 | 1.18 | 0.019 | 1.090 | 1.53 | 0.87 |
| Annual | TPY | 85.61 | 5.15 | 0.083 | 3.82 | 5.35 | 3.06 |
| Carbon Monoxide | | | | | | | |
| Basis | | Vendor | AP-42 | AP-42 | AP-42 | Vendor | Vendro |
| Rate | lb/MMBtu | 0.121 | 0.37 | 0.37 | 0.088 | 3.5 | 3.5 |
| Maximum - from basis | lb/hr/unit | 2.16 | 6.40 | 0.10 | 0.916 | 12.12 | 6.93 |
| - as BACT | lb/hr/unit | 2.16 | 6.40 | 0.10 | 0.916 | 1.53 | 0.87 |
| Annual | TPY | 23.65 | 28.02 | 0.45 | 3.21 | 5.35 | 3.06 |
| Hydrocarbons | | | | | | | |
| Basis | | Vendor | AP-42 | AP-42 | AP-42 | Vendor | Vendor |
| Rate | lb/MMBtu | 0.035 | 0.14 | 0.14 | 0.006 | 0.1 | 0.1 |
| Maximum - from basis | lb/hr/unit | 0.62 | 2.42 | 0.039 | 0.060 | 0.35 | 0.20 |
| - as BACT | lb/hr/unit | 0.62 | 2.42 | 0.039 | 0.060 | 0.20 | 0.12 |
| Annual | TPY | 6.78 | 10.60 | 0.17 | 0.21 | 0.71 | 0.41 |

Notes: CT = combustion turbine; Flare is the purge flare; boiler is gycol boiler.
Satellite platforms have two options; with one or two wells being serviced.
Emissions of CT based on vendor information; Flare based on AP-42 for industrial flares (Section 13.5); Boiler emissions based on AP-42 for small commercial boilers firing natural gas; Satellite platform emissions based on vendor information, BACT based on catalytic converter and engine size is conservative.
Tons/year based on average capacity factor of 80%.
Sour gas (@ 100 ppm H2S) to be used in CT and boiler; sweet gas (5 ppm H2S) to be used in satellite engines and purge flare.

Table A-4B. Estimated Emissions for Destin Dome CPF Diesels

| | Units | CPF<br>Crane & Auxillary Diesels |
|---|---|---|
| Source Characteristics: | | |
| Type | | Diesel |
| Number | | 5 |
| Brake Horsepower | | 700 |
| kW | | 522 |
| Fuel Characteristics: | | |
| Heat Content | Btu/lb | 19,200 |
| Density | Lb/gal | 7.2 |
| Operation | days | 365 |
| Fuel Usage: | | |
| Maximum | gal/hr | 40 |
| | lb/hr/eng. | 288 |
| | MMBtu/hr | 5.53 |
| Average^a | lb/hr | 176 |
| | gal/hr | 24 |
| | gal/day | 586 |
| | 10^3 lb/yr | 1,541 |
| | 10^3 BHP/yr | 3,745 |
| | MMBtu/yr | 29,587 |
| | gal/yr | 214,024 |
| Criteria Pollutant Emissions: | | |
| Particulate (PM10) | | |
| Basis | | AP-42 |
| Rate | lb/mmBtu | 0.1 |
| Maximum | lb/hr/eng. | 0.55 |
| | lb/hr/source | 2.76 |
| Annual | TPY | 1.48 |
| Sulfur Dioxide | | |
| Basis | | 0.5% Sulfur |
| Rate | lb/mmBtu | 0.52 |
| Maximum | lb/hr/eng. | 2.88 |
| | lb/hr/source | 14.40 |
| Annual | TPY | 7.70 |
| Nitrogen Oxides | | |
| Basis | | AP-42 |
| Rate | lb/mmBtu | 3.2 |
| Maximum | lb/hr/eng. | 17.69 |
| | lb/hr/source | 88.47 |
| Annual | TPY | 47.34 |
| Carbon Monoxide | | |
| Basis | | AP-42 |
| Rate | lb/mmBtu | 0.85 |
| Maximum | lb/hr/eng. | 4.70 |
| | lb/hr/source | 23.50 |
| Annual | TPY | 12.57 |
| Volatile Organic Compounds | | |
| Basis | | AP-42 |
| Rate | lb/mmBtu | 0.09 |
| Maximum | lb/hr/eng. | 0.50 |
| | lb/hr/source | 2.49 |
| Annual | TPY | 1.33 |

Table A-5. Fuel Use Estimates for Crew, Supply, and Utility Boats

| | Trips | Operation | | Main | Fuel | Total |
|---|---|---|---|---|---|---|
| | | hr/wkˆa | hr/yr | (BHP) | (gal/hr) | (gal/yr) |
| Crew Boat (2) | | | | | | |
| Travel to Area | 6 | 20 | 1,040 | 2,025 | 130.0 | 135,200 |
| Maneuvering | 6 | 3 | 156 | NA | 32.5 | 5,070 |
| Hotelling | 6 | 36 | 1,872 | NA | 5.0 | 9,360 |
| Supply Boat (2) | | | | | | |
| Travel to Area | 6 | 25 | 1,300 | 3,000 | 110.0 | 143,000 |
| Maneuvering | 6 | 3 | 156 | NA | 27.5 | 4,290 |
| Hotelling | 6 | 72 | 3,744 | NA | 5.0 | 18,720 |
| Utility Boat (2) | | | | | | |
| Travel to Area | NA | NA | 160 | 3,000 | 65.0 | 10,400 |
| Maneuvering | 6 | 3 | 156 | NA | 16.3 | 2,543 |
| Hotelling | NA | 168 | 17,472 | NA | 3.0 | 52,416 |

ˆa Based on 25 mile trip each way at 15 mph for crew boat and 12 mph for supply boat.

ˆb Travel fuel usage based on previous estimates for Block 56. (see Table A-2 for fuel factors for travel.)

Table A-6. Basis of Fuel Usage for Supply and Crew Boat

| | Speed (mph) | Main Engines (BHP) | Fuel Usage (gal/hr) | Fuel Factor (gal/hr/BHP) |
|---|---|---|---|---|
| Crew Boat | 15 | 2,200 | 130 | 0.059 |
| Supply Boat | 12 | 3,000 | 110 | 0.037 |

Table A-7. Fuel Usage for Pipelay Barge

| Barge | Capacity kW | Fuel Usage (gal/hr) | |
|---|---|---|---|
| | | Max. | Avg. |
| Pipelay Barge | 2,000 | 146.3 | 63.9 |

See Table A-4 for fuel use factor; based on gal/kW/hr.

Table A-8. Basis of Pipelay Barge

| Source | Capacity | | Fuel Usage (gal/hr) | | Fuel Usage (gal/hr/kW) | |
|---|---|---|---|---|---|---|
| | (BHP) | kW | Max | Avg. | Max | Avg. |
| Main Engines | 4,950 | 3,691 | 270 | 118 | 0.073 | 0.032 |

[a] Assume same general fuel use as generators for Destin Dome Block 97 main engines.

Table A-9. Fuel Use for Pipelay Barge

| Flowline | Length (miles) | Lay-time (days) | Lay-time (hours) | Travel (hours) | Fuel Use (gal) |
|---|---|---|---|---|---|
| 100A to CPF | 4.8 | 7.3 | 175.5 | 48 | 14,287 |
| 99A/B to CPF | 5.3 | 8.0 | 191.3 | 48 | 15,302 |
| 13B to CPF | 3.2 | 4.8 | 114.0 | 48 | 10,361 |

Based on Chevron data for Destin Dome development.
Fuel use based on average.

Table A-10. Fuel use Estimates for Tug Operations Associated Pipelay Barge

| Source | Operation (hours)^a | | | Fuel Use (gal.)^b | | |
|---|---|---|---|---|---|---|
| | Travel to Area | Maneuvering | Hotelling | Travel to Area | Maneuvering | Hotelling |
| Pipelay Tug (2) | | | | | | |
| 100A to CPF | 48 | 26 | 149 | 26,662 | 3,655 | 3,186 |
| 99A/B to CPF | 48 | 29 | 163 | 26,662 | 3,985 | 3,474 |
| 13B to CPF | 48 | 17 | 97 | 26,662 | 2,376 | 2,071 |

^a Assumes 15% maneuvering and 85% hotelling from total on-site time.

^b See Table A-8 for fuel use factors.

^c Jackup boat maneuvering and hotelling fuel usage based on crew boat.

Table A-11. Estimated Fuel Use Factors for Tug for Pipelay Barge

| | Main Engines (BHP) | Fuel Use Factors (gal/hr/BHP) | | |
|---|---|---|---|---|
| | | Travel | Maneu. | Hotel |
| Pipelay Tug | 4700 | 277.7 | 69.4 | 10.7 |

Note: Fuel use based on crew boat fuel factor listed in Table A-2.

Table A-12. Estimated Emissions for Destin Dome

| | | Drilling Rig | | Pipelay Barge | | CPF |
|---|---|---|---|---|---|---|
| | Units | Main Electric Power Engines | Crane Logging & Auxillary Diesels | Main Generators | Crane & Auxillary Diesels | Crane & Auxillary Diesels |
| Source Characteristics: | | | | | | |
| Type | | Diesel | Diesel | Diesel | Diesel | Diesel |
| Number | | 3 | 5 | 2 | Several | Several |
| Brake Horsepower | | 1,650 | 250 | 2,682 | 700 | 700 |
| kW | | 1,230 | 186 | 2,000 | 522 | 522 |
| Fuel Characteristics: | | | | | | |
| Heat Content | Btu/lb | 19,200 | 19,200 | 19,200 | 19,200 | 19,200 |
| Density | Lb/gal | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 |
| Operation | days | 280 | 90 | 188 | 188 | 365 |
| Fuel Usage: | | | | | | |
| Maximum | gal/hr | 90 | 14 | 146 | 40 | 40 |
| | lb/hr/eng. | 648 | 101 | 1,051 | 288 | 288 |
| | MMBtu/hr | 12.44 | 1.94 | 20.18 | 5.53 | 5.53 |
| Average^a | lb/hr | 850 | 144 | 63.9 | 7 | 7 |
| | gal/hr | 118 | 20 | 9 | 1 | 1 |
| | gal/day | 2,833 | 480 | 213 | 23 | 23 |
| | 10^3 lb/yr | 5,712 | 311 | 288 | 32 | 61 |
| | 10^3 BHP/yr | 14,544 | 771 | 734 | 77 | 149 |
| | MMBtu/yr | 109,670 | 5,972 | 5,523 | 605 | 1,177 |
| | gal/yr | 793,333 | 43,200 | 39,950 | 4,376 | 8,517 |
| Criteria Pollutant Emissions: | | | | | | |
| Lead | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 |
| Maximum | lb/hr/eng. | 1.11E-04 | 1.72E-05 | 8.98E-05 | 4.92E-05 | 4.92E-05 |
| | lb/hr/rig | 3.32E-04 | 3.44E-05 | 1.80E-04 | 4.92E-05 | 4.92E-05 |
| Annual | TPY | 4.88E-04 | 2.66E-05 | 2.46E-05 | 2.69E-06 | 5.24E-06 |
| Regulated Pollutants: | | | | | | |
| Arsenic | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| Maximum | lb/hr/eng. | 5.23E-05 | 8.13E-06 | 4.24E-05 | 2.32E-05 | 2.32E-05 |
| | lb/hr/rig | 1.57E-04 | 1.63E-05 | 8.48E-05 | 2.32E-05 | 2.32E-05 |
| Annual | TPY | 2.30E-04 | 1.25E-05 | 1.16E-05 | 1.27E-06 | 2.47E-06 |
| Beryllium | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Maximum | lb/hr/eng. | 3.11E-05 | 4.84E-06 | 2.52E-05 | 1.38E-05 | 1.38E-05 |
| | lb/hr/rig | 9.33E-05 | 9.68E-06 | 5.05E-05 | 1.38E-05 | 1.38E-05 |
| Annual | TPY | 1.37E-04 | 7.46E-06 | 6.90E-06 | 7.56E-07 | 1.47E-06 |
| Mercury | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Maximum | lb/hr/eng. | 3.73E-05 | 5.81E-06 | 3.03E-05 | 1.66E-05 | 1.66E-05 |
| | lb/hr/rig | 1.12E-04 | 1.16E-05 | 6.05E-05 | 1.66E-05 | 1.66E-05 |
| Annual | TPY | 1.65E-04 | 8.96E-06 | 8.28E-06 | 9.07E-07 | 1.77E-06 |

Table A-12. Estimated Emissions for Destin Dome

| | Units | Drilling Rig | | Pipelay Barge | | CPF |
|---|---|---|---|---|---|---|
| | | Main Electric Power Engines | Crane Logging & Auxillary Diesels | Main Generators | Crane & Auxillary Diesels | Crane & Auxillary Diesels |
| Fluoride | | | | | | |
| Basis | | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) |
| Rate | lb/10^12 Btu | 32.5 | 32.5 | 32.5 | 32.5 | 32.5 |
| Maximum | lb/hr/eng. | 4.05E-04 | 6.30E-05 | 3.28E-04 | 1.80E-04 | 1.80E-04 |
| | lb/hr/rig | 1.21E-03 | 1.26E-04 | 6.57E-04 | 1.80E-04 | 1.80E-04 |
| Annual | TPY | 1.78E-03 | 9.72E-05 | 8.98E-05 | 9.84E-06 | 1.92E-05 |
| Non-Regulated Pollutants: | | | | | | |
| Manganese | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| Maximum | lb/hr/eng. | 1.74E-04 | 2.71E-05 | 1.41E-04 | 7.74E-05 | 7.74E-05 |
| | lb/hr/rig | 5.23E-04 | 5.42E-05 | 2.83E-04 | 7.74E-05 | 7.74E-05 |
| Annual | TPY | 7.68E-04 | 4.18E-05 | 3.87E-05 | 4.23E-06 | 8.24E-06 |
| Nickel | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| Maximum | lb/hr/eng. | 2.24E-04 | 3.48E-05 | 1.82E-04 | 9.95E-05 | 9.95E-05 |
| | lb/hr/rig | 6.72E-04 | 6.97E-05 | 3.63E-04 | 9.95E-05 | 9.95E-05 |
| Annual | TPY | 9.87E-04 | 5.37E-05 | 4.97E-05 | 5.44E-06 | 1.06E-05 |
| Cadmium | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| Maximum | lb/hr/eng. | 1.37E-04 | 2.13E-05 | 1.11E-04 | 6.08E-05 | 6.08E-05 |
| | lb/hr/rig | 4.11E-04 | 4.26E-05 | 2.22E-04 | 6.08E-05 | 6.08E-05 |
| Annual | TPY | 6.03E-04 | 3.28E-05 | 3.04E-05 | 3.33E-06 | 6.48E-06 |
| Chromium | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 |
| Maximum | lb/hr/eng. | 8.34E-04 | 1.30E-04 | 6.76E-04 | 3.70E-04 | 3.70E-04 |
| | lb/hr/rig | 2.50E-03 | 2.59E-04 | 1.35E-03 | 3.70E-04 | 3.70E-04 |
| Annual | TPY | 3.67E-03 | 2.00E-04 | 1.85E-04 | 2.03E-05 | 3.94E-05 |
| Copper | | | | | | |
| Basis | | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) |
| Rate | lb/10^12 Btu | 280.0 | 280.0 | 280.0 | 280.0 | 280.0 |
| Maximum | lb/hr/eng. | 3.48E-03 | 5.42E-04 | 2.83E-03 | 1.55E-03 | 1.55E-03 |
| | lb/hr/rig | 1.05E-02 | 1.08E-03 | 5.65E-03 | 1.55E-03 | 1.55E-03 |
| Annual | TPY | 1.54E-02 | 8.36E-04 | 7.73E-04 | 8.47E-05 | 1.65E-04 |
| Vanadium | | | | | | |
| Basis | | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) |
| Rate | lb/10^12 Btu | 69.5 | 69.5 | 69.5 | 69.5 | 69.5 |
| Maximum | lb/hr/eng. | 8.65E-04 | 1.35E-04 | 7.01E-04 | 3.84E-04 | 3.84E-04 |
| | lb/hr/rig | 2.59E-03 | 2.69E-04 | 1.40E-03 | 3.84E-04 | 3.84E-04 |
| Annual | TPY | 3.81E-03 | 2.08E-04 | 1.92E-04 | 2.10E-05 | 4.09E-05 |
| Selenium | | | | | | |
| Basis | | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) | EPA(1990) |
| Rate | lb/10^12 Btu | 23.4 | 23.4 | 23.4 | 23.4 | 23.4 |
| Maximum | lb/hr/eng. | 2.91E-04 | 4.53E-05 | 2.36E-04 | 1.30E-04 | 1.30E-04 |
| | lb/hr/rig | 8.74E-04 | 9.07E-05 | 4.73E-04 | 1.30E-04 | 1.30E-04 |
| Annual | TPY | 1.28E-03 | 6.99E-05 | 6.47E-05 | 7.08E-06 | 1.38E-05 |

Table A-12. Estimated Emissions for Destin Dome

| | | Drilling Rig | | Pipelay Barge | | CPF |
|---|---|---|---|---|---|---|
| | Units | Main Electric Power Engines | Crane Logging & Auxillary Diesels | Main Generators | Crane & Auxillary Diesels | Crane & Auxillary Diesels |
| **Benzene** | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 1.55 | 1.55 | 1.55 | 1.55 | 1.55 |
| Maximum | lb/hr/eng. | 1.93E-05 | 3.00E-06 | 1.56E-05 | 8.57E-06 | 8.57E-06 |
| | lb/hr/rig | 5.79E-05 | 6.00E-06 | 3.13E-05 | 8.57E-06 | 8.57E-06 |
| Annual | TPY | 8.50E-05 | 4.63E-06 | 4.28E-06 | 4.69E-07 | 9.12E-07 |
| **Toluene** | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 44.85 | 44.85 | 44.85 | 44.85 | 44.85 |
| Maximum | lb/hr/eng. | 5.58E-04 | 8.68E-05 | 4.53E-04 | 2.48E-04 | 2.48E-04 |
| | lb/hr/rig | 1.67E-03 | 1.74E-04 | 9.05E-04 | 2.48E-04 | 2.48E-04 |
| Annual | TPY | 2.46E-03 | 1.34E-04 | 1.24E-04 | 1.36E-05 | 2.64E-05 |
| **Xylenes** | | | | | | |
| Basis | | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) |
| Rate | lb/10^12 Btu | 193.0 | 193.0 | 193.0 | 193.0 | 193.0 |
| Maximum | lb/hr/eng. | 2.40E-03 | 3.74E-04 | 1.95E-03 | 1.07E-03 | 1.07E-03 |
| | lb/hr/rig | 7.20E-03 | 7.47E-04 | 3.90E-03 | 1.07E-03 | 1.07E-03 |
| Annual | TPY | 1.06E-02 | 5.76E-04 | 5.33E-04 | 5.84E-05 | 1.14E-04 |
| **Propylene** | | | | | | |
| Basis | | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) |
| Rate | lb/10^12 Btu | 2,790.0 | 2,790.0 | 2,790.0 | 2,790.0 | 2,790.0 |
| Maximum | lb/hr/eng. | 3.47E-02 | 5.40E-03 | 2.82E-02 | 1.54E-02 | 1.54E-02 |
| | lb/hr/rig | 6.94E-02 | 1.08E-02 | 5.63E-02 | 1.54E-02 | 1.54E-02 |
| Annual | TPY | 1.53E-01 | 8.33E-03 | 7.70E-03 | 8.44E-04 | 1.64E-03 |
| **Formaldehyde** | | | | | | |
| Basis | | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) |
| Rate | lb/10^12 Btu | 78.9 | 78.9 | 78.9 | 78.9 | 78.9 |
| Maximum | lb/hr/eng. | 9.82E-04 | 1.53E-04 | 7.96E-04 | 4.36E-04 | 4.36E-04 |
| | lb/hr/rig | 2.94E-03 | 3.05E-04 | 1.59E-03 | 4.36E-04 | 4.36E-04 |
| Annual | TPY | 4.33E-03 | 2.36E-04 | 2.18E-04 | 2.39E-05 | 4.64E-05 |
| **Acetaldehyde** | | | | | | |
| Basis | | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) |
| Rate | lb/10^12 Btu | 25.2 | 25.2 | 25.2 | 25.2 | 25.2 |
| Maximum | lb/hr/eng. | 3.14E-04 | 4.88E-05 | 2.54E-04 | 1.39E-04 | 1.39E-04 |
| | lb/hr/rig | 9.41E-04 | 9.75E-05 | 5.09E-04 | 1.39E-04 | 1.39E-04 |
| Annual | TPY | 1.38E-03 | 7.52E-05 | 6.96E-05 | 7.62E-06 | 1.48E-05 |
| **Acrolein** | | | | | | |
| Basis | | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) | EPA(1992) |
| Rate | lb/10^12 Btu | 7.9 | 7.9 | 7.9 | 7.9 | 7.9 |
| Maximum | lb/hr/eng. | 9.80E-05 | 1.53E-05 | 7.95E-05 | 4.36E-05 | 4.36E-05 |
| | lb/hr/rig | 2.94E-04 | 3.05E-05 | 1.59E-04 | 4.36E-05 | 4.36E-05 |
| Annual | TPY | 4.32E-04 | 2.35E-05 | 2.18E-05 | 2.38E-06 | 4.64E-06 |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Basis | | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) | EPA(1996) |
| Rate | lb/10^12 Btu | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 |
| Maximum | lb/hr/eng. | 2.97E-04 | 4.62E-05 | 2.41E-04 | 1.32E-04 | 1.32E-04 |
| | lb/hr/rig | 8.91E-04 | 9.24E-05 | 4.82E-04 | 1.32E-04 | 1.32E-04 |
| Annual | TPY | 1.31E-03 | 7.13E-05 | 6.59E-05 | 7.22E-06 | 1.41E-05 |

Table A-12. Estimated Emissions for Destin Dome

| | Units | Drilling Rig | | Pipelay Barge | | CPF |
|---|---|---|---|---|---|---|
| | | Main Electric Power Engines | Crane Logging & Auxillary Diesels | Main Generators | Crane & Auxillary Diesels | Crane & Auxillary Diesels |
| Antimony | | | | | | |
| Basis | | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) |
| Rate | lb/10^12 Btu | 21.8 | 21.8 | 21.8 | 21.8 | 21.8 |
| Maximum | lb/hr/eng. | 2.72E-04 | 4.23E-05 | 2.20E-04 | 1.21E-04 | 1.21E-04 |
| | lb/hr/rig | 8.15E-04 | 8.46E-05 | 4.41E-04 | 1.21E-04 | 1.21E-04 |
| Annual | TPY | 1.20E-03 | 6.52E-05 | 6.03E-05 | 6.61E-06 | 1.29E-05 |
| Barium | | | | | | |
| Basis | | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) |
| Rate | lb/10^12 Btu | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| Maximum | lb/hr/eng. | 2.43E-04 | 3.78E-05 | 1.97E-04 | 1.08E-04 | 1.08E-04 |
| | lb/hr/rig | 7.29E-04 | 7.56E-05 | 3.94E-04 | 1.08E-04 | 1.08E-04 |
| Annual | TPY | 1.07E-03 | 5.83E-05 | 5.39E-05 | 5.91E-06 | 1.15E-05 |
| Colbalt | | | | | | |
| Basis | | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) |
| Rate | lb/10^12 Btu | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 |
| Maximum | lb/hr/eng. | 1.13E-04 | 1.75E-05 | 9.15E-05 | 5.01E-05 | 5.01E-05 |
| | lb/hr/rig | 3.38E-04 | 3.51E-05 | 1.83E-04 | 5.01E-05 | 5.01E-05 |
| Annual | TPY | 4.97E-04 | 2.71E-05 | 2.50E-05 | 2.74E-06 | 5.34E-06 |
| Zinc | | | | | | |
| Basis | | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) | EPA(1980) |
| Rate | lb/10^12 Btu | 683.3 | 683.3 | 683.3 | 683.3 | 683.3 |
| Maximum | lb/hr/eng. | 8.50E-03 | 1.32E-03 | 6.90E-03 | 3.78E-03 | 3.78E-03 |
| | lb/hr/rig | 2.55E-02 | 2.64E-03 | 1.38E-02 | 3.78E-03 | 3.78E-03 |
| Annual | TPY | 3.75E-02 | 2.04E-03 | 1.89E-03 | 2.07E-04 | 4.02E-04 |
| Chlorine | | | | | | |
| Basis | | 0.5 ppm | 0.5 ppm | 0.5 ppm | 0.5 ppm | 0.5 ppm |
| Rate | lb/10^12 Btu | 2,604.2 | 2,604.2 | 1,302.1 | 2,604.2 | 2,604.2 |
| Maximum | lb/hr/eng. | 3.24E-02 | 5.04E-03 | 2.63E-02 | 1.44E-02 | 1.44E-02 |
| | lb/hr/rig | 9.72E-02 | 1.01E-02 | 5.26E-02 | 1.44E-02 | 1.44E-02 |
| Annual | TPY | 1.43E-01 | 7.78E-03 | 3.60E-03 | 7.88E-04 | 1.53E-03 |

Notes: ^a Annual fuel usage based on average daily fuel usage.

^b Maximum lb/hr/rig based on 3 main electric operating at full load and 3 crane/logging/auxillary engines operating at full load.
Calculations on lb/hr/eng. based on emission rate
(example for PM: 0.16 g/BHP x 1,650 BHP-hr x1/454 g/lb = 0.6 lb/hr; lb/hr/rig based on number of engines)

^c Annual emissions based on average fuel usage. Calculations of tons/year based on emission rate times annual fuel usage.
(example for PM: 0.16 g/BHP-hr x 14,5000 10^3 BHP/yr x 1/454 g/lb x 1/2,000 lb/ton = 2.6 tons/yr)

# APPENDIX B

# CUSTOM MONITORING SCHEDULE FOR DETERMINING SULFUR CONTENT IN NATURAL GAS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 14 1987

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Authority for Approval of Custom Fuel Monitoring Schedules Under NSPS Subpart GG

FROM: John B. Rasnic, Chief John B Rasnic
Compliance Monitoring Branch

TO: Air Compliance Branch Chiefs
Regions II, III, IV, V, VI and IX

Air Programs Branch Chiefs
Regions I-X

The NSPS for Stationary Gas Turbines (Subpart GG) at 40 CFR 60.334(b)(2) allows for the development of custom fuel monitoring schedules as an alternative to daily monitoring of the sulfur and nitrogen content of fuel fired in the turbines. Regional Offices have been forwarding custom fuel monitoring schedules to the Stationary Source Compliance Division (SSCD) for consideration since it was understood that authority for approval of these schedules was not delegated to the Regions. However, in consultation with the Emission Standards and Engineering Division, it has been determined that the Regional Offices do have the authority to approve Subpart GG custom fuel monitoring schedules. Therefore it is no longer necessary to forward those requests to Headquarters for approval.

Over the past few years, SSCD has issued over twenty custom schedules for sources using pipeline quality natural gas. In order to maintain national consistency, we recommend that any schedules Regional Offices issue for natural gas be no less stringent than the following: sulfur monitoring should be bimonthly, followed by quarterly, then semiannual, given at least six months of data demonstrating little variability in sulfur content and compliance with §60.333 at each monitoring frequency; nitrogen monitoring can be waived for pipeline quality natural gas, since there is no fuel-bound nitrogen and since the free nitrogen does not contribute appreciably to $NO_x$ emissions. Please see the attached sample custom schedule for details. Given the increasing trend in the use of pipeline quality natural gas, we are investigating the possibility of amending Subpart GG to allow for less frequent sulfur monitoring and a waiver of nitrogen monitoring requirements where natural gas is used.

Where sources using oil request custom fuel monitoring schedules, Regional Offices are encouraged to contact SSCD for consultation on the appropriate fuel monitoring schedule. However, Regions are not required to send the request itself to SSCD for approval.

If you have any questions, please contact Sally M. Farrell at FTS 382-2875.

Attachment

cc: John Crenshaw
George Walsh
Robert Ajax
Earl Salo

Enclosure

Conditions for Custom Fuel Sampling Schedule for Stationary Gas Turbines

1. Monitoring of fuel nitrogen content shall not be required while natural gas is the only fuel fired in the gas turbine.

2. Sulfur Monitoring

   a. Analysis for fuel sulfur content of the natural gas shall be conducted using one of the approved ASTM reference methods for the measurement of sulfur in gaseous fuels, or an approved alternative method. The reference methods are: ASTM D1072-80; ASTM D3031-81; ASTM D3246-81; and ASTM D4084-82 as referenced in 40 CFR 60.335(b)(2).

   b. Effective the date of this custom schedule, sulfur monitoring shall be conducted twice monthly for six months. If this monitoring shows little variability in the fuel sulfur content, and indicates consistent compliance with 40 CFR 60.333, then sulfur monitoring shall be conducted once per quarter for six quarters.

   c. If after the monitoring required in item 2(b) above, or herein, the sulfur content of the fuel shows little variability and, calculated as sulfur dioxide, represents consistent compliance with the sulfur dioxide emission limits specified under 40 CFR 60.333, sample anaylsis shall be conducted twice per annum. This monitoring shall be conducted during the first and third quarters of each calendar year.

   d. Should any sulfur analysis as required in items 2(b) or 2(c) above indicate noncompliance with 40 CFR 60.333, the owner or operator shall notify the State Air Control Board ) of such excess emissions and the custom schedule shall be re-examined by the Environmental Protection Agency. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

3. If there is a change in fuel supply, the owner or operator must notify the State of such change for re-examination of this custom schedule. A substantial change in fuel quality shall be considered as a change in fuel supply. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

4. Records of sample analysis and fuel supply pertinent to this custom schedule shall be retained for a period of three years, and be available for inspection by personnel of federal, state, and local air pollution control agencies.

# APPENDIX C

## INFORMATION SUPPORTING EMISSION ESTIMATES AND SOURCE DESCRIPTIONS

# C-1 EMISSION FACTORS

## 1.4 Natural Gas Combustion

### 1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

### 1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and $NO_x$ control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some $NO_x$ control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

### 1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides ($NO_x$), carbon monoxide (CO), and carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), volatile organic compounds (VOCs), trace amounts of sulfur dioxide ($SO_2$), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of $NO_x$ formation in natural gas combustion is thermal $NO_x$. The thermal $NO_x$ mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen ($N_2$) and oxygen ($O_2$) molecules in the combustion air. Most $NO_x$ formed through the thermal $NO_x$ mechanism occurs in the high temperature flame zone near the burners. The formation of thermal $NO_x$ is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, $NO_x$ emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of $NO_x$ formation, called prompt $NO_x$, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt $NO_x$ reactions occur within the flame and are usually negligible when compared to the amount of $NO_x$ formed through the thermal $NO_x$ mechanism. However, prompt $NO_x$ levels may become significant with ultra-low-$NO_x$ burners.

The third mechanism of $NO_x$ formation, called fuel $NO_x$, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, $NO_x$ formation through the fuel $NO_x$ mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of $NO_x$ control systems such as low $NO_x$ burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of $SO_2$ from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of $SO_2$ emissions. Boilers combusting unprocessed natural gas may have higher $SO_2$ emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine $SO_2$ emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-11]

$CO_2$, $CH_4$, and $N_2O$ emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to $CO_2$ during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to $CO_2$ results in $CH_4$, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of $CH_4$, CO, and VOC produced is insignificant compared to $CO_2$ levels.

Formation of $N_2O$ during the combustion process is affected by two furnace-zone factors. $N_2O$ emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of $N_2O$ also favor emissions of methane.

## 1.4.4 Controls[4,12]

$NO_x$ Controls -

Currently, the two most prevalent combustion control techniques used to reduce $NO_x$ emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low $NO_x$ burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces $NO_x$ emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal $NO_x$ mechanism. To a lesser extent, FGR also reduces $NO_x$ formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing $NO_x$ emission rates for these systems. An FGR system is normally used in combination with specially designed low $NO_x$ burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low $NO_x$ burners and FGR are used in combination, these techniques are capable of reducing $NO_x$ emissions by 60 to 90 percent.

Low $NO_x$ burners reduce $NO_x$ by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal $NO_x$ formation. The two most common types of low $NO_x$ burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. $NO_x$ emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low $NO_x$ burners.

Other combustion control techniques used to reduce $NO_x$ emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing $NO_x$ emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of $NO_x$ to $NO_2$.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce $NO_x$ emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia ($NH_3$) or urea into combustion flue gases (in a specific temperature zone) to reduce $NO_x$ emission. The Alternative Control Techniques (ACT) document for $NO_x$ emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[14] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in $NO_x$ for applications on wall-fired boilers and a 13 percent reduction in $NO_x$ for applications on tangential-fired boilers.[13] In many situations, a boiler may have an SNCR system installed to trim $NO_x$ emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum $NO_x$ reduction. The SCR system involves injecting $NH_3$ into the flue gas in the presence of a catalyst to reduce $NO_x$ emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates $NO_x$ reduction efficiencies for SCR control ranging from 80 to 90 percent.[14]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[13] Tables in this section present emission factors on a volume basis (lb/$10^6$ scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/$10^6$ scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how "good" the factor is, with "A" being excellent and "E" being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

### 1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/oar/oaqps/efig).

Supplement D, 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.
- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

## Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES ($NO_x$) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

| Combustor Type (MMBtu/hr Heat Input) [SCC] | $NO_x$[b] | | CO | |
|---|---|---|---|---|
| | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
| Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01] | | | | |
| Uncontrolled (Pre-NSPS)[c] | 280 | A | 84 | B |
| Uncontrolled (Post-NSPS)[c] | 190 | A | 84 | B |
| Controlled - Low $NO_x$ burners | 140 | A | 84 | B |
| Controlled - Flue gas recirculation | 100 | D | 84 | B |
| Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03] | | | | |
| Uncontrolled | 100 | B | 84 | B |
| Controlled - Low $NO_x$ burners | 50 | D | 84 | B |
| Controlled - Low $NO_x$ burners/Flue gas recirculation | 32 | C | 84 | B |
| Tangential-Fired Boilers (All Sizes) [1-01-006-04] | | | | |
| Uncontrolled | 170 | A | 24 | C |
| Controlled - Flue gas recirculation | 76 | D | 98 | D |
| Residential Furnaces (<0.3) [No SCC] | | | | |
| Uncontrolled | 94 | B | 40 | B |

[a] Reference 13. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as $NO_2$. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate $NO_x$ emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate $NO_x$ emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

## TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

| Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|
| $CO_2$[b] | 120,000 | A |
| Lead | 0.0005 | D |
| $N_2O$ (Uncontrolled) | 2.2 | E |
| $N_2O$ (Controlled-low-$NO_X$ burner) | 0.64 | E |
| PM (Total)[c] | 7.6 | D |
| PM (Condensable)[c] | 5.7 | D |
| PM (Filterable)[c] | 1.9 | B |
| $SO_2$[d] | 0.6 | A |
| TOC | 11 | B |
| Methane | 2.3 | B |
| VOC | 5.5 | C |

[a] Reference 13. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds.
VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to $CO_2$. $CO_2[lb/10^6$ scf$]$ = (3.67) (CON) (C)(D), where CON = fractional conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate $PM_{10}$, $PM_{2.5}$ or $PM_1$ emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to $SO_2$.
Assumes sulfur content is natural gas of 2,000 grains/$10^6$ scf. The $SO_2$ emission factor in this table can be converted to other natural gas sulfur contents by multiplying the $SO_2$ emission factor by the ratio of the site-specific sulfur content (grains/$10^6$ scf) to 2,000 grains/$10^6$ scf.

## TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 91-57-6 | 2-Methylnaphthalene[b, c] | 2.4E-05 | D |
| 56-49-5 | 3-Methylchloranthrene[b, c] | <1.8E-06 | E |
|  | 7,12-Dimethylbenz(a)anthracene[b,c] | <1.6E-05 | E |
| 83-32-9 | Acenaphthene[b,c] | <1.8E-06 | E |
| 203-96-8 | Acenaphthylene[b,c] | <1.8E-06 | E |
| 120-12-7 | Anthracene[b,c] | <2.4E-06 | E |
| 56-55-3 | Benz(a)anthracene[b,c] | <1.8E-06 | E |
| 71-43-2 | Benzene[b] | 2.1E-03 | B |
| 50-32-8 | Benzo(a)pyrene[b,c] | <1.2E-06 | E |
| 205-99-2 | Benzo(b)fluoranthene[b,c] | <1.8E-06 | E |
| 191-24-2 | Benzo(g,h,i)perylene[b,c] | <1.2E-06 | E |
| 205-82-3 | Benzo(k)fluoranthene[b,c] | <1.8E-06 | E |
| 106-97-8 | Butane | 2.1E+00 | E |
| 218-01-9 | Chrysene[b,c] | <1.8E-06 | E |
| 53-70-3 | Dibenzo(a,h)anthracene[b,c] | <1.2E-06 | E |
| 25321-22-6 | Dichlorobenzene[b] | 1.2E-03 | E |
| 74-84-0 | Ethane | 3.1E+00 | E |
| 206-44-0 | Fluoranthene[b,c] | 3.0E-06 | E |
| 86-73-7 | Fluorene[b,c] | 2.8E-06 | E |
| 50-00-0 | Formaldehyde[b] | 7.5E-02 | B |
| 110-54-3 | Hexane[b] | 1.8E+00 | E |
| 193-39-5 | Indeno(1,2,3-cd)pyrene[b,c] | <1.8E-06 | E |
| 91-20-3 | Naphthalene[b] | 6.1E-04 | E |
| 109-66-0 | Pentane | 2.6E+00 | E |
| 85-01-8 | Phenanathrene[b,c] | 1.7E-05 | D |

## TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 74-98-6 | Propane | 1.6E+00 | E |
| 129-00-0 | Pyrene[b, c] | 5.0E-06 | E |
| 108-88-3 | Toluene[b] | 3.4E-03 | C |

[a] Reference 13. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 7440-38-2 | Arsenic[b] | 2.0E-04 | E |
| 7440-39-3 | Barium | 4.4E-03 | D |
| 7440-41-7 | Beryllium[b] | <1.2E-05 | E |
| 7440-43-9 | Cadmium[b] | 1.1E-03 | D |
| 7440-47-3 | Chromium[b] | 1.4E-03 | D |
| 7440-48-4 | Cobalt[b] | 8.4E-05 | D |
| 7440-50-8 | Copper | 8.5E-04 | C |
| 7439-96-5 | Manganese[b] | 3.8E-04 | D |
| 7439-97-6 | Mercury[b] | 2.6E-04 | D |
| 7439-98-7 | Molybdenum | 1.1E-03 | D |
| 7440-02-0 | Nickel[b] | 2.1E-03 | C |
| 7782-49-2 | Selenium[b] | <2.4E-05 | E |
| 7440-62-2 | Vanadium | 2.3E-03 | D |
| 7440-66-6 | Zinc | 2.9E-02 | E |

[a] Reference 13. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

References For Section 1.4

1. *Exhaust Gases From Combustion And Industrial Processes*, EPA Contract No. EHSD 71-36, Engineering Science, Inc., Washington, DC, October 1971.

2. *Chemical Engineers' Handbook, Fourth Edition*, J. H. Perry, Editor, McGraw-Hill Book Company, New York, NY, 1963.

3. *Background Information Document For Industrial Boilers*, EPA-450/3-82-006a, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1982.

4. *Background Information Document For Small Steam Generating Units*, EPA-450/3-87-000, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1987.

5. J. L. Muhlbaier, "Particulate and Gaseous Emissions From Natural Gas Furnaces and Water Heaters", *Journal Of The Air Pollution Control Association*, December 1981.

6. L. P. Nelson, *et al.*, *Global Combustion Sources Of Nitrous Oxide Emissions*, Research Project 2333-4 Interim Report, Sacramento: Radian Corporation, 1991.

7. R. L. Peer, *et al.*, *Characterization Of Nitrous Oxide Emission Sources*, Prepared for the U. S. EPA Contract 68-D1-0031, Research Triangle Park, NC: Radian Corporation, 1995.

8. S. D. Piccot, *et al.*, *Emissions and Cost Estimates For Globally Significant Anthropogenic Combustion Sources Of* $NO_x$, $N_2O$, $CH_4$, *CO, and* $CO_2$, EPA Contract No. 68-02-4288, Research Triangle Park, NC: Radian Corporation, 1990.

9. *Sector-Specific Issues and Reporting Methodologies Supporting the General Guidelines for the Voluntary Reporting of Greenhouse Gases under Section 1605(b) of the Energy Policy Act of 1992* (1994) DOE/PO-0028, Volume 2 of 3, U.S. Department of Energy.

10. J. P. Kesselring and W. V. Krill, "A Low-$NO_x$ Burner For Gas-Fired Firetube Boilers", *Proceedings: 1985 Symposium On Stationary Combustion* $NO_x$ *Control, Volume 2*, EPRI CS-4360, Electric Power Research Institute, Palo Alto, CA, January 1986.

11. *Emission Factor Documentation for AP-42 Section 1.4—Natural Gas Combustion*, Technical Support Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1997.

12. *Alternate Control Techniques Document -* $NO_x$ *Emissions from Utility Boilers*, EPA-453/R-94-023, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

## 3.2 Heavy-duty Natural Gas-fired Pipeline Compressor Engines And Turbines

### 3.2.1 General[1-3]

Natural gas-fired internal combustion engines are used in the natural gas industry at pipeline compressor and storage stations. The engines and gas turbines are used to provide mechanical shaft power that drives compressors. At pipeline compressor stations, the engine or turbine is used to help move natural gas from station to station. At storage facilities, they are used to help inject the natural gas into high pressure underground cavities (natural gas storage fields), e. g., empty oil fields. Although they can operate at a fairly constant load, pipeline engines or turbines must be able to operate under varying pipeline requirements. The size of these engines ranges from 800 brake horsepower (bhp) to 5,000 bhp. For gas turbines, the capacity ranges from 1,000 to 15,000 bhp.

### 3.2.2 Process Description[1-3]

Reciprocating engines are separated into 3 design classes: 2-cycle (stroke) lean burn, 2-stroke ultra lean (clean) burn, 4-stroke lean burn, 4-stroke clean burn, and 4-stroke rich burn. Each of these have design differences that affect both baseline emissions as well as the potential for emissions control. Two-stroke engines complete the power cycle in a single crankshaft revolution as compared to the two crankshaft revolutions required for 4-stroke engines.

In a 2-stroke engine, the air/fuel charge is injected with the piston near the bottom of the power stroke. The intake ports are then covered or closed, and the piston moves to the top of the cylinder, thereby compressing the charge. Following ignition and combustion, the power stroke starts with the downward movement of the piston. Exhaust ports or valves are then uncovered to exhaust the combustion products, and a new air/fuel charge is injected. Two-stroke engines may be turbocharged using an exhaust-powered turbine to pressurize the charge for injection into the cylinder and to increase cylinder scavenging. Non-turbocharged engines may be either blower scavenged or piston scavenged to improve removal of combustion products.

Four-stroke engines use a separate engine revolution for the intake/compression cycle and the power/exhaust cycle. These engines may be either naturally aspirated, using the suction from the piston to entrain the air charge, or turbocharged, using an exhaust-driven turbine to pressurize the charge. Turbocharged units produce a higher power output for a given engine displacement, whereas naturally aspirated units have lower initial cost and maintenance. Rich burn engines operate near the stoichiometric air/fuel ratio with exhaust excess oxygen levels less than 4 percent. Lean burn engines may operate up to the lean flame extinction limit, with exhaust oxygen levels of 12 percent or greater. Pipeline population statistics show a nearly equal installed capacity of turbines and reciprocating engines. For reciprocating engines, 2-stroke designs contribute approximately two-thirds of installed capacity.

Almost all of the gas turbines used by the natural gas industry for pipeline and storage facilities are simple cycle. A gas turbine is an internal combustion engine that operates with rotary rather than reciprocating motion. Gas turbines are essentially composed of several major components: compressor, combustor, and power turbine. Natural gas and compressed air (up to 30 atmospheres pressure) are injected separately into the combustor can, mixed, and reacted.

The hot expanding exhaust gases are then passed into the power turbine to produce usable shaft energy. The heat content of the exhaust gases exiting the turbine are not commonly utilized with pipeline applications, although other applications use heat recovery steam generators for cogeneration or combined cycle application.

Gas turbines may have one, two, or three shafts to transmit power from the inlet air compression turbine, the power turbine, and the exhaust turbine. The majority of gas turbines used in pipeline installations are simple cycle two-shaft gas turbines. There are three types of combustor can design in use: annular, can-annular, and silo. The type of combustor can design depends on the make/model of the gas turbine. Several stationary engine designs are aircraft-derivative using an annular or can-annular design.

### 3.2.3 Emissions

The primary pollutants from natural gas-fueled reciprocating engines and gas turbines are nitrogen oxide ($NO_x$), carbon monoxide (CO), and total organic compounds (TOC). Nitrogen oxide formation is strongly dependent on the high temperatures developed in the cylinder or combustor can. The other pollutants, CO and HC species, are primarily the result of incomplete combustion. Trace amounts of metals and non-combustible inorganic material may be carried over from the lubricating oil, from engine wear, or from trace constituents in the gas. Sulfur oxides are very low since sulfur compounds are removed in the gas treatment plant prior to entry into the pipeline.

#### 3.2.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The principle mechanism with gas-fired engines and turbines is thermal $NO_x$, which arises from the thermal dissociation and subsequent reaction of nitrogen ($N_2$) and oxygen ($O_2$) molecules in the combustion air. Most thermal $NO_x$ is formed in high-temperature regions in the cylinder or combustor can where combustion air has mixed sufficiently with the fuel to produce the peak temperature fuel/air interface. A component of thermal $NO_x$, called prompt $NO_x$, is formed from early reactions of nitrogen intermediaries and hydrocarbon radicals from the fuel. The prompt $NO_x$ forms within the flame and is usually negligible compared to the amount of thermal $NO_x$ formed. The second mechanism, fuel $NO_x$, stems from the evolution and reaction of fuel-bound $N_2$ compounds with oxygen. Natural gas has negligible chemically bound fuel $N_2$ (although some molecular nitrogen) and essentially all $NO_x$ formed is thermal $NO_x$. The formation of prompt $NO_x$ can form a significant part of total $NO_x$ only under highly controlled situations where thermal $NO_x$ is suppressed. It is more prevalent with rich burn engines. The rates of these reactions are highly dependent upon the stoichiometric ratio, combustion temperature, and residence time at the combustion temperature.

The maximum thermal $NO_x$ production occurs at a slightly lean fuel/air mixture ratio because of the excess availability of oxygen for reaction. The control of stoichiometry is critical in achieving reductions in thermal $NO_x$. Premixing with lean burn reciprocating engines is effective in suppressing $NO_x$ relative to rich burn engines. The thermal $NO_x$ generation decreases rapidly as the temperature drops below the adiabatic temperature. Thus, maximum reduction of thermal $NO_x$ generation can be achieved by control of both the combustion temperature and the stoichiometry.

Gas turbines operate with high overall levels of excess air because turbines use combustion air dilution as the means to maintain the turbine inlet temperature below design limits. Most of the dilution takes place in the can downstream of the primary flame, so that high excess air levels are not indicative of the $NO_x$-forming potential. The combustion in conventional designs is by diffusion flames that are characterized by regions of near-stoichiometric fuel/air mixtures where temperatures are very high and the majority of $NO_x$ is formed. Since the localized $NO_x$-forming regions are at much higher temperatures than the adiabatic flame temperature for the overall mixture, the rate of $NO_x$ formation is dependent on the fuel/air mixing process. The mixing determines the prevalence of the high temperature regions as well as the peak temperature attained.

### 3.2.3.2 Carbon Monoxide and Total Organic Compounds (Hydrocarbons) -

Carbon monoxide and hydrocarbon emissions both result from the products of incomplete combustion. Carbon monoxide results when there is insufficient residence time at high temperature to complete the final step in hydrocarbon oxidation. In reciprocating engines, CO emissions may indicate early quenching of combustion gases on cylinder walls or valve surfaces. The oxidation of CO to carbon dioxide ($CO_2$) is a slow reaction compared to most hydrocarbon oxidation reactions. In gas turbines, failure to achieve CO burnout may result from quenching in the can by the dilution air. CO emissions are usually higher when the unit is run at low loads.

The pollutants commonly classified as hydrocarbons can encompass a wide spectrum of volatile and semi-volatile organic compounds. They are discharged into the atmosphere when some of the gas remains unburned or is only partially burned during the combustion process. With natural gas, some organics are carryover, unreacted, trace constituents of the gas, while others may be pyrolysis products of the heavier hydrocarbon constituents. Partially burned hydrocarbons can occur because of poor air/fuel homogeneity due to incomplete mixing prior to, or during, combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; or low cylinder temperature due to excessive cooling through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.

### 3.2.3.3 Particulate Matter and PM-10[4] -

Particulate emissions with gas-fired turbines and reciprocating engines are non-detectable with conventional protocols unless the engines are operated in a sooting condition. Otherwise, particulate could arise from carryover of non-combustible trace constituents in the gas or from lube oil.

## 3.2.4 Control Technologies

Three generic control techniques have been developed for reciprocating engines and gas turbines: parametric controls (timing and operating at a leaner air/fuel ratio for reciprocating engines and water injection for gas turbines); combustion modification such as advanced engine design for new sources or major modification to existing sources (clean burn reciprocating head designs and dry gas turbine combustor can designs); and postcombustion catalytic $NO_x$ reduction (selective catalytic reduction [SCR] for gas turbines and lean burn reciprocating engines and nonselective catalytic reduction [NSCR] for rich burn engines).

### 3.2.4.1 Control Techniques for Rich Burn Reciprocating Engines[5] -

Nonselective Catalytic Reduction -

This technique uses the residual hydrocarbons and CO in the rich burn engine exhaust as a reducing agent for $NO_x$. In NSCR, hydrocarbons will be oxidized by $O_2$ and $NO_x$, hence the designation "nonselective". This is in contrast to ammonia injection for SCR where ammonia selectively reacts with $NO_x$. The excess hydrocarbons and $NO_x$ pass over a catalyst, usually a noble metal (platinum, rhodium, or palladium) which reduces the reactants to $N_2$, $CO_2$, and $H_2O$.

The NSCR technique is effectively limited to engines with normal exhaust oxygen levels of 4 percent or less. This includes 4-cycle naturally aspirated engines and some 4-cycle turbocharged engines. Engines operating with NSCR require tight air/fuel control to maintain high reduction effectiveness without high hydrocarbon emissions. To achieve optimum $NO_x$ reduction performance, the engine may need to be run in a richer fuel condition than normal.

Prestratified Charge -

Prestratified charge combustion is a retrofit system that is limited to 4-cycle carbureted natural gas engines. In this system, controlled amounts of air are introduced into the intake manifold in a specified sequence and quantity. This stratification provides both a fuel rich ignition and rapid flame cooling resulting in reduced formation of $NO_x$.

### 3.2.4.2 Control Techniques for Lean Burn Reciprocating Engines -

Lean Combustion -

Lean combustion techniques use increased bulk air/fuel ratios to lower peak flame temperature and reduce $NO_x$ formation. Typically, air/fuel ratios are increased from normal levels of 20 to 35 up to controlled levels of 45 to 50. The upper limit is constrained by the onset of misfiring at the lean limit. This condition also increases CO and HC emissions.

To maintain acceptable engine performance at lean conditions, high energy ignition systems have been developed that promote flame stability at very lean conditions. With high energy ignition, a rich mixture is ignited in a small ignition cell located in the cylinder head. The ignition cell flame passes to the cylinder where it provides a uniform ignition source. The technique can be retrofit to existing turbocharged 2- and 4-cycle engines. With new engine designs, $NO_x$ reductions of 80 to 90 percent have been achieved compared to spark ignition designs. In most cases, the $NO_x$ reductions have been accompanied by increases in power output and increased fuel economy.

Selective Catalytic Reduction -

Selective catalytic reduction (SCR) is applicable to lean burn engines. Ammonia ($NH_3$) is injected upstream of a noble metal, metal oxide or zeolite catalyst to give an $NH_3$: $NO_x$ ratio of about 1:1. The mixture of $NH_3$ and $NO_x$ is selectively reduced over the catalyst within a temperature range of 600 to 900°F depending on the catalyst. The major system components are the catalyst and associated housing, the ammonia storage and delivery system, and the control system. The performance has been less acceptable than NSCR with rich burn engines, or SCR with gas turbines. The primary difficulty with lean burn engines has been maintaining air/fuel control, very limited automatic controls, and engine performance and the inherent variety of engine loading while achieving the necessary exhaust temperature window for efficient SCR operation.

### 3.2.4.3 Control Technologies for Gas Turbines -

Water Injection -

Water or steam injection is a technology that has been demonstrated as very effective in suppressing $NO_x$ emissions from gas turbines. The effect of steam and water injection is to increase the thermal mass by dilution and thereby reduce the adiabatic flame temperature and the peak flame temperatures in the $NO_x$-forming regions. With water injection, there is the additional benefit of absorbing the latent heat of vaporization from the flame zone. Water or steam is typically injected at a water-to-fuel weight ratio of less than 1. Depending on the initial $NO_x$ levels, such rates of injection may reduce $NO_x$ by 60 percent or higher. Wet injection is usually accompanied by an efficiency penalty but an increase in power output. Efficiency penalties of 2 to 3 percent are typical. The power increase results because fuel flow is increased to maintain turbine inlet temperature at manufacturers' specifications. Power increases with water or steam injection of 5 to 6 percent are typical. Both CO and HC emissions are increased by large rates of water injection.

The use of wet injection may be constrained in some applications such as pipeline pumping by the unavailability of pure water for injection. The choice between water or steam is usually driven by the availability of steam. Most operators prefer steam because of fewer operational problems, better heat rate, and increased power augmentation compared to water. The use of water with low mineral content is a significant cost item with water injection. The reliability of the water treatment system and injection pumps also can be a major issue in continuous operation under low $NO_x$ conditions.

Selective Catalytic Reduction Systems -

Selective catalytic reduction systems are postcombustion technologies that have recently been applied in limited cases to gas turbines. An SCR system consists of an ammonia storage, feed, and injection system, and a catalyst and catalyst housing. Selective catalytic reduction systems selectively reduce $NO_x$ emissions by injecting $NH_3$ into the exhaust gas stream upstream of the catalyst. Nitrogen oxides, $NH_3$, and $O_2$ react on the surface of the catalyst to form $N_2$ and $H_2O$. For the SCR system to operate properly, the exhaust gas must be within a particular temperature range (typically between 450 and 850°F). The temperature range is dictated by the catalyst (typically made from noble metals, base metal oxides such as vanadium and titanium, and zeolite-based material). Exhaust gas temperatures greater than the upper limit (850°F) will pass the $NO_x$ and ammonia unreacted through the catalyst. Ammonia emissions, called $NH_3$ slip, are a key consideration when specifying a SCR system. Ammonia, either in the form of liquid anhydrous ammonia, or aqueous ammonia hydroxide is stored on site and injected into the exhaust stream upstream of the catalyst. Although an SCR system can operate alone, it is typically used in conjunction with water/steam injection systems to reduce $NO_x$ emissions to their lowest levels (less than 10 ppm at 15 percent oxygen).

Combustion Modifications -

Several different methods or approaches of reducing $NO_x$ emissions from gas turbines are currently being researched and developed by the manufacturers of gas turbines. Since thermal $NO_x$ is a function of both temperature (exponentially) and time (linearally), the basis of these controls are to either lower the combustor temperature using lean mixtures air and fuel and/or staging the combustion or decrease the residence time of the combustor. Some manufacturers use a combination of these methods to reduce $NO_x$ emissions. These methods or approaches are lean combustion; reduced combustor residence time; two-stage lean/lean combustion; and two-stage rich/lean combustion.

Most gas turbine combustors were originally designed to operate with a stoichiometric mixture (theoretical amount of air required to react with the fuel). Lean combustion involves increasing the air/fuel ratio of the mixture so that the peak and average temperature within the combustor will be less than that of the stoichiometric mixture. A lean mixture of air and fuel can be premixed before ignition, a stoichiometric mixture can be ignited and additional air can be introduced at a later stage (staging) creating an overall lean mixture in the turbine, or a combination of both can occur. Introducing excess air at a later stage not only creates a leaner mixture but can also reduce the residence time of the combustor (given enough excess air is added at the latter stage to create a mixture so lean that it will no longer combust). Also, the residence time of a combustor can be decreased by increasing the turbulence within the combustor.

Two-stage lean/lean combustors are essentially fuel-staged combustors in which each stage burns lean. The two-stage lean/lean combustor allows the turbine to operate with an extremely lean mixture and a stable flame that should not "blow off" or extinguish. A small stoichiometric pilot flame ignites the premixed gas and provides flame stability. The high $NO_x$ emissions associated with the higher-temperature pilot flame is minor compared to the low $NO_x$ emissions generated by the extremely lean mixture.

Two-stage rich/lean combustors are essentially air-staged combustors in which the primary stage/zone is operated fuel rich and the secondary stage/zone is operated fuel lean. The rich mixture will produce lower temperatures (compared to stoichiometric) and higher concentrations of CO and $H_2$ because of incomplete combustion. The rich mixture decreases the amount of oxygen available for $NO_x$

generation and the increased CO and $H_2$ concentrations will help reduce some of the $NO_x$ formed. Before entering the secondary zone, the exhaust of the primary zone is quenched (to extinguish the flame) by large amounts of air and a lean mixture is now created. The combustion of the lean mixture is then completed in the secondary zone.

Emission factors for natural gas-fired pipeline compressor engines are presented in Table 3.2-1 for baseline operation and in Tables 3.2-2, 3.2-3, 3.2-4, and 3.2-5 for controlled operation. The factors for controlled operation are taken from a single source test. Table 3.2-6 lists noncriteria emission factors for uncontrolled natural gas prime movers.

## 3.2.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the memoranda describing each supplement or the background report for this section. These and other documents can be found on the CHIEF electronic bulletin board (919-541-5742), or on the new EFIG home page (http://www.epa.gov/oar/oaqps/efig/).

Supplement A, February 1996

- In the table for uncontrolled natural gas prime movers, the SCC for 4-cycle lean burn was changed from 2-01-002-53 to 2-02-002-54. The SCC for 4-cycle rich burn was changed from 2-02-002-54 to 2-02-02-002-53.
- An SCC (2-02-002-53) was provided for 4-cycle rich burn engines, and the "less than" symbol (<) was restored to the appropriate factors.

Supplement B, October 1996

- The introduction section was revised.
- Text was added concerning process description of turbines.
- Text was revised concerning emissions and controls.
- References in various tables were editorially corrected.
- The inconsistency between a $CO_2$ factor in the table and an equation in the footnote was corrected.

## Table 3.2-1. CRITERIA EMISSION FACTORS FOR UNCONTROLLED NATURAL GAS PRIME MOVERS[a]

EMISSION FACTOR RATING: A

| | Gas Turbines (SCC 2-02-002-01) | | 2-Cycle Lean Burn (SCC 2-02-002-52) | | 4-Cycle Lean Burn (SCC 2-02-002-54) | | 4-Cycle Rich Burn (SCC 2-02-002-53) | |
|---|---|---|---|---|---|---|---|---|
| Pollutant | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) |
| $NO_x$ | 2.87 E-03 | 0.34 | 0.024 | 2.7 | 0.026 | 3.2 | 0.022 | 2.3 |
| CO | 1.83 E-03 | 0.17 | 3.31 E-03 | 0.38 | 3.53 E-03 | 0.42 | 0.019 | 1.6 |
| $CO_2$[b] | 0.88 | 109 | 0.77 | 109 | 0.77 | 109 | 0.77 | 109 |
| TOC | 3.97 E-04 | 0.053 | 0.013 | 1.5 | 0.011 | 1.3 | 2.65 E-03 | 0.27 |
| TNMOC | 2.20 E-05 | 0.002 | 9.48 E-04 | 0.11 | 1.59 E-03 | 0.18 | 3.09 E-04 | 0.03 |
| $CH_4$ | 3.75 E-04 | 0.051 | 0.012 | 1.4 | 9.04 E-03 | 1.1 | 2.43 E-03 | 0.24 |

[a] References 6-13. Factors are based on large population of engines. Factors for individual engines from specific manufacturers may vary. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TNMOC = total nonmethane organic compounds.

[b] Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$ [lb/MMBtu] = (3.67)(%CON)(C/E), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0250 MMBtu/lb.

## Table 3.2-2. EMISSION FACTORS FOR CONTROLLED NATURAL GAS PRIME MOVERS: COMBUSTION MODIFICATIONS ON 2-CYCLE LEAN BURN ENGINE[a]
(SCC 2-02-002-52)

EMISSION FACTOR RATING: E (except as noted)

| | Baseline | | Increased Air/Fuel Ratio With Intercooling | |
|---|---|---|---|---|
| Pollutant | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) |
| $NO_x$ | 0.022 | 2.9 | 0.011 | 1.5 |
| CO | 2.07 E-03 | 0.28 | 3.31 E-03 | 0.46 |
| $CO_2$[b] | 0.77 | 109 | 0.77 | 109 |
| TOC | 0.017 | 2.2 | 0.019 | 2.6 |
| TNMOC | 0.011 | 1.6 | 0.013 | 1.8 |
| $CH_4$ | 5.07 E-03 | 0.68 | 5.51 E-03 | 0.75 |
| PM-10 | | | | |
| Total (front+back halves) | 3.53 E-04 | 0.046 | 3.97 E-04 | 0.055 |
| Solids (front half) | 2.16 E-04 | 0.029 | 2.87 E-04 | 0.038 |
| Condensables (back half) | 1.26 E-04 | 0.017 | 1.28 E-04 | 0.017 |

[a] Reference 10-14,17-19. Factors reflect a single data set and as such baseline emissions for this engine were slightly different from the uncontrolled emission factor for 2-cycle lean burn engines. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. TNMOC = total nonmethane organic compounds. PM-10 = particulate matter ≤ 10 micrometers (μm) aerodynamic diameter. (All particulate is assumed to be ≤ 1 μm aerodynamic diameter). SCC = Source Classification Code.

[b] EMISSION FACTOR RATING: A. Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$[lb/MMBtu] = (3.67)(%CON)(C/E), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0250 MMBtu/lb. $CO_2$ emissions are not affected by controls.

## Table 3.2-3. EMISSION FACTORS FOR CONTROLLED NATURAL GAS PRIME MOVERS: NONSELECTIVE CATALYTIC REDUCTION ON 4-CYCLE RICH BURN ENGINE[a]
(SCC 2-02-002-53)

EMISSION FACTOR RATING: E (except as noted)

| Pollutant | Inlet | | Outlet | |
|---|---|---|---|---|
| | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) |
| $NO_x$ | 0.017 | 1.8 | 5.51 E-03 | 0.58 |
| CO | 0.026 | 2.8 | 0.022 | 2.4 |
| $CO_2$[b] | 0.77 | 109 | 0.77 | 109 |
| TOC | 7.28 E-04 | 0.079 | 4.41 E-04 | 0.047 |
| $NH_3$ | 1.10 E-04 | 0.012 | 1.81 E-03 | 0.19 |
| C7 - C16 | 4.19 E-05 | 0.0042 | 9.04 E-06 | 0.0009 |
| C16+ | 3.75 E-05 | 0.004 | 1.32 E-06 | 0.0001 |
| PM solids (front half) | 6.61 E-06 | 0.0007 | 6.61 E-06 | 0.0007 |
| Benzene[c] | ND | 7.1 E-04 | ND | 1.1 E-04 |
| Toluene[c] | ND | 2.3 E-04 | ND | <2.3 E-05 |
| Xylenes[c] | ND | <5.9 E-05 | ND | <4.0 E-05 |
| Propylene | ND | <1.6 E-04 | ND | <1.6 E-04 |
| Naphthalene[c] | ND | <4.9 E-05 | ND | <4.9 E-05 |
| Formaldehyde[c] | ND | <1.6 E-03 | ND | <7.2 E-06 |
| Acetaldehyde[c] | ND | <6.1 E-05 | ND | <4.8 E-06 |
| Acrolein[c] | ND | <3.7 E-05 | ND | <9.6 E-06 |

Table 3.2-3 (cont.).

[a] References 8,10-13,15-18. Factors reflect very limited data and as such inlet emissions were slightly different from the uncontrolled emission factor for 4-cycle rich burn engines. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. ND = No data. SCC = Source Classification Code.

[b] EMISSION FACTOR RATING: A. Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$(lb/MMBtu) = (3.67)(%CON)(C/E), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0250 MMBtu/lb. $CO_2$ emissions are not affected by controls.

[c] Hazardous air pollutant listed in the *Clean Air Act*.

## Table 3.2-4. EMISSION FACTORS FOR CONTROLLED NATURAL GAS PRIME MOVERS: SELECTIVE CATALYTIC REDUCTION ON 4-CYCLE LEAN BURN ENGINE[a]

(SCC 2-02-002-54)

EMISSION FACTOR RATING: E (except as noted)

| Pollutant | Inlet | | Outlet | |
|---|---|---|---|---|
| | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) |
| $NO_x$ | 0.042 | 6.4 | 7.94 E-03 | 1.2 |
| CO | 2.65 E-03 | 0.38 | 2.43 E-03 | 0.37 |
| $CO_2$[b] | 0.77 | 109 | 0.77 | 109 |
| $NH_3$ | ND | ND | 5.95 E-04 | 0.091 |
| C7 - C16 | 1.54 E-05 | 0.0023 | 6.83 E-06 | 0.0013 |
| C16+ | 2.87 E-05 | 0.0044 | 5.29 E-06 | 0.0008 |

[a] References 10-13,16-19. Factors reflect very limited data and as such inlet emissions were slightly different from the uncontrolled emission factor for 4-cycle lean burn engines. To convert from lb/hp-hr to kg/kw-hr multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. ND = No data. SCC = Source Classification Code.

[b] EMISSION FACTOR RATING: A. Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$ [lb/MMBtu] = (3.67)(%CON)(C/E), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0250 MMBtu/lb. $CO_2$ emissions are not affected by controls.

## Table 3.2-5. EMISSION FACTORS FOR CONTROLLED NATURAL GAS PRIME MOVERS: CLEAN BURN AND PRECOMBUSTION CHAMBER ON 2-CYCLE LEAN BURN ENGINE[a]

(SCC 2-02-002-52)

EMISSION FACTOR RATING: C (except as noted)

| | Clean Burn | | Precombustion Chamber | |
|---|---|---|---|---|
| Pollutant | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) | Emission Factor (lb/hp-hr) | Emission Factor (lb/MMBtu) |
| $NO_x$ | 5.07 E-03 | 0.83 | 6.39 E-03 | 0.85 |
| CO | 2.43 E-03 | 0.30 | 5.29 E-03 | 0.67 |
| $CO_2$[b] | 0.77 | 109 | 0.77 | 109 |
| TOC | 5.51 E-03 | 0.77 | 0.014 | 1.8 |
| TNMOC | 2.65 E-04 | 0.15 | 1.94 E-03 | 0.25 |
| $CH_4$ | 5.29 E-03 | 0.62 | 0.012 | 1.5 |

[a] Reference 7,10-13,17-19. $CO_2$ emissions are not affected by controls. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. TNMOC = total nonmethane organic compounds. SCC = Source Classification Code.

[b] EMISSION FACTOR RATING: A. Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$ [lb/MMBtu] = (3.67)(%CON)(C/E), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), and E = energy content of fuel, 0.0250 MMBtu/lb.

## Table 3.2-6. NONCRITERIA EMISSION FACTORS FOR UNCONTROLLED NATURAL GAS 2-CYCLE LEAN BURN ENGINES

EMISSION FACTOR RATING: E

| Pollutant | Emission Factors (lb/hp-hr) |
|---|---|
| Formaldehyde[b] | 2.93 E-03 |
| Benzene[b] | 3.62 E-06 |
| Toluene[b] | 3.62 E-06 |
| Ethylbenzene[b] | 1.81 E-06 |
| Xylenes[b] | 5.43 E-06 |

[a] Reference 20. Source Classification Code 2-02-002-52. Ratings reflect very limited data and may not apply to specific facilities. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

### References For Section 3.2

1. *Standards Support And Environmental Impact Statement, Volume I: Proposed Standards Of Performance For Stationary Gas Turbines*, EPA-450/2-77-017a, September 1977.

2. *Engines, Turbines, And Compressors Directory*, American Gas Association, Catalog #XF0488.

3. *Standards Support And Environmental Impact Statement, Volume I: Stationary Internal Combustion Engines*, EPA-450/2-78-125a, U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, July 1979.

4. *Limiting Net Greenhouse Gas Emissions In The United States, Volume II: Energy Responses*, Report for the Office of Environmental Analysis, Office of Policy, Planning and Analysis, Department of Energy (DOE), DOE/PE-0101 Volume II, September 1991.

5. C. Castaldini, *Evaluation Of Water Injection Impacts For Gas Turbine $NO_x$ Control At Compressor Stations*, prepared by Acurex Corp. for the Gas Research Institute, GRI-90/0138, July 1990.

6. N. L. Martin and R. H. Thring, *Computer Database Of Emissions Data For Stationary Reciprocating Natural Gas Engines And Gas Turbines In Use By The Gas Pipeline Transmission Industry Users Manual (Electronic Database Included)*, GRI-89/0041, Gas Research Institute, Chicago, IL, February 1989.

7. R. E. Fanick, *et al.*, *Emissions Data For Stationary Reciprocating Engines And Gas Turbines In Use By The Gas Pipeline Transmission Industry — Phases I & II*, Project PR-15-613, Pipeline Research Committee, American Gas Association, Arlington, VA, April 1988.

8. C. Castaldini, *$NO_x$ Reduction Technologies For Natural Gas Industry Prime Movers*, GRI-90/0215, Gas Research Institute, Chicago, IL, August 1990.

9. C. Urban, *Compilation Of Emissions Data For Stationary Reciprocating Gas Engines And Gas Turbines In Use By American Gas Association Member Companies*, prepared by Southwest Research Institute Pipeline Research Committee of the American Gas Association, Project PR-15-86, May 1980.

10. G. Marland and R. M. Rotty, *Carbon Dioxide Emissions From Fossil Fuels: A Procedure For Estimation And Results For 1951-1981*, DOE/NBB-0036 TR-003, Carbon Dioxide Research Division, Office of Energy Research, U. S. Department of Energy, Oak Ridge, TN, 1983.

11. G. Marland and R. M. Rotty, *Carbon Dioxide Emissions From Fossil Fuels: A Procedure For Estimation And Results For 1950-1982*, Tellus 36B:232-261, 1984.

12. *Inventory Of U. S. Greenhouse Gas Emissions And Sinks: 1990-1991*, EPA-230-R-96-006, U. S. Environmental Protection Agency, Washington, DC, November 1995.

13. *IPCC Guidelines For National Greenhouse Gas Inventories Workbook*, Intergovernmental Panel on Climate Change/Organization for Economic Cooperation and Development, Paris, France, 1995.

14. C. Castaldini, *Environmental Assessment Of $NO_x$ Control On A Spark-ignited Large Bore Reciprocating Internal Combustion Engine*, EPA-600/7-86-002A, U. S. Environmental Protection Agency, Cincinnati, OH, January 6, 1986.

15. C. Castaldini and L. R. Waterland, *Environmental Assessment Of A Reciprocating Engine Retrofitted With Nonselective Catalytic Reduction*, EPA-600/7-84-073B, U. S. Environmental Protection Agency, Cincinnati, OH, June 1984.

16. *Air Pollution Source Testing For California AB2588 On An Oil Platform Operated By Chevron USA, Inc. Platform Hope, California*, Chevron USA, Inc., Ventura, CA, August 29, 1990.

17. *Air Pollution Source Testing For California AB2588 Of Engines At The Chevron USA, Inc. Carpinteria Facility*, Chevron USA, Inc., Ventura, CA, August 30, 1990.

18. *Pooled Source Emission Test Report: Gas Fired IC Engines In Santa Barbara County*, ARCO, Bakersfield, CA, July 1990.

19. C. Castaldini and L. R. Waterland, *Environmental Assessment Of A Reciprocating Engine Retrofitted With Selective Catalytic Reduction*, EPA Contract No. 68-02-3188, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 1984.

20. *Engines, Turbines, And Compressors Directory*, Catalog #XF0488, American Gas Association, Arlington, VA, 1985.

## 3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

### 3.4.1 General

The primary domestic use of large stationary diesel engines (greater than 600 horsepower [hp]) is in oil and gas exploration and production. These engines, in groups of 3 to 5, supply mechanical power to operate drilling (rotary table), mud pumping, and hoisting equipment, and may also operate pumps or auxiliary power generators. Another frequent application of large stationary diesels is electricity generation for both base and standby service. Smaller uses include irrigation, hoisting, and nuclear power plant emergency cooling water pump operation.

Dual-fuel engines were developed to obtain compression ignition performance and the economy of natural gas, using a minimum of 5 to 6 percent diesel fuel to ignite the natural gas. Large dual-fuel engines have been used almost exclusively for prime electric power generation. This section includes all dual-fuel engines.

### 3.4.2 Process Description

All reciprocating internal combustion (IC) engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 ignition methods used in stationary reciprocating IC engines, compression ignition (CI) and spark ignition (SI). In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder. Although all diesel- fueled engines are compression ignited and all gasoline- and gas-fueled engines are spark ignited, gas can be used in a CI engine if a small amount of diesel fuel is injected into the compressed gas/air mixture to burn any mixture ratio of gas and diesel oil (hence the name dual fuel), from 6 to 100 percent diesel oil.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

### 3.4.3 Emissions And Controls

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the atmosphere from the exhaust. Crankcase blowby is minor because TOCs are not present during compression of the charge. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels. In general, evaporative losses are also negligible in engines using gaseous fuels because these engines receive their fuel continuously from a pipe rather than via a fuel storage tank and fuel pump.

The primary pollutants from internal combustion engines are oxides of nitrogen ($NO_x$), hydrocarbons and other organic compounds, carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. The other pollutants, HC, CO, and smoke, are primarily the result of incomplete combustion. Ash and metallic additives in the fuel also contribute to the particulate content of the exhaust. Sulfur oxides also appear in the exhaust from IC engines. The sulfur compounds, mainly sulfur dioxide ($SO_2$), are directly related to the sulfur content of the fuel.[2]

### 3.4.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The predominant mechanism with internal combustion engines is thermal $NO_x$ which arises from the thermal dissociation and subsequent reaction of nitrogen ($N_2$) and oxygen ($O_2$) molecules in the combustion air. Most thermal $NO_x$ is formed in the high-temperature region of the flame from dissociated molecular nitrogen in the combustion air. Some $NO_x$, called prompt $NO_x$, is formed in the early part of the flame from reaction of nitrogen intermediary species, and HC radicals in the flame. The second mechanism, fuel $NO_x$, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Gasoline, and most distillate oils, have no chemically-bound fuel $N_2$ and essentially all $NO_x$ formed is thermal $NO_x$.

### 3.4.3.2 Total Organic Compounds -

The pollutants commonly classified as hydrocarbons are composed of a wide variety of organic compounds and are discharged into the atmosphere when some of the fuel remains unburned or is only partially burned during the combustion process. Most unburned hydrocarbon emissions result from fuel droplets that were transported or injected into the quench layer during combustion. This is the region immediately adjacent to the combustion chamber surfaces, where heat transfer outward through the cylinder walls causes the mixture temperatures to be too low to support combustion.

Partially burned hydrocarbons can occur because of poor air and fuel homogeneity due to incomplete mixing, before or during combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; excessively large fuel droplets (diesel engines); and low cylinder temperature due to excessive cooling (quenching) through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.[2]

### 3.4.3.3 Carbon Monoxide -

Carbon monoxide is a colorless, odorless, relatively inert gas formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to $CO_2$ cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the cylinder is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.[2-3]

### 3.4.3.4 Smoke, Particulate Matter, and PM-10 -

White, blue, and black smoke may be emitted from IC engines. Liquid particulates appear as white smoke in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines. The primary constituent of black smoke is agglomerated carbon particles (soot).[2]

### 3.4.3.5 Sulfur Oxides -

Sulfur oxide emissions are a function of only the sulfur content in the fuel rather than any combustion variables. In fact, during the combustion process, essentially all the sulfur in the fuel is oxidized to $SO_2$. The oxidation of $SO_2$ gives sulfur trioxide ($SO_3$), which reacts with water to give sulfuric acid ($H_2SO_4$), a contributor to acid precipitation. Sulfuric acid reacts with basic substances to give sulfates, which are fine particulates that contribute to PM-10 and visibility reduction. Sulfur oxide emissions also contribute to corrosion of the engine parts.[2,3]

Table 3.4-1 contains gaseous emission factors for the pollutants discussed above, expressed in units of pounds per horsepower-hour (lb/hp-hr), and pounds per million British thermal unit (lb/MMBtu). Table 3.4-2 shows the particulate and particle-sizing emission factors. Table 3.4-3 shows the speciated organic compound emission factors and Table 3.4-4 shows the emission factors for polycyclic aromatic hydrocarbons (PAH). These tables do not provide a complete speciated organic compound and PAH listing because they are based only on a single engine test; they are to be used only for rough order of magnitude comparisons.

Table 3.4-5 shows the $NO_x$ reduction and fuel consumption penalties for diesel and dual-fueled engines based on some of the available control techniques. The emission reductions shown are those that have been demonstrated. The effectiveness of controls on a particular engine will depend on the specific design of each engine, and the effectiveness of each technique could vary considerably. Other $NO_x$ control techniques exist but are not included in Table 3.4-5. These techniques include internal/external exhaust gas recirculation, combustion chamber modification, manifold air cooling, and turbocharging.

## 3.4.4 Control Technologies

Control measures to date are primarily directed at limiting $NO_x$ and CO emissions since they are the primary pollutants from these engines. From a $NO_x$ control viewpoint, the most important distinction between different engine models and types of reciprocating engines is whether they are rich-burn or lean-burn. Rich-burn engines have an air-to-fuel ratio operating range that is near stoichiometric or fuel-rich of stoichiometric and as a result the exhaust gas has little or no excess oxygen. A lean-burn engine has an air-to-fuel operating range that is fuel-lean of stoichiometric; therefore, the exhaust from these engines is characterized by medium to high levels of $O_2$. The most common $NO_x$ control technique for diesel and dual fuel engines focuses on modifying the combustion process. However, selective catalytic reduction (SCR) and nonselective catalytic reduction (NSCR) which are post-combustion techniques are becoming available. Control for CO have been partly adapted from mobile sources.[5]

Combustion modifications include injection timing retard (ITR), preignition chamber combustion (PCC), air-to-fuel ratio, and derating. Injection of fuel into the cylinder of a CI engine initiates the combustion process. Retarding the timing of the diesel fuel injection causes the combustion process to occur later in the power stroke when the piston is in the downward motion and combustion chamber volume is increasing. By increasing the volume, the combustion temperature and pressure are lowered, thereby lowering $NO_x$ formation. ITR reduces $NO_x$ from all diesel engines; however, the effectiveness is specific to each engine model. The amount of $NO_x$ reduction with ITR diminishes with increasing levels of retard.[5]

Improved swirl patterns promote thorough air and fuel mixing and may include a precombustion chamber (PCC). A PCC is an antechamber that ignites a fuel-rich mixture that propagates to the main combustion chamber. The high exit velocity from the PCC results in improved mixing and complete combustion of the lean air/fuel mixture which lowers combustion temperature, thereby reducing $NO_x$ emissions.[5]

The air-to-fuel ratio for each cylinder can be adjusted by controlling the amount of fuel that enters each cylinder. At air-to-fuel ratios less than stoichiometric (fuel-rich), combustion occurs under conditions of insufficient oxygen which causes $NO_x$ to decrease because of lower oxygen and lower temperatures. Derating involves restricting engine operation to lower than normal levels of power production for the given application. Derating reduces cylinder pressures and temperatures thereby lowering $NO_x$ formation rates.[5]

SCR is an add-on $NO_x$ control placed in the exhaust stream following the engine and involves injecting ammonia ($NH_3$) into the flue gas. The $NH_3$ reacts with the $NO_x$ in the presence of a catalyst to form water and nitrogen. The effectiveness of SCR depends on fuel quality and engine duty cycle (load fluctuations). Contaminants in the fuel may poison or mask the catalyst surface causing a reduction or termination in catalyst activity. Load fluctuations can cause variations in exhaust temperature and $NO_x$ concentration which can create problems with the effectiveness of the SCR system.[5]

NSCR is often referred to as a three-way conversion catalyst system because the catalyst reactor simultaneously reduces $NO_x$, CO, and HC and involves placing a catalyst in the exhaust stream of the engine. The reaction requires that the $O_2$ levels be kept low and that the engine be operated at fuel-rich air-to-fuel ratios.[5]

### 3.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the memoranda describing each supplement or the background report for this section. These and other documents can be found on the CHIEF electronic bulletin board (919-541-5742), or on the new EFIG home page (http://www.epa.gov/oar/oaqps/efig/).

Supplement A, February 1996

No changes.

Supplement B, October 1996

- The general text was updated.
- Controlled $NO_x$ factors and PM factors were added for diesel units.
- Math errors were corrected in factors for CO from diesel units and for uncontrolled $NO_x$ from dual fueled units.

## Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES[a]

| Pollutant | Diesel Fuel (SCC 2-02-004-01) | | | Dual Fuel[b] (SCC 2-02-004-02) | | |
|---|---|---|---|---|---|---|
| | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) | EMISSION FACTOR RATING | Emission Factor (lb/hp-hr) (power output) | Emission Factor (lb/MMBtu) (fuel input) | EMISSION FACTOR RATING |
| $NO_x$ | | | | | | |
| Uncontrolled | 0.024 | 3.2 | B | 0.018 | 2.7 | D |
| Controlled | 0.013[c] | 1.9[c] | B | ND | ND | NA |
| CO | 5.5 E-03 | 0.85 | C | 7.5 E-03 | 1.16 | D |
| $SO_x$[d] | 8.09 E-03$S_1$ | 1.01$S_1$ | B | 4.06 E-04$S_1$ + 9.57 E-03$S_2$ | 0.05$S_1$ + 0.895$S_2$ | B |
| $CO_2$[e] | 1.16 | 165 | B | 0.772 | 110 | B |
| PM | 0.0007[c] | 0.1[c] | B | ND | ND | NA |
| TOC (as $CH_4$) | 7.05 E-04 | 0.09 | C | 5.29 E-03 | 0.8 | D |
| Methane | f | f | E | 3.97 E-03 | 0.6 | E |
| Nonmethane | f | f | E | 1.32 E-03 | 0.2[g] | E |

[a] Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

[b] Dual fuel assumes 95% natural gas and 5% diesel fuel.

[c] References 8-26. Controlled $NO_x$ is by ignition timing retard.

[d] Assumes that all sulfur in the fuel is converted to $SO_2$. $S_1$ = % sulfur in fuel oil; $S_2$ = % sulfur in natural gas. For example, if sulfer content is 1.5%, then S = 1.5.

[e] Assumes 100% conversion of carbon in fuel to $CO_2$ with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

[f] Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

[g] Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

## Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

| Pollutant | Emission Factor (lb/MMBtu) (fuel input) |
|---|---|
| Filterable particulate[b] | |
| < 1 μm | 0.0478 |
| < 3 μm | 0.0479 |
| < 10 μm | 0.0496 |
| Total filterable particulate | 0.0620 |
| Condensable particulate | 0.0077 |
| Total PM-10[c] | 0.0573 |
| Total particulate[d] | 0.0697 |

[a] Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter ≤ 10 micrometers (μm) aerometric diameter.

[b] Particle size is expressed as aerodynamic diameter.

[c] Total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate.

[d] Total particulate is the sum of the total filterable particulate and condensable particulate.

## Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

| Pollutant | Emission Factor (lb/MMBtu) (fuel input) |
|---|---|
| Benzene[b] | 7.76 E-04 |
| Toluene[b] | 2.81 E-04 |
| Xylenes[b] | 1.93 E-04 |
| Propylene | 2.79 E-03 |
| Formaldehyde[b] | 7.89 E-05 |
| Acetaldehyde[b] | 2.52 E-05 |
| Acrolein[b] | 7.88 E-06 |

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

## Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

| PAH | Emission Factor (lb/MMBtu) (fuel input) |
|---|---|
| Naphthalene[b] | 1.30 E-04 |
| Acenaphthylene | 9.23 E-06 |
| Acenaphthene | 4.68 E-06 |
| Fluorene | 1.28 E-05 |
| Phenanthrene | 4.08 E-05 |
| Anthracene | 1.23 E-06 |
| Fluoranthene | 4.03 E-06 |
| Pyrene | 3.71 E-06 |
| Benz(a)anthracene | 6.22 E-07 |
| Chrysene | 1.53 E-06 |
| Benzo(b)fluoranthene | 1.11 E-06 |
| Benzo(k)fluoranthene | <2.18 E-07 |
| Benzo(a)pyrene | <2.57 E-07 |
| Indeno(1,2,3-cd)pyrene | <4.14 E-07 |
| Dibenz(a,h)anthracene | <3.46 E-07 |
| Benzo(g,h,l)perylene | <5.56 E-07 |
| TOTAL PAH | <2.12 E-04 |

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

[b] Hazardous air pollutant listed in the *Clean Air Act*.

### Table 3.4-5. $NO_x$ REDUCTION AND FUEL CONSUMPTION PENALTIES FOR LARGE STATIONARY DIESEL AND DUAL-FUEL ENGINES[a]

| Control Approach | | Diesel (SCC 2-02-004-01) | | Dual Fuel (SCC 2-02-004-02) | |
|---|---|---|---|---|---|
| | | $NO_x$ Reduction (%) | ΔBSFC[b] (%) | $NO_x$ Reduction (%) | ΔBSFC (%) |
| Derate | 10% | ND | ND | <20 | 4 |
| | 20% | <20 | 4 | ND | ND |
| | 25% | 5 - 23 | 1 - 5 | 1 - 33 | 1 - 7 |
| Retard | 2° | <20 | 4 | <20 | 3 |
| | 4° | <40 | 4 | <40 | 1 |
| | 8° | 28 - 45 | 2 - 8 | 50 - 73 | 3 - 5 |
| Air-to-fuel | 3% | ND | ND | <20 | 0 |
| | ±10% | 7 - 8 | 3 | 25 - 40 | 1 - 3 |
| Water injection ($H_2O$/fuel ratio) | 50% | 25 - 35 | 2 - 4 | ND | ND |
| SCR | | 80 - 95 | 0 | 80 - 95 | 0 |

[a] References 1,27-28. The reductions shown are typical and will vary depending on the engine and duty cycle. SCC = Source Classification Code. ΔBSFC = change in brake-specific fuel consumption. ND = no data.

References For Section 3.4

1. H. I. Lips, *et al.*, *Environmental Assessment Of Combustion Modification Controls For Stationary Internal Combustion Engines,* EPA-600/7-81-127, U. S. Environmental Protection Agency, Cincinnati, OH, July 1981.

2. *Standards Support And Environmental Impact Statement, Volume I: Stationary Internal Combustion Engines*, EPA-450/2-78-125a, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1979.

3. M. Hoggan, et. al., *Air Quality Trends in California's South Coast and Southeast Desert Air Basins, 1976-1990,* "Air Quality Management Plan, Appendix II-B", South Coast Air Quality Management District, July 1991.

4. *Limiting Net Greenhouse Gas Emissions In the United States, Volume II: Energy Responses,* report for the Office of Environmental Analysis, Office of Policy, Planning and Analysis, Department of Energy (DDE), DOE/PE-0101 Volume II, September 1991.

5. Snyder, R. B., *Alternative Control Techniques Document—*$NO_x$ *Emissions from Stationary Reciprocating Internal Combustion Engines*, EPA-453/R-93-032, U. S. Environmental Protection Agency, Research Triangle Park, July 1993.

6. C. Castaldini, *Environmental Assessment Of* $NO_x$ *Control On A Compression Ignition Large Bore Reciprocating Internal Combustion Engine, Volume I: Technical Results,* EPA-600/7-86/001a, U. S. Environmental Protection Agency, Cincinnati, OH, April 1984.

7. *Pooled Source Emission Test Report: Oil And Gas Production Combustion Sources, Fresno And Ventura Counties, California*, ENSR # 7230-007-700, Western States Petroleum Association, Bakersfield, CA, December 1990.

8. *Final Report For An Emission Compliance Test Program On Two Standby Generators Located At American Car Company*, Greenwich, CT, York Services Corp., 1987.

9. *Final Report For An Emission Compliance Test Program On A Standby Diesel Generator At South Central Connecticut Regional Water Authority*, West Haven, CT, York Services Corp., 1988.

10. *Air Emission From Stationary Diesel Engines For The Alaska Rural Electric Cooperative Association*, Environmetrics, 1992.

11. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator,* St. Mary's Hospital, Waterburg, CT, TRC Environmental Consultants, 1987.

12. *Compliance Measured Particulate Emissions From An Emergency Diesel Generator, Silorsky Aircraft, United Technologies*, Stratford, CT, TRC Environmental Consultants, 1987.

13. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, Colonial Gold Limited Partnership, Hartford, CT, TRC Environmental Consultants, 1988.

14. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, CIGNA Insurance Company, Bloomfield, CT, TRC Environmental Consultants, 1988.

15. *Compliance Test Report For Particulate Emission From A Waukesha Diesel Generator*, Bristol Meyers, Wallinsford, CT, TRC Environmental Consultants, 1987.

16. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, Connecticut General Life Insurance, Windsor, CT, TRC Environmental Consultants, 1987.

17. *Compliance Measured Particulate Emissions From An Emergency Diesel Generator*, Danbury Hospital, Danbury, CT, TRC Environmental Consultants, 1988.

18. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator*, Colonial Metro Limited Partnership, Hartford, CT, TRC Environmental Consultants, 1988.

19. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator*, Boehringer -Ingelheim Pharmaceuticals, Danbury, CT, TRC Environmental Consultants, 1988.

20. *Compliance Test Report For Emissions Of Particulate From An Emergency Diesel Generator*, Meriden - Wallingford Hospital, Meriden, CT, TRC Environmental Consultants, 1987.

21. *Compliance Test Report Johnson Memorial Hospital Emergency Generator Exhaust Stack*, Stafford Springs, CT, ROJAC Environmental Services, 1987.

22. *Compliance Test Report Union Carbide Corporation Generator Exhaust Stack*, Danbury, CT, ROJAC Environmental Services, 1988.

23. *Compliance Test Report Hartford Insurance Company Emergency Generator Exhaust Stack*, Bloomfield, CT, ROJAC Environmental Services, 1987.

24. *Compliance Test Report Hartford Insurance Group Emergency Generator Exhaust Stack*, Hartford, CT, ROJAC Environmental Services, 1987.

25. *Compliance Test Report Southern New England Telephone Company Emergency Generator Exhaust Stack*, North Haven, CT, ROJAC Environmental Services, 1988.

26. *Compliance Test Report Pfizer, Inc. Two Emergency Generator Exhaust Stacks*, Groton, CT, ROJAC Environmental Services, 1987.

27. L. M. Campbell, *et al.*, *Sourcebook: $NO_x$ Control Technology Data, Control Technology Center*, EPA-600/2-91-029, U. S. Environmental Protection Agency, Cincinnati, OH, July 1991.

28. *Catalysts For Air Pollution Control*, Manufacturers Of Emission Controls Association (MECA), Washington, DC, March 1992.

## 5.3 Natural Gas Processing

### 5.3.1 General[1]

Natural gas from high-pressure wells is usually passed through field separators at the well to remove hydrocarbon condensate and water. Natural gasoline, butane, and propane are usually present in the gas, and gas processing plants are required for the recovery of these liquefiable constituents (see Figure 5.3-1). Natural gas is considered "sour" if hydrogen sulfide ($H_2S$) is present in amounts greater than 5.7 milligrams per normal cubic meters (mg/$\underline{N}$m$^3$) (0.25 grains per 100 standard cubic feet [gr/100 scf]). The $H_2S$ must be removed (called "sweetening" the gas) before the gas can be utilized. If $H_2S$ is present, the gas is usually sweetened by absorption of the $H_2S$ in an amine solution. Amine processes are used for over 95 percent of all gas sweetening in the United States. Other methods, such as carbonate processes, solid bed absorbents, and physical absorption, are employed in the other sweetening plants. Emission data for sweetening processes other than amine types are very meager, but a material balance on sulfur will give accurate estimates for sulfur dioxide ($SO_2$).

The major emission sources in the natural gas processing industry are compressor engines, acid gas wastes, fugitive emissions from leaking process equipment and if present, glycol dehydrator vent streams. Compressor engine emissions are discussed in Section 3.3.2. Fugitive leak emissions are detailed in *Protocol For Equipment Leak Emission Estimates*, EPA-453/R-95-017, November 1995. Regeneration of the glycol solutions used for dehydrating natural gas can release significant quantities of benzene, toluene, ethylbenzene, and xylene, as well as a wide range of less toxic organics. These emissions can be estimated by a thermodynamic software model (*GRI-GLYCalc*$^{TM}$) available from the Gas Research Institute. Only the $SO_2$ emissions from gas sweetening operations are discussed here.

### 5.3.2 Process Description[2-3]

Many chemical processes are available for sweetening natural gas. At present, the amine process (also known as the Girdler process), is the most widely used method for $H_2S$ removal. The process is summarized in reaction 1 and illustrated in Figure 5.3-2.

$$2\ RNH_2 + H_2S \rightarrow (RNH_3)_2S \qquad (1)$$

where:

R = mono, di, or tri-ethanol
N = nitrogen
H = hydrogen
S = sulfur

The recovered hydrogen sulfide gas stream may be: (1) vented, (2) flared in waste gas flares or modern smokeless flares, (3) incinerated, or (4) utilized for the production of elemental sulfur or sulfuric acid. If the recovered $H_2S$ gas stream is not to be utilized as a feedstock for commercial applications, the gas is usually passed to a tail gas incinerator in which the $H_2S$ is oxidized to $SO_2$ and is then passed to the atmosphere out a stack. For more details, the reader should consult Reference 8.

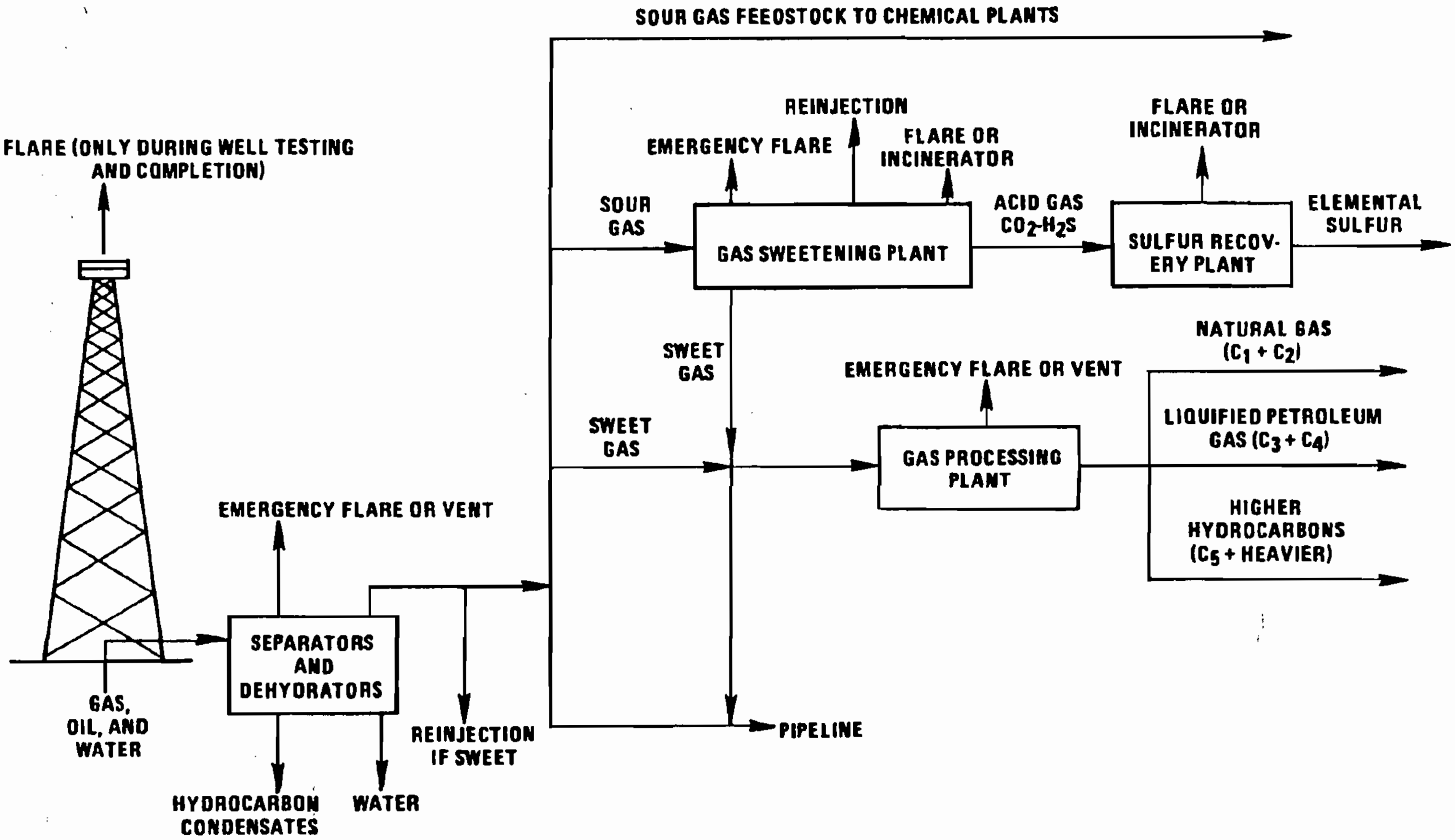


Figure 5.3-1. General flow diagram of the natural gas industry.

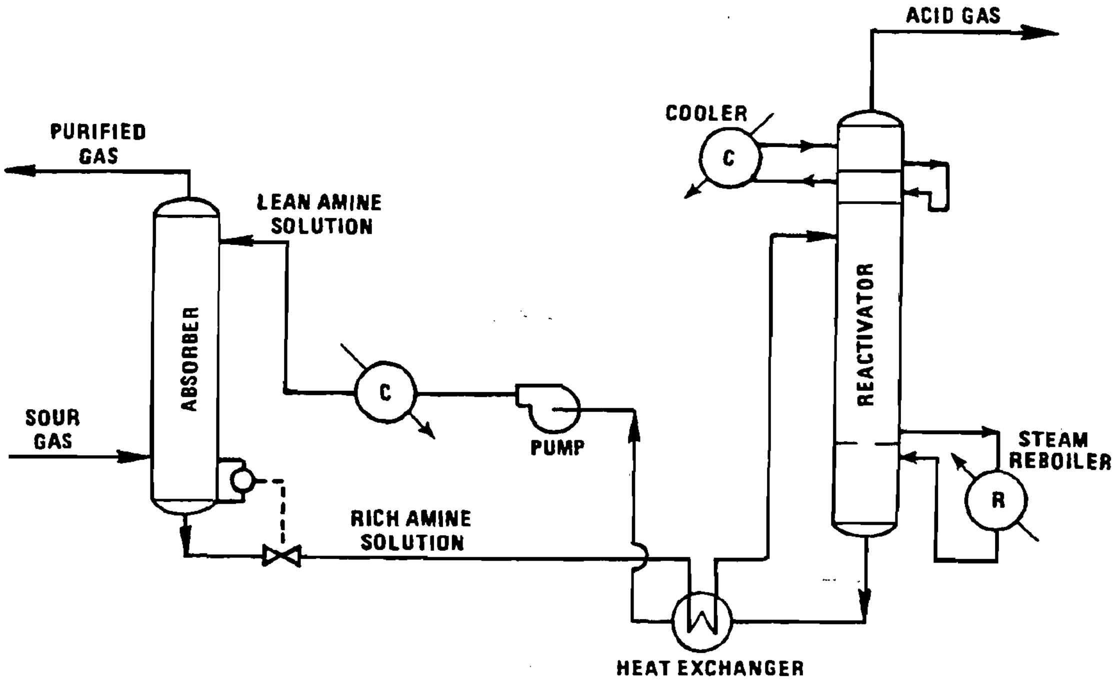


Figure 5.3-2. Flow diagram of the amine process for gas sweetening.

## 5.3.3 Emissions[4-5]

Emissions will result from gas sweetening plants only if the acid waste gas from the amine process is flared or incinerated. Most often, the acid waste gas is used as a feedstock in nearby sulfur recovery or sulfuric acid plants. See Sections 8.13 "Sulfur Recovery", or 8.10, "Sulfuric Acid", respectively, for these associated processes.

When flaring or incineration is practiced, the major pollutant of concern is $SO_2$. Most plants employ elevated smokeless flares or tail gas incinerators for complete combustion of all waste gas constituents, including virtually 100 percent conversion of $H_2S$ to $SO_2$. Little particulate, smoke, or hydrocarbons result from these devices, and because gas temperatures do not usually exceed 650°C (1200°F), significant quantities of nitrogen oxides are not formed. Emission factors for gas sweetening plants with smokeless flares or incinerators are presented in Table 5.3-1. Factors are expressed in units of kilograms per 1000 cubic meters (kg/$10^3$ $m^3$) and pounds per million standard cubic feet (lb/$10^6$ scf).

Some plants still use older, less-efficient waste gas flares. Because these flares usually burn at temperatures lower than necessary for complete combustion, larger emissions of hydrocarbons and particulate, as well as $H_2S$, can occur. No data are available to estimate the magnitude of these emissions from waste gas flares.

## Table 5.3.1 (Metric And English Units). EMISSION FACTORS FOR GAS SWEETENING PLANTS[a]

EMISSION FACTOR RATING: SULFUR OXIDES: A
ALL OTHERS: C

| Process[b] | Particulate | Sulfur Oxides[c] ($SO_2$) | Carbon Monoxide | Hydrocarbons | Nitrogen Oxides |
|---|---|---|---|---|---|
| Amine | | | | | |
| kg/$10^3$ $m^3$ gas processed | Neg | 26.98 S[d] | Neg | —[e] | Neg |
| lb/$10^6$ scf gas processed | Neg | 1685 S[d] | Neg | —[e] | Neg |

[a] Factors are presented only for smokeless flares and tail gas incinerators on the amine gas sweetening process with no sulfur recovery or sulfuric acid production present. Too little information exists to characterize emissions from older, less-efficient waste gas flares on the amine process or from other, less common gas sweetening processes. Factors for various internal combustion engines used in a gas processing plant are given in Section 3.3, "Gasoline and Diesel Industrial Engines". Factors for sulfuric acid plants and sulfur recovery plants are given in Section 8.10, "Sulfuric Acid", and Section 8.13, "Sulfur Recovery", respectively.
Neg = negligible.

[b] References 2,4-7. Factors are for emissions after smokeless flares (with fuel gas and steam injection) or tail gas incinerators.

[c] Assumes that 100% of the $H_2S$ in the acid gas stream is converted to $SO_2$ during flaring or incineration and that the sweetening process removes 100% of the $H_2S$ in the feedstock.

[d] S is the $H_2S$ content of the sour gas entering the gas sweetening plant, in mole or volume percent. For example, if the $H_2S$ content is 2%, the emission factor would be 26.98 times 2, or 54.0 kg/1000 $m^3$ (3370 lb/$10^6$ scf) of sour gas processed. If the $H_2S$ mole % is unknown, average values from Table 5.3-2 may be substituted. Note: If $H_2S$ contents are reported in ppm or grains (gr) per 100 scf, use the following factors to convert to mole %:

10,000 ppm $H_2S$ = 1 mole % $H_2S$
627 gr $H_2S$/100 scf = 1 mole % $H_2S$

The $m^3$ or scf are to be measured at 60°F and 760 mm Hg for this application (1 lb-mol = 379.5 scf).

[e] Flare or incinerator stack gases are expected to have negligible hydrocarbon emissions. To estimate fugitive hydrocarbon emissions from leaking compressor seals, valves, and flanges, see *"Protocol For Equipment Leak Emission Estimates"*, EPA-453/R-95-017, November 1995 (or updates).

## Table 5.3-2. AVERAGE HYDROGEN SULFIDE CONCENTRATIONS IN NATURAL GAS BY AIR QUALITY CONTROL REGION[a]

| State | AQCR Name | AQCR Number | Average $H_2S$, mole % |
|---|---|---|---|
| Alabama | Mobile-Pensacola-Panama City-Southern Mississippi (FL, MS) | 5 | 3.30 |
| Arizona | Four Corners (CO, NM, UT) | 14 | 0.71 |
| Arkansas | Monroe-El Dorado (LA) | 19 | 0.15 |
| | Shreveport-Texarkana-Tyler (LA, OK, TX) | 22 | 0.55 |
| California | Metropolitan Los Angeles | 24 | 2.09 |
| | San Joaquin Valley | 31 | 0.89 |
| | South Central Coast | 32 | 3.66 |
| | Southeast Desert | 33 | 1.0 |
| Colorado | Four Corners (AZ, NM, UT) | 14 | 0.71 |
| | Metropolitan Denver | 36 | 0.1 |
| | Pawnee | 37 | 0.49 |
| | San Isabel | 38 | 0.3 |
| | Yampa | 40 | 0.31 |
| Florida | Mobile-Pensacola-Panama City-Southern Mississippi (AL, MS) | 5 | 3.30 |
| Kansas | Northwest Kansas | 97 | 0.005 |
| | Southwest Kansas | 100 | 0.02 |
| Louisiana | Monroe-El Dorado (AR) | 19 | 0.15 |
| | Shreveport-Texarkana-Tyler (AR, OK, TX) | 22 | 0.55 |
| Michigan | Upper Michigan | 126 | 0.5 |
| Mississippi | Mississippi Delta | 134 | 0.68 |
| | Mobile-Pensacola-Panama City-Southern Mississippi (AL, FL) | 5 | 3.30 |
| Montana | Great Falls | 141 | 3.93 |
| | Miles City | 143 | 0.4 |
| New Mexico | Four Corners (AZ, CO, UT) | 14 | 0.71 |
| | Pecos-Permian Basin | 155 | 0.83 |
| North Dakota | North Dakota | 172 | 1.74[b] |

6. *Control Techniques For Hydrocarbon And Organic Solvent Emissions From Stationary Sources*, AP-68, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1970.

7. *Control Techniques For Nitrogen Oxides From Stationary Sources*, AP-67, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1970.

8. B. J. Mullins, *et al.*, *Atmospheric Emissions Survey Of The Sour Gas Processing Industry*, EPA-450/3-75-076, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1975.

9. *Federal Air Quality Control Regions*, AP-102, U. S. Environmental Protection Agency, Research Triangle Park, NC, January 1972.

Table 5.3-2 (cont.).

| State | AQCR Name | AQCR Number | Average $H_2S$, mole % |
|---|---|---|---|
| Oklahoma | Northwestern Oklahoma | 187 | 1.1 |
| | Shreveport-Texarkana-Tyler (AR, LA, TX) | 22 | 0.55 |
| | Southeastern Oklahoma | 188 | 0.3 |
| Texas | Abilene-Wichita Falls | 210 | 0.055 |
| | Amarillo-Lubbock | 211 | 0.26 |
| | Austin-Waco | 212 | 0.57 |
| | Corpus Christi-Victoria | 214 | 0.59 |
| | Metropolitan Dallas-Fort Worth | 215 | 2.54 |
| | Metropolitan San Antonio | 217 | 1.41 |
| | Midland-Odessa-San Angelo | 218 | 0.63 |
| | Shreveport-Texarkana-Tyler (AR, LA, OK) | 22 | 0.55 |
| Utah | Four Corners (AZ, CO, NM) | 14 | 0.71 |
| Wyoming | Casper | 241 | 1.262 |
| | Wyoming (except Park, Bighorn, and Washakie Counties) | 243 | 2.34[c] |

[a] Reference 9. AQCR = Air Quality Control Region.

[b] Sour gas only reported for Burke, Williams, and McKenzie Counties, ND.

[c] Park, Bighorn, and Washakie Counties, WY, report gas with an average $H_2S$ content of 23 mole %.

## References For Section 5.3

1. D. K. Katz, *et al.*, *Handbook Of Natural Gas Engineering*, McGraw-Hill Book Company, New York, 1959.

2. R. R. Maddox, *Gas And Liquid Sweetening*, 2nd Ed. Campbell Petroleum Series, Norman, OK, 1974.

3. R. E. Kirk and D. F. Othmer (eds.), *Encyclopedia Of Chemical Technology*. Vol. 7, Interscience Encyclopedia, Inc., New York, NY, 1951.

4. *Sulfur Compound Emissions Of The Petroleum Production Industry*, EPA-650/2-75-030. U. S. Environmental Protection Agency, Cincinnati, OH, 1974.

5. Unpublished stack test data for gas sweetening plants, Ecology Audits, Inc., Dallas, TX, 1974.

## 13.2.4 Aggregate Handling And Storage Piles

### 13.2.4.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, such as material loading onto the pile, disturbances by strong wind currents, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

### 13.2.4.2 Emissions And Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Emissions also depend on 3 parameters of the condition of a particular storage pile: age of the pile, moisture content, and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, the potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents, either from aggregate transfer itself or from high winds. As the aggregate pile weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and then the drying process is very slow.

Silt (particles equal to or less than 75 micrometers [$\mu$m] in diameter) content is determined by measuring the portion of dry aggregate material that passes through a 200-mesh screen, using ASTM-C-136 method.[1] Table 13.2.4-1 summarizes measured silt and moisture values for industrial aggregate materials.

### 13.2.4.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

Table 13.2.4-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

| Industry | No. Of Facilities | Material | Silt Content (%) | | | Moisture Content (%) | | |
|---|---|---|---|---|---|---|---|---|
| | | | No. Of Samples | Range | Mean | No. Of Samples | Range | Mean |
| Iron and steel production | 9 | Pellet ore | 13 | 1.3 - 13 | 4.3 | 11 | 0.64 - 4.0 | 2.2 |
| | | Lump ore | 9 | 2.8 - 19 | 9.5 | 6 | 1.6 - 8.0 | 5.4 |
| | | Coal | 12 | 2.0 - 7.7 | 4.6 | 11 | 2.8 - 11 | 4.8 |
| | | Slag | 3 | 3.0 - 7.3 | 5.3 | 3 | 0.25 - 2.0 | 0.92 |
| | | Flue dust | 3 | 2.7 - 23 | 13 | 1 | — | 7 |
| | | Coke breeze | 2 | 4.4 - 5.4 | 4.9 | 2 | 6.4 - 9.2 | 7.8 |
| | | Blended ore | 1 | — | 15 | 1 | — | 6.6 |
| | | Sinter | 1 | — | 0.7 | 0 | — | — |
| | | Limestone | 3 | 0.4 - 2.3 | 1.0 | 2 | ND | 0.2 |
| Stone quarrying and processing | 2 | Crushed limestone | 2 | 1.3 - 1.9 | 1.6 | 2 | 0.3 - 1.1 | 0.7 |
| | | Various limestone products | 8 | 0.8 - 14 | 3.9 | 8 | 0.46 - 5.0 | 2.1 |
| Taconite mining and processing | 1 | Pellets | 9 | 2.2 - 5.4 | 3.4 | 7 | 0.05 - 2.0 | 0.9 |
| | | Tailings | 2 | ND | 11 | 1 | — | 0.4 |
| Western surface coal mining | 4 | Coal | 15 | 3.4 - 16 | 6.2 | 7 | 2.8 - 20 | 6.9 |
| | | Overburden | 15 | 3.8 - 15 | 7.5 | 0 | — | — |
| | | Exposed ground | 3 | 5.1 - 21 | 15 | 3 | 0.8 - 6.4 | 3.4 |
| Coal-fired power plant | 1 | Coal (as received) | 60 | 0.6 - 4.8 | 2.2 | 59 | 2.7 - 7.4 | 4.5 |
| Municipal solid waste landfills | 4 | Sand | 1 | — | 2.6 | 1 | — | 7.4 |
| | | Slag | 2 | 3.0 - 4.7 | 3.8 | 2 | 2.3 - 4.9 | 3.6 |
| | | Cover | 5 | 5.0 - 16 | 9.0 | 5 | 8.9 - 16 | 12 |
| | | Clay/dirt mix | 1 | — | 9.2 | 1 | — | 14 |
| | | Clay | 2 | 4.5 - 7.4 | 6.0 | 2 | 8.9 - 11 | 10 |
| | | Fly ash | 4 | 78 - 81 | 80 | 4 | 26 - 29 | 27 |
| | | Misc. fill materials | 1 | — | 12 | 1 | — | 11 |

[a] References 1-10. ND = no data.

The quantity of particulate emissions generated by either type of drop operation, per kilogram (kg) (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

$$E = k(0.0016) \frac{\left[\frac{U}{2.2}\right]^{1.3}}{\left[\frac{M}{2}\right]^{1.4}} \text{ (kg/megagram [Mg])}$$

$$E = k(0.0032) \frac{\left[\frac{U}{5}\right]^{1.3}}{\left[\frac{M}{2}\right]^{1.4}} \text{ (pound [lb]/ton)} \quad (1)$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

| Aerodynamic Particle Size Multiplier (k) For Equation 1 | | | | |
|---|---|---|---|---|
| < 30 μm | < 15 μm | < 10 μm | < 5 μm | < 2.5 μm |
| 0.74 | 0.48 | 0.35 | 0.20 | 0.11 |

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the 2 was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced 1 quality rating level if the silt content used in a particular application falls outside the range given:

| Ranges Of Source Conditions For Equation 1 | | | |
|---|---|---|---|
| Silt Content (%) | Moisture Content (%) | Wind Speed | |
| | | m/s | mph |
| 0.44 - 19 | 0.25 - 4.8 | 0.6 - 6.7 | 1.3 - 15 |

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site-specific values for correction parameters cannot be obtained, the appropriate mean from Table 13.2.4-1 may be used, but the quality rating of the equation is reduced by 1 letter.

For emissions from equipment traffic (trucks, front-end loaders, dozers, etc.) traveling between or on piles, it is recommended that the equations for vehicle traffic on unpaved surfaces be used (see Section 13.2.2). For vehicle travel between storage piles, the silt value(s) for the areas among the piles (which may differ from the silt values for the stored materials) should be used.

Worst-case emissions from storage pile areas occur under dry, windy conditions. Worst-case emissions from materials-handling operations may be calculated by substituting into the equation appropriate values for aggregate material moisture content and for anticipated wind speeds during the worst case averaging period, usually 24 hours. The treatment of dry conditions for Section 13.2.2, vehicle traffic, "Unpaved Roads", follows the methodology described in that section centering on parameter p. A separate set of nonclimatic correction parameters and source extent values corresponding to higher than normal storage pile activity also may be justified for the worst-case averaging period.

### 13.2.4.4 Controls[12-13]

Watering and the use of chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent.[12]

### References For Section 13.2.4

1. C. Cowherd, Jr., *et al.*, *Development Of Emission Factors For Fugitive Dust Sources*, EPA-450/3-74-037, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

2. R. Bohn, *et al.*, *Fugitive Emissions From Integrated Iron And Steel Plants*, EPA-600/2-78-050, U. S. Environmental Protection Agency, Cincinnati, OH, March 1978.

3. C. Cowherd, Jr., *et al.*, *Iron And Steel Plant Open Dust Source Fugitive Emission Evaluation*, EPA-600/2-79-103, U. S. Environmental Protection Agency, Cincinnati, OH, May 1979.

4. *Evaluation Of Open Dust Sources In The Vicinity Of Buffalo, New York*, EPA Contract No. 68-02-2545, Midwest Research Institute, Kansas City, MO, March 1979.

5. C. Cowherd, Jr., and T. Cuscino, Jr., *Fugitive Emissions Evaluation*, MRI-4343-L, Midwest Research Institute, Kansas City, MO, February 1977.

6. T. Cuscino, Jr., *et al.*, *Taconite Mining Fugitive Emissions Study*, Minnesota Pollution Control Agency, Roseville, MN, June 1979.

7. *Improved Emission Factors For Fugitive Dust From Western Surface Coal Mining Sources*, 2 Volumes, EPA Contract No. 68-03-2924, PEDCo Environmental, Kansas City, MO, and Midwest Research Institute, Kansas City, MO, July 1981.

8. *Determination Of Fugitive Coal Dust Emissions From Rotary Railcar Dumping*, TRC, Hartford, CT, May 1984.

9. *PM-10 Emission Inventory Of Landfills In the Lake Calumet Area*, EPA Contract No. 68-02-3891, Midwest Research Institute, Kansas City, MO, September 1987.

10. *Chicago Area Particulate Matter Emission Inventory — Sampling And Analysis*, EPA Contract No. 68-02-4395, Midwest Research Institute, Kansas City, MO, May 1988.

11. *Update Of Fugitive Dust Emission Factors In AP-42 Section 11.2*, EPA Contract No. 68-02-3891, Midwest Research Institute, Kansas City, MO, July 1987.

12. G. A. Jutze, *et al.*, *Investigation Of Fugitive Dust Sources Emissions And Control*, EPA-450/3-74-036a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

13. C. Cowherd, Jr., *et al.*, *Control Of Open Fugitive Dust Sources*, EPA-450/3-88-008, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1988.

## 13.5 Industrial Flares

### 13.5.1 General

Flaring is a high-temperature oxidation process used to burn combustible components, mostly hydrocarbons, of waste gases from industrial operations. Natural gas, propane, ethylene, propylene, butadiene and butane constitute over 95 percent of the waste gases flared. In combustion, gaseous hydrocarbons react with atmospheric oxygen to form carbon dioxide ($CO_2$) and water. In some waste gases, carbon monoxide (CO) is the major combustible component. Presented below, as an example, is the combustion reaction of propane.

$$C_3H_8 + 5\ O_2 \longrightarrow 3\ CO_2 + 4\ H_2O$$

During a combustion reaction, several intermediate products are formed, and eventually, most are converted to $CO_2$ and water. Some quantities of stable intermediate products such as carbon monoxide, hydrogen, and hydrocarbons will escape as emissions.

Flares are used extensively to dispose of (1) purged and wasted products from refineries, (2) unrecoverable gases emerging with oil from oil wells, (3) vented gases from blast furnaces, (4) unused gases from coke ovens, and (5) gaseous wastes from chemical industries. Gases flared from refineries, petroleum production, chemical industries, and to some extent, from coke ovens, are composed largely of low molecular weight hydrocarbons with high heating value. Blast furnace flare gases are largely of inert species and CO, with low heating value. Flares are also used for burning waste gases generated by sewage digesters, coal gasification, rocket engine testing, nuclear power plants with sodium/water heat exchangers, heavy water plants, and ammonia fertilizer plants.

There are two types of flares, elevated and ground flares. Elevated flares, the more common type, have larger capacities than ground flares. In elevated flares, a waste gas stream is fed through a stack anywhere from 10 to over 100 meters tall and is combusted at the tip of the stack. The flame is exposed to atmospheric disturbances such as wind and precipitation. In ground flares, combustion takes place at ground level. Ground flares vary in complexity, and they may consist either of conventional flare burners discharging horizontally with no enclosures or of multiple burners in refractory-lined steel enclosures.

The typical flare system consists of (1) a gas collection header and piping for collecting gases from processing units, (2) a knockout drum (disentrainment drum) to remove and store condensables and entrained liquids, (3) a proprietary seal, water seal, or purge gas supply to prevent flash-back, (4) a single- or multiple-burner unit and a flare stack, (5) gas pilots and an ignitor to ignite the mixture of waste gas and air, and, if required, (6) a provision for external momentum force (steam injection or forced air) for smokeless flaring. Natural gas, fuel gas, inert gas, or nitrogen can be used as purge gas. Figure 13.5-1 is a diagram of a typical steam-assisted elevated smokeless flare system.

Complete combustion requires sufficient combustion air and proper mixing of air and waste gas. Smoking may result from combustion, depending upon waste gas components and the quantity and distribution of combustion air. Waste gases containing methane, hydrogen, CO, and ammonia usually burn without smoke. Waste gases containing heavy hydrocarbons such as paraffins above methane, olefins, and aromatics, cause smoke. An external momentum force, such as steam injection

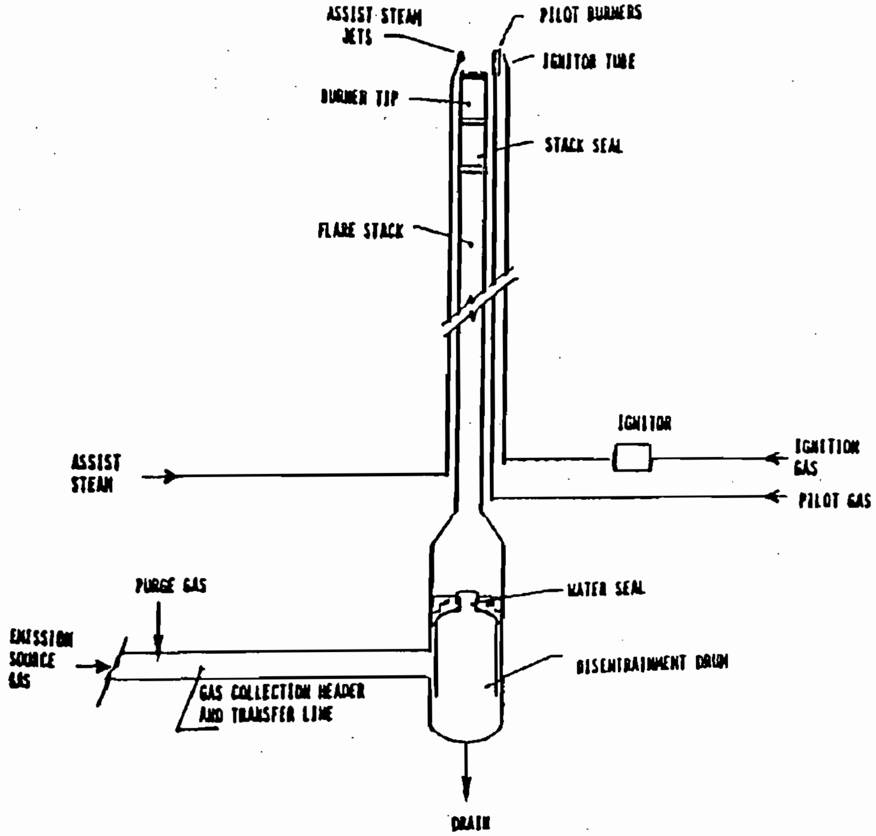


Figure 13.5-1. Diagram of a typical steam-assisted smokeless elevated flare.

or blowing air, is used for efficient air/waste gas mixing and turbulence, which promotes smokeless flaring of heavy hydrocarbon waste gas. Other external forces may be used for this purpose, including water spray, high velocity vortex action, or natural gas. External momentum force is rarely required in ground flares.

Steam injection is accomplished either by nozzles on an external ring around the top of the flare tip or by a single nozzle located concentrically within the tip. At installations where waste gas flow varies, both are used. The internal nozzle provides steam at low waste gas flow rates, and the external jets are used with large waste gas flow rates. Several other special-purpose flare tips are commercially available, one of which is for injecting both steam and air. Typical steam usage ratio varies from 7:1 to 2:1, by weight.

Waste gases to be flared must have a fuel value of at least 7500 to 9300 kilojoules per cubic meter $kJ/m^3$ (200 to 250 British thermal units per cubic foot [$Btu/ft^3$]) for complete combustion; otherwise fuel must be added. Flares providing supplemental fuel to waste gas are known as fired, or endothermic, flares. In some cases, even flaring waste gases having the necessary heat content will also require supplemental heat. If fuel-bound nitrogen is present, flaring ammonia with a heating value of 13,600 $kJ/m^3$ (365 $Btu/ft^3$) will require higher heat to minimize nitrogen oxides ($NO_x$) formation.

At many locations, flares normally used to dispose of low-volume continuous emissions are designed to handle large quantities of waste gases that may be intermittently generated during plant emergencies. Flare gas volumes can vary from a few cubic meters per hour during regular operations

Table 13.5-2. HYDROCARBON COMPOSITION OF FLARE EMISSION[a]

| Composition | Volume % | |
|---|---|---|
| | Average | Range |
| Methane | 55 | 14 - 83 |
| Ethane/Ethylene | 8 | 1 - 14 |
| Acetylene | 5 | 0.3 - 23 |
| Propane | 7 | 0 - 16 |
| Propylene | 25 | 1 - 65 |

[a] Reference 1. The composition presented is an average of a number of test results obtained under the following sets of test conditions: steam-assisted flare using high-Btu-content feed; steam-assisted using low-Btu-content feed; air-assisted flare using high-Btu-content feed; and air-assisted flare using low-Btu-content feed. In all tests, "waste" gas was a synthetic gas consisting of a mixture of propylene and propane.

## References For Section 13.5

1. *Flare Efficiency Study*, EPA-600/2-83-052, U. S. Environmental Protection Agency, Cincinnati, OH, July 1983.

2. K. D. Siegel, *Degree Of Conversion Of Flare Gas In Refinery High Flares*, Dissertation, University of Karlsruhe, Karlsruhe, Germany, February 1980.

3. *Manual On Disposal Of Refinery Wastes, Volume On Atmospheric Emissions*, API Publication 931, American Petroleum Institute, Washington, DC, June 1977.

up to several thousand cubic meters per hour during major upsets. Flow rates at a refinery could be from 45 to 90 kilograms per hour (kg/hr) (100 - 200 pounds per hour [lb/hr]) for relief valve leakage but could reach a full plant emergency rate of 700 megagrams per hour (Mg/hr) (750 tons/hr). Normal process blowdowns may release 450 to 900 kg/hr (1000 - 2000 lb/hr), and unit maintenance or minor failures may release 25 to 35 Mg/hr (27 - 39 tons/hr). A 40 molecular weight gas typically of 0.012 cubic nanometers per second ($nm^3/s$) (25 standard cubic feet per minute [scfm]) may rise to as high as 115 $nm^3/s$ (241,000 scfm). The required flare turndown ratio for this typical case is over 15,000 to 1.

Many flare systems have 2 flares, in parallel or in series. In the former, 1 flare can be shut down for maintenance while the other serves the system. In systems of flares in series, 1 flare, usually a low-level ground flare, is intended to handle regular gas volumes, and the other, an elevated flare, to handle excess gas flows from emergencies.

## 13.5.2 Emissions

Noise and heat are the most apparent undesirable effects of flare operation. Flares are usually located away from populated areas or are sufficiently isolated, thus minimizing their effects on populations.

Emissions from flaring include carbon particles (soot), unburned hydrocarbons, CO, and other partially burned and altered hydrocarbons. Also emitted are $NO_x$ and, if sulfur-containing material such as hydrogen sulfide or mercaptans is flared, sulfur dioxide ($SO_2$). The quantities of hydrocarbon emissions generated relate to the degree of combustion. The degree of combustion depends largely on the rate and extent of fuel-air mixing and on the flame temperatures achieved and maintained. Properly operated flares achieve at least 98 percent combustion efficiency in the flare plume, meaning that hydrocarbon and CO emmissions amount to less than 2 percent of hydrocarbons in the gas stream.

The tendency of a fuel to smoke or make soot is influenced by fuel characteristics and by the amount and distribution of oxygen in the combustion zone. For complete combustion, at least the stoichiometric amount of oxygen must be provided in the combustion zone. The theoretical amount of oxygen required increases with the molecular weight of the gas burned. The oxygen supplied as air ranges from 9.6 units of air per unit of methane to 38.3 units of air per unit of pentane, by volume. Air is supplied to the flame as primary air and secondary air. Primary air is mixed with the gas before combustion, whereas secondary air is drawn into the flame. For smokeless combustion, sufficient primary air must be supplied, this varying from about 20 percent of stoichiometric air for a paraffin to about 30 percent for an olefin. If the amount of primary air is insufficient, the gases entering the base of the flame are preheated by the combustion zone, and larger hydrocarbon molecules crack to form hydrogen, unsaturated hydrocarbons, and carbon. The carbon particles may escape further combustion and cool down to form soot or smoke. Olefins and other unsaturated hydrocarbons may polymerize to form larger molecules which crack, in turn forming more carbon.

The fuel characteristics influencing soot formation include the carbon-to-hydrogen (C-to-H) ratio and the molecular structure of the gases to be burned. All hydrocarbons above methane, i. e., those with a C-to-H ratio of greater than 0.33, tend to soot. Branched chain paraffins smoke more readily than corresponding normal isomers. The more highly branched the paraffin, the greater the tendency to smoke. Unsaturated hydrocarbons tend more toward soot formation than do saturated ones. Soot is eliminated by adding steam or air; hence, most industrial flares are steam-assisted and some are air-assisted. Flare gas composition is a critical factor in determining the amount of steam necessary.

Since flares do not lend themselves to conventional emission testing techniques, only a few attempts have been made to characterize flare emissions. Recent EPA tests using propylene as flare gas indicated that efficiencies of 98 percent can be achieved when burning an offgas with at least 11,200 $kJ/m^3$ (300 $Btu/ft^3$). The tests conducted on steam-assisted flares at velocities as low as 39.6 meters per minute (m/min) (130 ft/min) to 1140 m/min (3750 ft/min), and on air-assisted flares at velocities of 180 m/min (617 ft/min) to 3960 m/min (13,087 ft/min) indicated that variations in incoming gas flow rates have no effect on the combustion efficiency. Flare gases with less than 16,770 $kJ/m^3$ (450 $Btu/ft^3$) do not smoke.

Table 13.5-1 presents flare emission factors, and Table 13.5-2 presents emission composition data obtained from the EPA tests.[1] Crude propylene was used as flare gas during the tests. Methane was a major fraction of hydrocarbons in the flare emissions, and acetylene was the dominant intermediate hydrocarbon species. Many other reports on flares indicate that acetylene is always formed as a stable intermediate product. The acetylene formed in the combustion reactions may react further with hydrocarbon radicals to form polyacetylenes followed by polycyclic hydrocarbons.[2]

In flaring waste gases containing no nitrogen compounds, NO is formed either by the fixation of atmospheric nitrogen (N) with oxygen (O) or by the reaction between the hydrocarbon radicals present in the combustion products and atmospheric nitrogen, by way of the intermediate stages, HCN, CN, and OCN.[2] Sulfur compounds contained in a flare gas stream are converted to $SO_2$ when burned. The amount of $SO_2$ emitted depends directly on the quantity of sulfur in the flared gases.

Table 13.5-1 (English Units). EMISSION FACTORS FOR FLARE OPERATIONS[a]

EMISSION FACTOR RATING: B

| Component | Emission Factor ($lb/10^6$ Btu) |
|---|---|
| Total hydrocarbons[b] | 0.14 |
| Carbon monoxide | 0.37 |
| Nitrogen oxides | 0.068 |
| Soot[c] | 0 - 274 |

[a] Reference 1. Based on tests using crude propylene containing 80% propylene and 20% propane.

[b] Measured as methane equivalent.

[c] Soot in concentration values: nonsmoking flares, 0 micrograms per liter ($\mu$g/L); lightly smoking flares, 40 $\mu$g/L; average smoking flares, 177 $\mu$g/L; and heavily smoking flares, 274 $\mu$g/L.

United States
Environmental Protection
Agency

Office of Air and Radiation
(ANR-443)
Washington, DC 20460

November 1991

PB92-126960

Air

EPA

# Nonroad Engine and Vehicle Emission Study—Report

TABLE I-11 DERIVATION OF MARINE ENGINE EMISSION FACTORS

a.) 2-STROKE OUTBOARDS

| POWER CATEGORY | SURVEY DISTRIB. (N) | ASSUMED HP (HP) | POWER FACTOR (PF) | BSE (grams/hp-hr) HC | CO | NOx | N*HP*PF*BSE (g/hr) HC | CO | NOx | BSFC (gal/hp-hr) | N*HP*PF*BSFC (gal/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 HP & under | 0.07 | 4 | 0.2746 | 312.62 | 414.61 | 0.62 | 24.06 | 31.88 | 0.04 | 0.33 | 0.03 |
| 6-15 | 0.19 | 10.5 | 0.2746 | 196.96 | 306.97 | 0.92 | 109.01 | 169.26 | 0.50 | 0.24 | 0.13 |
| 16-35 | 0.14 | 25.5 | 0.2033 | 132.24 | 192.39 | 1.86 | 96.98 | 139.83 | 1.36 | 0.16 | 0.12 |
| 36-74 | 0.22 | 55 | 0.2818 | 115.33 | 186.67 | 1.99 | 393.27 | 636.52 | 6.78 | 0.17 | 0.58 |
| 75-149 | 0.29 | 112 | 0.1964 | 110.55 | 235.64 | 1.31 | 712.39 | 1518.48 | 8.47 | 0.15 | 0.97 |
| 150 & over | 0.09 | 215 | 0.1964 | 113.64 | 210.28 | 1.09 | 437.05 | 607.30 | 4.20 | 0.16 | 0.61 |
|  | 1 |  |  |  |  |  | 1771.74 | 3303.07 | 21.36 |  | 2.43 |

SUM(N*HP*PF*BSE)/SUM(N*HP*PF*BSFC)

|  | HC | CO | NOx |
|---|---|---|---|
| grams/gallon | 726.06 | 1357.34 | 8.77 |
| lbs/gallon | 1.61 | 2.99 | 0.02 |

b.) 4-STROKE OUTBOARDS

| POWER (HP) | BSE (g/kWh) HC | CO | NOx | BSE (g/hp-hr) HC | CO | NOx | FUEL BASED EF's (pounds/gal) HC | CO | NOx | FUEL BASED EF's (grams/gal) HC | CO | NOx | POWER FACTOR | HP*PF*BSE (grams/hr) HC | CO | NOx | BSFC | HP*PF*BSFC (gallons/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 16.5 | 291 | 4.4 | 14 | 217 | 3.3 | 0.22 | 3.47 | 0.052 | 99.790 | 1573.957 | 23.587 | 0.2033 | 28.046 | 441.158 | 6.670 | 0.138 | 0.281 |
| 35 | 14 | 241 | 10.2 | 10 | 180 | 7.6 | 0.199 | 3.43 | 0.145 | 90.264 | 1555.814 | 65.771 | 0.2033 | 74.284 | 1278.753 | 54.121 | 0.116 | 0.825 |
| 45 | 11.1 | 171 | 10.9 | 8 | 128 | 6.1 | 0.181 | 2.79 | 0.178 | 82.100 | 1265.518 | 80.739 | 0.2033 | 75.725 | 1166.568 | 74.360 | 0.101 | 0.924 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 178.055 | 2886.479 | 135.152 |  | 2.030 |

SUM(HP*PF*BSE)/SUM(HP*PF*BSFC)

|  | HC | CO | NOx |
|---|---|---|---|
| grams/gallon | 67.71 | 1421.95 | 66.58 |
| lbs/gallon | 0.19 | 3.13 | 0.15 |

BEST AVAILABLE COPY

| POWER | BSE |  |  | BSE |  |  | FUEL BASED EFs |  |  | FUEL BASED EFs |  |  | POWER | HP*PF*BSE |  |  | BSFC | HP*PF*BSF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | (g/kWh) |  |  | (g/hp-hr) |  |  | (pounds/gal) |  |  | (grams/gal) |  |  |  | (grams/hr) |  |  |  |  |
| (HP) | HC | CO | NOx | HC | CO | NOx | HC | CO | NOx | HC | CO | NOx | FACTOR | HC | CO | NOx |  | (gallons/hr) |
| 120 | 8.6 | 200 | 4.3 | 6 | 149 | 3.2 | 0.14 | 3.26 | 0.07 | 63.5026 | 1478.703 | 31.7513 | 0.2 | 153.91 | 3579.36 | 76.96 | 0.1 | 2.4 |
| 165 | 15.4 | 184 | 6.8 | 11 | 137 | 5.1 | 0.253 | 3.03 | 0.112 | 114.7583 | 1374.378 | 50.80208 | 0.2 | 378.96 | 4527.89 | 167.34 | 0.1 | 3.3 |
| 200 | 5.7 | 123 | 6.7 | 4 | 92 | 6.0 | 0.094 | 2.03 | 0.111 | 42.63746 | 920.7877 | 50.34849 | 0.2 | 170.02 | 3668.84 | 199.85 | 0.1 | 4 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 702.90 | 11776.09 | 444.14 |  | 9.7 |

SUM(HP*PF*BSE)/SUM(HP*PF*BSFC)

|  | HC | CO | NOx |
|---|---|---|---|
| grams/gallon | 72.46 | 1214.03 | 45.79 |
| lbs/gallon | 0.16 | 2.68 | 0.10 |

a.) DIESEL SAILBOAT AUXILLARY
LB/GALLON

|  | HC | CO | NOx |
|---|---|---|---|
| lb/gallon | 0.27 | 0.48 | 0.36 |
| g/gallon | 122.47 | 217.72 | 163.29 |

e.) DIESEL INBOARD

| POWER | BSE |  |  | BSE |  |  | HP*BSE |  |  | BSFC | HP*BSFC |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | (g/kWh) |  |  | (g/hp-hr) |  |  | (grams/hr) |  |  |  |  |
| (HP) | HC | CO | NOx | HC | CO | NOx | HC | CO | NOx |  | (gallons/hr) |
| 143 | 3 | 4.6 | 17.5 | 2 | 3 | 13.0 | 319.91 | 490.52 | 1866.11 | 0.066 | 9.438 |
| 177 | 1.1 | 1.4 | 12.2 | 1 | 1 | 9.1 | 145.19 | 184.78 | 1610.26 | 0.066 | 11.682 |
| 197 | 2.5 | 4 | 16.4 | 2 | 3 | 12.2 | 367.26 | 587.61 | 2409.21 | 0.066 | 13.002 |
|  |  |  |  |  |  |  | 832.35 | 1262.92 | 5885.59 |  | 34.122 |

SUM(HP*PF*BSE)/SUM(HP*PF*BSFC)

|  | HC | CO | NOx |
|---|---|---|---|
| grams/gallon | 24.39 | 37.01 | 172.49 |
| lbs/gallon | 0.05 | 0.08 | 0.38 |

## TABLE I-12 Emission Factors for Commercial Marine Vessels

### a.) AVERAGE EMISSION FACTORS
FOR
### OCEAN-GOING COMMERCIAL VESSELS

POUNDS OF POLLUTANT PER THOUSAND GALLONS OF FUEL CONSUMED

| | POLLUTANT | | | | |
|---|---|---|---|---|---|
| OPERATING PLANT<br>Operating Mode/Rated Output | NOx | HC | CO | SOx | PM |
| STEAM PROPULSION | | | | | |
| Full power | 63.6 | 1.72 | 7.27 | 159x(%S) | 56.5 |
| Maneuver/Cruise | 55.8 | 0.682 | 3.45 | 159x(%S) | 20 |
| Hotelling | | | | | |
| - Burning residual bunker fuel | 36.4 | 3.2 | * | 159x(%S) | 10 |
| - Burning distillate oil | 22.2 | 3 | 4 | 142x(%S) | 15 |
| MOTOR PROPULSION | | | | | |
| All underway operating modes | 550 | 24 | 61 | 157x(%S) | 33 |
| AUXILIARY DIESEL GENERATORS | | | | | |
| - 20 KW (50% Load) | 477 | 144 | 53.4 | 27 | 17 |
| - 40 KW (50% Load) | 226 | 285 | 67.6 | 27 | 17 |
| - 200 KW (50% Load) | 140 | 17.8 | 62.3 | 27 | 17 |
| - 500 KW (50% Load) | 293 | 81.9 | 48.1 | 27 | 17 |

Notes:
1. Emission factors showing an asterisk (*) are considered negligible for these operating modes.
2. Average sulfur concentrations used are 0.8 percent for marine diesel, and 2.0 percent for bunker fuel oil.

Sources:
1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 1985
2. U.S. Department of Transportation, Port Vessel Emissions Model, 1986
3. California Air Resources Board, Report to the California Legislature on Air Pollutant Emissions from Marine Vessels

BEST AVAILABLE COPY

TABLE I-12 (cont.)

## b.) AVERAGE EMISSION FACTORS FOR HARBOR AND FISHING VESSELS

| OPERATING PLANT<br>Operating Mode/Rated Output | POLLUTANT | | | | |
|---|---|---|---|---|---|
| | NOx | HC | CO | SOx | PM |
| | POUNDS PER THOUSAND GALLONS OF FUEL CONSUMED | | | | |
| DIESEL ENGINES | | | | | |
| < 500 Horsepower | | | | | |
| Full | 275.1 | 21 | 58.5 | 157x(%S) | 17 |
| Cruise | 389.3 | 51.1 | 47.3 | 157x(%S) | 17 |
| Slow | 337.5 | 56.7 | 59 | 157x(%S) | 17 |
| 500 - 1000 Horsepower | | | | | |
| Full | 300 | 24 | 61 | 157x(%S) | 17 |
| Cruise | 300 | 17.1 | 80.9 | 157x(%S) | 17 |
| Slow | 167.2 | 16.8 | 62.2 | 157x(%S) | 17 |
| 1000 - 1500 Horsepower | | | | | |
| Full | 300 | 24 | 61 | 157x(%S) | 17 |
| Cruise | 300 | 24 | 61 | 157x(%S) | 17 |
| Slow | 300 | 24 | 61 | 157x(%S) | 17 |
| 1500 - 2000 Horsepower | | | | | |
| Full | 472 | 16.8 | 237.7 | 157x(%S) | 17 |
| Cruise | 623.1 | 24 | 44.6 | 157x(%S) | 17 |
| Slow | 371.3 | 24 | 122.4 | 157x(%S) | 17 |
| 2000+ Horsepower | | | | | |
| Full | 399.6 | 21.3 | 95.9 | 157x(%S) | 17 |
| Cruise | 391.7 | 16.8 | 78.3 | 157x(%S) | 17 |
| Slow | 419.6 | 22.6 | 59.8 | 157x(%S) | 17 |
| | NOx | HC | CO | SOx | PM |
| GASOLINE ENGINES | GRAMS PER BRAKE HORSEPOWER HOUR | | | | |
| Exhaust Emissions - All HP Ratings | 5.16 | 6.68 | 199 | 0.268 | 0.327 |
| Evaporative Emissions | | 62.0 | grams/hr | | |
| Crankcase Blowby | | 38.3 | grams/hr | | |

Notes: 1. Average sulfur concentration for marine diesel fuel = 0.8 percent

Sources:
1. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 1985
2. U.S. Department of Transportation, Port Vessel Emissions Model, 1986
3. California Air Resources Board, Report to the California Legislature on Air Pollutant Emissions from Marine Vessels

## II-3 Inboard-Powered Vessels

II-3.1 General – Vessels classified on the basis of use will generally fall into one of three categories: commercial, pleasure, or military. Although usage and population data on vessels are, as a rule, relatively scarce, information on commercial and military vessels is more readily available than data on pleasure craft. Information on military vessels is available in several study reports,[1-5] but data on pleasure craft are limited to sales-related facts and figures.[6-10]

Commercial vessel population and usage data have been further subdivided by a number of industrial and governmental researchers into waterway classifications[11-16] (for example, Great Lakes vessels, river vessels, and coastal vessels). The vessels operating in each of these waterway classes have similar characteristics such as size, weight, speed, commodities transported, engine design (external or internal combustion), fuel used, and distance traveled. The wide variation between classes, however, necessitates the separate assessment of each of the waterway classes with respect to air pollution.

Information on military vessels is available from both the U.S. Navy and the U.S. Coast Guard as a result of studies completed recently. The U.S. Navy has released several reports that summarize its air pollution assessment work.[3-5] Emission data have been collected in addition to vessel population and usage information. Extensive study of the air pollutant emissions from U.S. Coast Guard watercraft has been completed by the U.S. Department of Transportation. The results of this study are summarized in two reports.[1-2] The first report takes an in-depth look at population/usage of Coast Guard vessels. The second report, dealing with emission test results, forms the basis for the emission factors presented in this section for Coast Guard vessels as well as for non-military diesel vessels.

Although a large portion of the pleasure craft in the U.S. are powered by gasoline outboard motors (see section II-4 of this document), there are numerous larger pleasure craft that use inboard power either with or without "out-drive" (an outboard-like lower unit). Vessels falling into the inboard pleasure craft category utilize either Otto cycle (gasoline) or diesel cycle internal combustion engines. Engine horsepower varies appreciably from the small "auxiliary" engine used in sailboats to the larger diesels used in yachts.

### II-3.2 Emissions

*Commercial vessels.* Commercial vessels may emit air pollutants under two major modes of operation: underway and at dockside (auxiliary power).

Emissions underway are influenced by a great variety of factors including power source (steam or diesel), engine size (in kilowatts or horsepower), fuel used (coal, residual oil, or diesel oil), and operating speed and load. Commercial vessels operating within or near the geographic boundaries of the United States fall into one of the three categories of use discussed above (Great Lakes, rivers, coastline). Tables II-3-1 and II-3-2 contain emission information on commercial vessels falling into these three categories. Table II-3-3 presents emission factors for diesel marine engines at various operating modes on the basis of horsepower. These data are applicable to any vessel having a similar size engine, not just to commercial vessels.

Unless a ship receives auxiliary steam from dockside facilities, goes immediately into drydock, or is out of operation after arrival in port, she continues her emissions at dockside. Power must be made available for the ship's lighting, heating, pumps, refrigeration, ventilation, etc. A few steam ships use auxiliary engines (diesel) to supply power, but they generally operate one or more main boilers under reduced draft and lowered fuel rates–a very inefficient process. Motorships (ships powered by internal combustion engines) normally use diesel-powered generators to furnish auxiliary power.[17] Emissions from these diesel-powered generators may also be a source of underway emissions if they are used away from port. Emissions from auxiliary power systems, in terms of the

## Table II-3-1. AVERAGE EMISSION FACTORS FOR COMMERCIAL MOTORSHIPS BY WATERWAY CLASSIFICATION

EMISSION FACTOR RATING: C

| Emissions[a] | Class[c] | | |
|---|---|---|---|
| | River | Great Lakes | Coastal |
| Sulfur oxides[b] ($SO_x$ as $SO_2$) | | | |
| kg/$10^3$ liter | 3.2 | 3.2 | 3.2 |
| lb/$10^3$ gal | 27 | 27 | 27 |
| Carbon monoxide | | | |
| kg/$10^3$ liter | 12 | 13 | 13 |
| lb/$10^3$ gal | 100 | 110 | 110 |
| Hydrocarbons | | | |
| kg/$10^3$ liter | 6.0 | 7.0 | 6.0 |
| lb/$10^3$ gal | 50 | 59 | 50 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | | | |
| kg/$10^3$ liter | 33 | 31 | 32 |
| lb/$10^3$ gal | 280 | 260 | 270 |

[a] Expressed as function of fuel consumed (based on emission data from Reference 2 and population/usage data from References 11 through 16.

[b] Calculated, not measured. Based on 0.20 percent sulfur content fuel and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

[c] Very approximate particulate emission factors from Reference 2 are 470 g/hr (1.04 lb/hr). The reference does not contain sufficient information to calculate fuel-based factors.

quantity of fuel consumed, are presented in Table II-3-4. In some instances, fuel quantities used may not be available, so calculation of emissions based on kilowatt hours (kWh) produced may be necessary. For operating loads in excess of zero percent, the mass emissions ($e_l$) in kilograms per hour (pounds per hour) are given by:

$$e_l = kle_f \tag{1}$$

where: k = a constant that relates fuel consumption to kilowatt hours.[2]

that is, $3.63 \times 10^{-4}$ 1000 liters fuel/kWh

or

$9.59 \times 10^{-5}$ 1000 gal fuel/kWh

l = the load, kW

$e_f$ = the fuel-specific emission factor from Table 3.2.3-4, kg/$10^3$ liter (lb/$10^3$ gal)

## Table II-3-2. EMISSION FACTORS FOR COMMERCIAL STEAMSHIPS–ALL GEOGRAPHIC AREAS
## EMISSION FACTOR RATING: D

| | Fuel and operating mode[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residual oil[b] | | | | | | Distillate oil[b] | | | | | |
| | Hoteling | | Cruise | | Full | | Hoteling | | Cruise | | Full | |
| Pollutant | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal |
| Particulates[c] | 1.20[d] | 10.0[d] | 2.40 | 20.0 | 6.78 | 56.5 | 1.8 | 15 | 1.78 | 15 | 1.78 | 15 |
| Sulfur oxides ($SO_x$ as $SO_2$)[e] | 19.1S | 159S | 19.1S | 159S | 19.1S | 159S | 17.0S | 142S | 17.0S | 142S | 17.0S | 142S |
| Carbon monoxide[c] | Neg[d] | Neg[d] | 0.414 | 3.45 | 0.872 | 7.27 | 0.5 | 4 | 0.5 | 4 | 0.5 | 4 |
| Hydrocarbons[c] | 0.38[d] | 3.2[d] | 0.082 | 0.682 | 0.206 | 1.72 | 0.4 | 3 | 0.4 | 3 | 0.4 | 3 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 4.37 | 36.4 | 6.70 | 55.8 | 7.63 | 63.6 | 2.66 | 22.2 | 2.83 | 23.6 | 5.34 | 44.5 |

[a] The operating modes are based on the percentage of maximum available power: "hoteling" is 10 to 11 percent of available power, "full" is 100 percent of available power, and "cruise" is an intermediate power (35 to 75 percent, depending on the test organization and vessel tested).

[b] Test organizations used "Navy Special" fuel oil, which is not a true residual oil. No vessel test data were available for residual oil combustion. "Residual" oil results are from References 2, 3, and 5. "Distillate" oil results are from References 3 and 5 only. Exceptions are noted. "Navy Distillate" was used as distillate test fuel.

[c] Particulate, carbon monoxide, and hydrocarbon emission factors for distillate oil combustion are based on stationary boilers (see Section 1.3 of this document).

[d] Reference 18 indicates that carbon monoxide emitted during hoteling is small enough to be considered negligible. This reference also places hydrocarbons at 0.38 kg/$10^3$ liter (3.2 lb/$10^3$ gal) and particulate at 1.20 kg/$10^3$ liter (10.0 lb/$10^3$ gal). These data are included for completeness only and are not necessarily comparable with other tabulated data.

[e] Emission factors listed are theoretical in that they are based on all the sulfur in the fuel converting to sulfur dioxide. Actual test data from References 3 and 5 confirm the validity of these theoretical factors. "S" is fuel sulfur content in percent.

## TableII-3-3. DIESEL VESSEL EMISSION FACTORS BY OPERATING MODE[a]
## EMISSION FACTOR RATING: C

| Horsepower | Mode | Emissions[b] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Carbon monoxide | | Hydrocarbons | | Nitrogen oxides ($NO_x$ as $NO_2$) | |
| | | $lb/10^3$ gal | $kg/10^3$ liter | $lb/10^3$ gal | $kg/10^3$ liter | $lb/10^3$ gal | $kg/10^3$ liter |
| 200 | Idle | 210.3 | 25.2 | 391.2 | 46.9 | 6.4 | 0.8 |
| | Slow | 145.4 | 17.4 | 103.2 | 12.4 | 207.8 | 25.0 |
| | Cruise | 126.3 | 15.1 | 170.2 | 20.4 | 422.9 | 50.7 |
| | Full | 142.1 | 17.0 | 60.0 | 7.2 | 255.0 | 30.6 |
| 300 | Slow | 59.0 | 7.1 | 56.7 | 6.8 | 337.5 | 40.4 |
| | Cruise | 47.3 | 5.7 | 51.1 | 6.1 | 389.3 | 46.7 |
| | Full | 58.5 | 7.0 | 21.0 | 2.5 | 275.1 | 33.0 |
| 500 | Idle | 282.5 | 33.8 | 118.1 | 14.1 | 99.4 | 11.9 |
| | Cruise | 99.7 | 11.9 | 44.5 | 5.3 | 338.6 | 40.6 |
| | Full | 84.2 | 10.1 | 22.8 | 2.7 | 269.2 | 32.3 |
| 600 | Idle | 171.7 | 20.6 | 68.0 | 8.2 | 307.1 | 36.8 |
| | Slow | 50.8 | 6.1 | 16.6 | 2.0 | 251.5 | 30.1 |
| | Cruise | 77.6 | 9.3 | 24.1 | 2.9 | 349.2 | 41.8 |
| 700 | Idle | 293.2 | 35.1 | 95.8 | 11.5 | 246.0 | 29.5 |
| | Cruise | 36.0 | 4.3 | 8.8 | 1.1 | 452.8 | 54.2 |
| 900 | Idle | 223.7 | 26.8 | 249.1 | 29.8 | 107.5 | 12.9 |
| | 2/3 | 62.2 | 7.5 | 16.8 | 2.0 | 167.2 | 20.0 |
| | Cruise | 80.9 | 9.7 | 17.1 | 2.1 | 360.0 | 43.1 |
| | | | | | | | |
| 1580 | Slow | 122.4 | 14.7 | — | — | 371.3 | 44.5 |
| | Cruise | 44.6 | 5.3 | — | — | 623.1 | 74.6 |
| | Full | 237.7 | 28.5 | 16.8 | 2.0 | 472.0 | 5.7 |
| 2500 | Slow | 59.8 | 7.2 | 22.6 | 2.7 | 419.6 | 50.3 |
| | 2/3 | 126.5 | 15.2 | 14.7 | 1.8 | 326.2 | 39.1 |
| | Cruise | 78.3 | 9.4 | 16.8 | 2.0 | 391.7 | 46.9 |
| | Full | 95.9 | 11.5 | 21.3 | 2.6 | 399.6 | 47.9 |
| 3600 | Slow | 148.5 | 17.8 | 60.0 | 7.2 | 367.0 | 44.0 |
| | 2/3 | 28.1 | 3.4 | 25.4 | 3.0 | 358.6 | 43.0 |
| | Cruise | 41.4 | 5.0 | 32.8 | 4.0 | 339.6 | 40.7 |
| | Full | 62.4 | 7.5 | 29.5 | 3.5 | 307.0 | 36.8 |

---

[a] Reference 2.
[b] Particulate and sulfur oxides data are not available.

Table II-3-4. AVERAGE EMISSION FACTORS FOR DIESEL-POWERED ELECTRICAL GENERATORS IN VESSELS[a]
EMISSION FACTOR RATING: C

| Rated output,[b] kW | Load,[c] % rated output | Emissions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Sulfur oxides ($SO_x$ as $SO_2$)[d] | | Carbon monoxide | | Hydrocarbons | | Nitrogen oxides ($NO_x$ as $NO_2$) | |
| | | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter |
| 20 | 0 | 27 | 3.2 | 150 | 18.0 | 263 | 31.5 | 434 | 52.0 |
| | 25 | 27 | 3.2 | 79.7 | 9.55 | 204 | 24.4 | 444 | 53.2 |
| | 50 | 27 | 3.2 | 53.4 | 6.40 | 144 | 17.3 | 477 | 57.2 |
| | 75 | 27 | 3.2 | 28.5 | 3.42 | 84.7 | 10.2 | 495 | 59.3 |
| 40 | 0 | 27 | 3.2 | 153 | 18.3 | 584 | 70.0 | 214 | 25.6 |
| | 25 | 27 | 3.2 | 89.0 | 10.7 | 370 | 44.3 | 219 | 26.2 |
| | 50 | 27 | 3.2 | 67.6 | 8.10 | 285 | 34.2 | 226 | 27.1 |
| | 75 | 27 | 3.2 | 64.1 | 7.68 | 231 | 27.7 | 233 | 27.9 |
| 200 | 0 | 27 | 3.2 | 134 | 16.1 | 135 | 16.2 | 142 | 17.0 |
| | 25 | 27 | 3.2 | 97.9 | 11.7 | 33.5 | 4.01 | 141 | 16.9 |
| | 50 | 27 | 3.2 | 62.3 | 7.47 | 17.8 | 2.13 | 140 | 16.8 |
| | 75 | 27 | 3.2 | 26.7 | 3.20 | 17.5 | 2.10 | 137 | 16.4 |
| 500 | 0 | 27 | 3.2 | 58.4 | 7.00 | 209 | 25.0 | 153 | 18.3 |
| | 25 | 27 | 3.2 | 53.4 | 6.40 | 109 | 13.0 | 222 | 26.6 |
| | 50 | 27 | 3.2 | 48.1 | 5.76 | 81.9 | 9.8 | 293 | 35.1 |
| | 75 | 27 | 3.2 | 43.7 | 5.24 | 59.1 | 7.08 | 364 | 43.6 |

[a] Reference 2.

[b] Maximum rated output of the diesel-powered generator.

[c] Generator electrical output (for example, a 20 kW generator at 50 percent load equals 10 kW output).

[d] Calculated, not measured, based on 0.20 percent fuel sulfur content and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

At zero load conditions, mass emission rates ($e_l$) may be approximated in terms of kg/hr (lb/hr) using the following relationship:

$$e_l = k l_{rated} e_f \qquad (2)$$

where: k = a constant that relates rated output and fuel consumption,

that is, $6.93 \times 10^{-5}$ 1000 liters fuel/kW

or

$1.83 \times 10^{-5}$ 1000 gal fuel/kW

$l_{rated}$ = the rated output, kW

$e_f$ = the fuel-specific emission factor from Table II-3-4, kg/$10^3$ liter (lb/$10^3$ gal)

*Pleasure craft.* Many of the engine designs used in inboard pleasure craft are also used either in military vessels (diesel) or in highway vehicles (gasoline). Out of a total of 700,000 inboard pleasure craft registered in the United States in 1972, nearly 300,000 were inboard/outdrive. According to sales data, 60 to 70 percent of these inboard/outdrive craft used gasoline-powered automotive engines rated at more than 130 horsepower.[6] The remaining 400,000 pleasure craft used conventional inboard drives that were powered by a variety of powerplants, both gasoline and diesel. Because emission data are not available for pleasure craft, Coast Guard and automotive data[2,19] are used to characterize emission factors for this class of vessels in Table II–3-5.

*Military vessels.* Military vessels are powered by a wide variety of both diesel and steam power plants. Many of the emission data used in this section are the result of emission testing programs conducted by the U.S. Navy and the U.S. Coast Guard.[1-3,5] A separate table containing data on military vessels is not provided here, but the included tables should be sufficient to calculate approximate military vessel emissions.

TABLE II–3.-5. AVERAGE EMISSION FACTORS FOR INBOARD PLEASURE CRAFT[a]

EMISSION FACTOR RATING: D

| | Based on fuel consumption | | | | Based on operating time | | | |
|---|---|---|---|---|---|---|---|---|
| | Diesel engine[b] | | Gasoline engine[c] | | | | | |
| | | | | | Diesel engine[b] | | Gasoline engine[c] | |
| Pollutant | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/hr | lb/hr | kg/hr | lb/hr |
| Sulfur oxides[d] ($SO_x$ as $SO_2$) | 3.2 | 27 | 0.77 | 6.4 | – | – | 0.008 | 0.019 |
| Carbon monoxide | 17 | 140 | 149 | 1240 | – | – | 1.69 | 3.73 |
| Hydrocarbons | 22 | 180 | 10.3 | 86 | – | – | 0.117 | 0.258 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 41 | 340 | 15.7 | 131 | – | – | 0.179 | 0.394 |

[a] Average emission factors are based on the duty cycle developed for large outboards (≥ 48 kilowatts or ≥ 65 horsepower) from Reference 7. The above factors take into account the impact of water scrubbing of underwater gasoline engine exhaust, also from Reference 7. All values given are for single engine craft and must be modified for multiple engine vessels.

[b] Based on tests of diesel engines in Coast Guard vessels, Reference 2.

[c] Based on tests of automotive engines, Reference 19. Fuel consumption of 11.4 liter/hr (3 gal/hr) assumed. The resulting factors are only *rough* estimates.

[d] Based on fuel sulfur content of 0.20 percent for diesel fuel and 0.043 percent for gasoline from References 7 and 17. Calculated using fuel density of 0.740 kg/liter (6.17 lb/gal) for gasoline and 0.854 kg/liter (7.12 lb/gal) for diesel fuel.

## References for Section II–3

1. Walter, R. A., A. J. Broderick, J. C. Sturm, and E. C. Klaubert. USCG Pollution Abatement Program: A Preliminary Study of Vessel and Boat Exhaust Emissions. U.S. Department of Transportation, Transportation Systems Center, Cambridge, Mass. Prepared for the United States Coast Guard, Washington, D.C. Report No. DOT-TSC-USCG-72-3. November 1971. 119 p.

2. Souza, A. F. A Study of Emissions from Coast Guard Cutters. Final Report. Scott Research Laboratories, Inc. Plumsteadville, Pa. Prepared for the Department of Transportation, Transportation Systems Center, Cambridge, Mass., under Contract No. DOT-TSC-429. February 1973.

3. Wallace, B. L. Evaluation of Developed Methodology for Shipboard Steam Generator Systems. Department of the Navy. Naval Ship Research and Development Center. Materials Department. Annapolis, Md. Report No. 28-463. March 1973. 18 p.

4. Waldron, A. L. Sampling of Emission Products from Ships' Boiler Stacks. Department of the Navy. Naval Ship Research and Development Center. Annapolis, Md. Report No. 28-169. April 1972. 7 p.

5. Foernsler, R. O. Naval Ship Systems Air Contamination Control and Environmental Data Base Programs; Progress Report. Department of the Navy. Naval Ship Research and Development Center. Annapolis, Md. Report No. 28-443. February 1973. 9 p.

6. The Boating Business 1972. The Boating Industry Magazine. Chicago, Ill. 1973.

7. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report Part 2. Outboard Motors. Southwest Research Institute. San Antonio, Tex. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. January 1973. 57 p.

8. Hurst, J. W. 1974 Chrysler Gasoline Marine Engines. Chrysler Corporation. Detroit, Mich.

9. Mercruiser Sterndrives/ Inboards 73. Mercury Marine, Division of the Brunswick Corporation. Fond du Lac, Wisc. 1972.

10. Boating 1972. Marex. Chicago, Illinois, and the National Association of Engine and Boat Manufacturers. Greenwich, Conn. 1972. 8 p.

11. Transportation Lines on the Great Lakes System 1970. Transportation Series 3. Corps of Engineers, United States Army, Waterborne Commerce Statistics Center. New Orleans, La. 1970. 26 p.

12. Transportation Lines on the Mississippi and the Gulf Intracoastal Waterway 1970. Transportation Series 4. Corps of Engineers, United States Army, Waterborne Commerce Statistics Center. New Orleans, La. 1970. 232 p.

13. Transportation Lines on the Atlantic, Gulf and Pacific Coasts 1970. Transportation Series 5. Corps of Engineers. United States Army. Waterborne Commerce Statistics Center. New Orleans, La. 1970. 201 p.

14. Schueneman. J. J. Some Aspects of Marine Air Pollution Problems on the Great Lakes. J. Air Pol. Control Assoc. *14*:23-29, September 1964.

15. 1971 Inland Waterborne Commerce Statistics. The American Waterways Operations, Inc. Washington, D.C. October 1972. 38 p.

16. Horsepower on the Inland Waterways. List No. 23. The Waterways Journal. St. Louis, Mo. 1972. 2 p.

17. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part 1. Locomotive Diesel Engines and Marine Counterparts. Southwest Research Institute. San Antonio, Tex. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. October 1972. 39 p.

18. Pearson. J. R. Ships as Sources of Emissions. Puget Sound Air Pollution Control Agency. Seattle, Wash. (Presented at the Annual Meeting of the Pacific Northwest International Section of the Air Pollution Control Association. Portland, Ore. November 1969.)

19. Study of Emissions from Light-Duty Vehicles in Six Cities. Automotive Environmental Systems, Inc. San Bernardino, Calif. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. 68-04-0042. June 1971.

## TABLE II-1-8 (CONCLUDED)

| Model-Series (Civil-Version) Mfg[h] Type[h] | Mode | Fuel Rate |  | CO |  | NO$_x$[b] |  | Total HC[c] |  | SO$_x$[d] |  | Particulates[e,f] |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| TF39-GE-1 (JT4A) GE TJ | Idle | 1130 | 513 | 75.7 | 34.3 | 3.4 | 1.5 | 26.0 | 11.8 | 1.1 | 0.5 | 0.3[g] | 0.1 |
|  | Takeoff | 11410 | 5176 | 8.0 | 3.6 | 319.5 | 144.9 | 2.3 | 1.0 | 11.4 | 5.2 | 17.1[g] | 7.8 |
|  | Climbout | 5740 | 2604 | 4.0 | 1.8 | 160.7 | 72.9 | 1.1 | 0.5 | 5.7 | 2.6 | 8.0[g] | 3.6 |
|  | Approach | 5740 | 2604 | 4.0 | 1.8 | 160.7 | 72.9 | 1.1 | 0.5 | 5.7 | 2.6 | 8.0[g] | 3.6 |
| TF41-A-2 All. TF | Idle | 1070 | 485 | 114.6 | 52.0 | 1.4 | 0.6 | 70.8 | 32.1 | 1.1 | 0.5 |  |  |
|  | Takeoff | 9040 | 4101 | 14.4 | 6.5 | 201.4 | 91.4 | 5.3 | 2.4 | 9.0 | 4.1 |  |  |
|  | Climbout | 9040 | 4101 | 14.4 | 6.5 | 201.4 | 91.4 | 5.3 | 2.4 | 9.0 | 4.1 |  |  |
|  | Approach | 5314 | 2410 | 27.5 | 12.5 | 56.6 | 25.7 | 12.9 | 5.9 | 5.3 | 2.4 |  |  |
| F100-PW-100 (JTF 22) P&W TF | Idle | 1060 | 481 | 20.5 | 9.3 | 4.2 | 1.9 | 2.4 | 1.1 | 1.1 | 0.5 | 0.1[g] | 0.05 |
|  | Takeoff | 44200 | 20049 | 2435.4 | 1104.7 | 729.3 | 330.8 | 4.4 | 2.0 | 44.2 | 20.0 | 0.0[g] | 0.0 |
|  | Climbout | 10400 | 4717 | 18.7 | 8.5 | 457.6 | 207.6 | 0.5 | 0.2 | 10.4 | 4.7 | 8.6[g] | 3.9 |
|  | Approach | 3000 | 1361 | 9.0 | 4.1 | 33.0 | 15.0 | 1.8 | 0.8 | 3.0 | 1.4 | 1.0[g] | 0.5 |
| PT6A-27 PWC TP | Idle | 115 | 52 | 7.36 | 3.34 | 0.28 | 0.13 | 5.77 | 2.62 | 0.12 | 0.05 |  |  |
|  | Takeoff | 425 | 193 | 0.43 | 0.20 | 3.32 | 1.51 | 0 | 0 | 0.43 | 0.20 |  |  |
|  | Climbout | 400 | 181 | 0.48 | 0.22 | 2.80 | 1.27 | 0 | 0 | 0.40 | 0.18 |  |  |
|  | Approach | 215 | 98 | 5.0 | 2.24 | 1.80 | 0.82 | 0.47 | 0.21 | 0.22 | 0.10 |  |  |
| T56-A7 All. TP | Idle | 548 | 249 | 17.5 | 7.9 | 2.1 | 1.0 | 11.5 | 5.2 | 0.5 | 0.2 | 1.6 | 0.7 |
|  | Takeoff | 2079 | 943 | 4.4 | 2.0 | 19.3 | 8.8 | 0.8 | 0.4 | 2.1 | 1.0 | 3.7 | 1.7 |
|  | Climbout | 1908 | 865 | 4.6 | 2.1 | 17.6 | 8.0 | 0.9 | 0.4 | 0.9 | 0.4 | 3.0 | 1.4 |
|  | Approach | 1053 | 478 | 3.7 | 1.7 | 7.8 | 3.5 | 0.5 | 0.2 | 1.1 | 0.5 | 3.0 | 1.4 |
| T53-L-11D (LTC1) Lyc TS | Idle | 142 | 64 | 4.2 | 1.9 | 0.2 | 0.1 | 9.0 | 4.1 | 0.14 | 0.06 |  |  |
|  | Climbout[i] | 679 | 308 | 2.0 | 0.9 | 5.0 | 2.3 | 0.2 | 0.1 | 0.68 | 0.31 |  |  |
|  | Approach | 679 | 308 | 2.0 | 0.9 | 5.0 | 2.3 | 0.2 | 0.1 | 0.68 | 0.31 |  |  |
| T55-L-11A (LTC4) Lyc TS | Idle |  |  | 29.5 | 13.4 | 0.8 | 4.0 | 4.0 | 1.8 |  |  |  |  |
|  | Climbout[i] |  |  | 14.5 | 6.6 | 18.6 | 8.4 | 0.2 | 0.1 |  |  |  |  |
|  | Approach |  |  | 12.9 | 5.9 | 9.1 | 4.1 | 0.3 | 0.1 |  |  |  |  |
| T58-GE-5 GE TS | Idle | 133 | 60 | 22.5 | 10.2 | 0.2 | 0.1 | 12.9 | 5.9 | 0.1 | 0.05 | 0.1 | 0.05 |
|  | Climbout[i] | 886 | 402 | 5.0 | 2.3 | 6.4 | 2.9 | 0.7 | 0.3 | 0.9 | 0.4 | 0.8 | 0.4 |
|  | Approach | 886 | 402 | 5.0 | 2.3 | 6.4 | 2.9 | 0.7 | 0.3 | 0.9 | 0.4 | 0.8 | 0.4 |

[a] Reference 1.

[b] Nitrogen oxides reported as $NO_2$.

[c] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[d] Sulfur oxides and sulfuric acid reported as $SO_2$. Calculated from fuel rate and 0.05 wt% sulfur in JP-4 or JP-5 fuel, or 0.01 wt% sulfur in aviation gasoline. For turbine engines, the conversion is therefore $SO_x$ (lb/hr) = $10^{-3}$ (fuel rate), and for piston engines, the conversion is $SO_x$ (lb/hr) = $2 \times 10^{-4}$ (fuel rate).

[e] Includes all "condensible particulates," and thus may be much higher than solid particulates alone (except as noted in g below).

[f] "Nom." data are interpolated values assumed for calculational purposes, in the absence of experimental data.

[g] Dry particles only.

[h] For abbreviations, see footnote, Table II-1-2.

[i] "Takeoff" mode is undefined for helicopters.

## C-2 TYPICAL DRILLING RIG DESCRIPTIONS

BEST AVAILABLE COPY

# JOHNNIE HOFFMAN

## NOBLE DRILLING (U.S.) INC.

### TYPE
Baker Marine jack-up offshore cantilever drilling unit.

### DRAW WORKS
Oilwell Model E-3000, driven by two EMD D-79 DC electric motors, with Elmagco 7838 electric brake and National-Oilwell disc brake system.

### RIG POWER
Three General Motors 12-645 diesel engines, each rated at 1,650 HP and each driving an EMD A-20-N6 AC generator, with SCR rig-drive system.

### MUD PUMPS
Two Oilwell A-1700-PT, 7¾" × 12" 1,700 HP Triplex pumps, each driven by two EMD D-79 DC electric motors, with 5" × 6" centrifugal supercharging pumps.

### DERRICK
Lee C. Moore 160′ × 30′ base, with 1,500,000-lb. hook-load capacity.

### TOP DRIVE SYSTEM
VARCO TDS-3, Five hundred ton capacity, driven by an EMD M-89 electric motor.

### STRING-UP
Provision for stringing 16 1⅜" lines.

### DRILL STRING
Per agreement.

### ROTARY TABLE
Oilwell A-37½", driven by an EMD D-79 DC electric motor.

### BLOWOUT PREVENTERS
21¼" — 2,000-psi WP Hydril MSP annular BOP.
13⅝" — stack consisting of one Hydril GL 5,000-psi WP BOP, one Cameron Type "U" single ram, and one Cameron Type "U" double ram 10,000-psi WP BOP.

### MUD MIXING
Two 5" × 6" centrifugal pumps, each driven by a 60-HP AC motor.

### MUD TANKS
1,600-barrel active capacity, with electric-drive agitators.

### SOLIDS CONTROL SYSTEM
Cascade arrangement with two Derrick High Profile primary shale shakers and three Fluids Systems linear

### DESANDER EQUIPMENT
Three 12" cones supplied by a centrifugal pump.

### DESILTER EQUIPMENT
Twelve 4" cones supplied by a centrifugal pump.

### DRY-MUD STORAGE
Six 1,280-cu.-ft. pneumatic storage tanks. Additional space for 5,000 sacks of material.

### CEMENTING UNIT
Standard offshore unit, with recirculating mixer and liquid additive systems.

### ELECTRIC LOGGING UNIT
Standard offshore unit.

### PERSONNEL QUARTERS
Air-conditioned accommodations for 68 persons.

### ELECTRIC POWER
Two 1,000-KVA transformers supply 480-volt AC power from main rig generators for auxiliary service. One Caterpillar D-379 diesel engine drives a 400-KW AC generator (emergency unit).

### MATERIAL-HANDLING EQUIPMENT
Two Link-Belt ABS-238 cranes, each with a 27-ton capacity at 50′ radius.

### HELIPORT
Adequate for Sikorsky S-61 helicopter.

### LIQUID STORAGE CAPACITY
7,043 barrels drill water, 906 barrels potable water, 211,000 gallons diesel fuel.

### LOADING INFORMATION
Maximum combined deck and liquid loads:
Moving: 1,930 Tons
In Drilling Position: 2,600 Tons

### CLASSIFICATION
Classed by American Bureau of Shipping as A-1 Self-Elevating Drilling Unit.

### LIFESAVING EQUIPMENT
Four 25 person life rafts.
Two 34-person survival capsules.

### MUD LOGGING FACILITY
Space available for installation.

REV 9 91

10/29/91

# JOHNNIE HOFFMAN

## EXHIBIT "A"

## CONTRACTOR FURNISHED EQUIPMENT

The Johnnie Hoffman is a Baker 300-C cantilever equipped Mobile Offshore Drilling Unit for operating in 300 feet of water.

Contractor shall provide the materials and services listed below. All other equipment, materials and services required for the operations hereunder shall be furnished by Operator.

### 1. DRILLING UNIT EQUIPMENT

A. DRAWWORKS - Oilwell E-3000 with 16,000-foot sandreel assembly, driven by two (2) EMD D79MB DC electric motors. National/Oilwell disc primary brake with Baylor 7838 auxiliary brake.

B. RIG POWER - Three (3) General Motors EMD model MD12E8-GM-6 (12-645) engines, each rated at 1650-BHP and driving an AC generator. Ross Hill SCR AC to DC conversion system.

C. MUD PUMPS - Two (2) Oilwell A1700PT 1700-HP Triplex pumps, each driven by two (2) EMD D79MB DC electric motors. Each pump is supplied by a 5" x 6" centrifugal supercharging pump. (See Attachment I).

D. MUD MIXING PUMPS - Two (2) 5" x 6" Mission, each powered by a 60-HP motor.

E. STRING UP - Provisions for stringing sixteen 1-5/8" lines:

1. Crown Block - Lee C. Moore, with nine 60-inch sheaves.

2. Traveling Block - Continental Emsco Model RA-60-8 with eight 60-inch sheaves.

3. Hook - BJ 5750.

4. Links - 2 3/4" x 108" 350 Ton Capacity API.
2 3/4" x 192" 350 Ton Capacity API.
3 1/2" x 180" 500 Ton Capacity API.

F. DERRICK - Lee C. Moore 160' x 30' base, 1,500,000 pound hook capacity.

G. TOP DRIVE - Varco Model TDS-3 top drive drilling system with M89 DC electric motor.

H. SUBSTRUCTURE - Baker Marine 1,500,000-pound hook or rotary capacity, 500,000-pound setback capacity. Combined hock or rotary load with setback limited to 2,000,000 pounds.

I. ROTARY TABLE - Oilwell Model B, 37-1/2-inch rotary table and skid unit with EMD D79MB DC electric motor.

J. BLOWOUT CONTROL EQUIPMENT

1. Blowout preventer stacks, consisting of:

One (1) 13-5/8" Cameron Type "U" single unit, 10,000 PSI W.P. with 5" rams and blind rams.

One (1) 13-5/8" Cameron type "U" double unit, 10,000 PSI W.P. with 5" blind rams.

One (1) 13-5/8" Hydril Type GL, 5000 PSI W.P.

One (1) 21-1/4" Hydril MSP 2000 PSI W.P. diverter.

One (1) 21-1/4" diverter spool with two (2) 10" I.D. 2M outlets and two (2) 10" 2M hydraulically operated valves.

Two (2) 10" I.D. diverter lines.

2. Koomey 220 gallon accumulator with 6-station manifold and one (1) 15 H.P. electrically powered pump and two (2) 50:1 ratio air-powered pumps.

3. Six station remote control for blowout preventers.

4. Koomey diverter control panel arranged to simultaneously open two (2) side-outlet diverter valves when diverter B.O.P. is closed with provision to then selectively close one or the other of the outlet valves with remote control. Accumulator power to be supplied by Item 2.

5. 10,000 PSI W.P. 3-1/16" choke manifold with kill and choke line steel hoses, complete with buffer chamber and mud gas separator.

6. One (1) positive choke and one (1) manually adjustable choke.

7. a. Kelly valve to fit Contractor's swivel.

   b. Kelly valve to fit Contractor's drill pipe.

8. Inside blowout preventer to fit Contractor's drill pipe.

9. One-inch steel hoses between blowout preventers and closing unit.

K. <u>MUD TANKS</u> - 1600-barrel capacity (three (3) mud tanks, one (1) gel tank, one (1) slug tank), equipped with electrically-driven agitators.

L. <u>DRILL STRING</u> -

<u>Drill Pipe</u>:

Grade "E" - 8,000 feet of 5" O.D. 19.50 pound, with 6-3/8" O.D., 4-1/2" API IF tool joints.

Grade "G-105" or "S-135" - 6,000 feet of 5" O.D. 19.50 pound, with 6-1/2" O.D., 4-1/2" API IF tool joints.

<u>Drill Collars</u>:

6-1/4" O.D. (Range 2): 21

7" O.D. (Range 2): 15

8" O.D. (Range 2): 15

Drill String items lost or damaged in the hole will be replaced by Operator at depreciated value calculated as follows:

<u>Drill Pipe</u>: Ninety percent of current new value provided pipe was graded premium on the last inspection, in accordance with API inspection specifications.

Drill Collars: Depreciation from current new value on the basis of 8.33% per 1/16" O.D. wear for 6-1/4" and 7" O.D. collars and 6.25% for 8" and 9" O.D. collars.

M. CEMENTING UNIT - Dowell CPS-361 with Liquid Additive skid and pressurized surge tank.

N. ELECTRIC LOG UNIT - Provision for standard computerized offshore unit.

O. SOLIDS CONTROL SYSTEM

1. Shale Shakers, cascade arrangement:

   a. Two (2) Derrick high profile shakers, Model K48-960F-3-SM, with screens from 10 through 60 mesh.

   b. Three (3) fluid systems linear shakers, with screens from 10 to 80 mesh.

2. Desander - Swaco with three (3) 12" cones.

3. Desilter - Swaco Model PO4C12B with twelve (12) 4" cones.

4. Degasser - Swaco degasser.

P. MISCELLANEOUS

1. Normal fishing tools - Overshot and taper tap to fit Contractor's drill string.

2. Weight Indicator - Martin-Decker Type "125".

3. Sewage disposal unit.

4. Subs for Contractor's drill string, as required.

5. Safety Appliances - As required by U.S.C.G. to include all aids to navigation for Drilling Unit.

6. Welding Equipment - Two (2) 400 amp AC-DC units with oxygen-acetylene equipment.

7. Pit-O-Graph or equivalent mud pit level recording unit.

8. Straight hole survey instrument, for normal hole deviation with Contractor's drill pipe.

9. Kelly spinner.

10. Mathey wire line measuring unit with 20,000 feet of .092" wire line.

11. Drill pipe spinning wrench.

12. Handling tools for Contractor's drill pipe.

13. Conductor Tensioning System:

Four (4) 1-1/8" wire ropes with turnbuckles, each capable of 25,000 pounds tension, for a total of 100,000 pounds, with two (2) horizontal conductor stabilizers, consisting of six inch pipes pinned to the rig hull and welded to the conductor.

## 2. BARGE STRUCTURE AND OUTFITTING

### A. HULL AND UPPER STRUCTURE

Baker Marine cantilever-equipped jack-up type capable of drilling in 300 feet and 250 feet of water during non-hurricane and hurricane seasons, respectively (depths must be reduced for leg penetration in excess of 15 feet). Water depth subject to insurance surveyor's approval. Overall dimensions are 233.5' x 214' x 26'. Minimum draft approximately 29 feet. Unit designed and constructed in accordance with ABS "Rules for Building and Classing Offshore Mobile Drilling Units 1973". Classed ABS A1. Modified 1988.

Nominal hurricane variable load capacity in 250 feet of water 2,475 tons (subject to approximately same loading on all three legs and insurance surveyor's approval).

Nominal non-hurricane variable load capacity in 300 feet of water 2,475 tons (subject to approximately same loading on all three legs and insurance surveyor's approval).

Nominal moving and jacking live load capacity 2,000 ton (subject to insurance surveyor's approval).

B. MATERIAL HANDLING - Two (2) Link Belt Model ABS-238 revolving cranes, each with a capacity of 27 tons at 50' radius.

C. 480-VOLT AC POWER - From above described AC generators, utilizing two (2) 1,000 KVA transformers.

D. EMERGENCY POWER - One (1) Caterpillar D-379 engine with 400 KW generator.

E. DRY STORAGE (CEMENT AND/OR MUD)
Bulk Storage - Six (6) P-tanks with total of 7,680 cubic feet capacity.

Covered storage for 5,000 sacks.

F. LIQUID STORAGE - Drilling water, 5,000 barrels - potable water, 1,000 barrels - diesel fuel, 5,000 barrels.

G. QUARTERS - Air-conditioned facilities to accommodate 68 persons.

H. COMMUNICATIONS - VHF marine radios. Gai-Tronics intercom system.

I. HELI-PORT - Adequate for Sikorsky S-61N helicopter.

3. SUPPLIES AND SERVICES

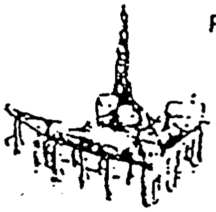
A. Supplies and services, as required, to properly operate and maintain Drilling Unit and drilling equipment.

B. Catering services and supplies for Contractor's employees, subcontractors, and third parties, and for three employees of Operator. Meals and lodging for Operator's employees in excess of three, and for Operator's additional personnel, subcontractors and third parties will be for the account of Operator and will be billed directly to Operator by Contractor's caterer.

# OCEAN TITAN

## Marathon LeTourneau

Independent Leg
Slot Type
Jackup Drilling Unit



**P.J. Thomas Rawlins**
Senior Representative
Marketing & Contracts -
New Orleans

ODECO INC.
1600 CANAL STREET
NEW ORLEANS, LA 70112

TEL: (504) 561-2645
FAX: (504) 561-2412
TLX: 161743 (ODECOUT)

ODECO INC.
1600 Canal Street
New Orleans, Louisiana 70112

# OCEAN TITAN

## GENERAL DESCRIPTION AND EQUIPMENT LIST

### A. GENERAL DESCRIPTION

The OCEAN TITAN is a Marathon LeTourneau, Class ~~64~~ 53 independent leg slot type jackup drilling unit designed to operate in water depths from twenty-two feet (22') to three hundred fifty feet (350') and for drilling to a nominal well depth of 25,000 feet with a rated hoisting capability up to 1,700,000 lbs.

### PRINCIPAL CHARACTERISTICS AND DIMENSIONS:

| | |
|---|---|
| Length overall | 231' 0" |
| Width of hull | 200' 6" |
| Depth of hull | 26' 0" |
| Slot length | 41' 0" |
| Slot width | 50' 0" |
| Number of legs | 3 |
| Overall length of legs and spud cans | 467' 1" |
| Longitudinal leg centers | 123' 0" |
| Transverse leg centers | 142' 0" |
| Spud tank diameter (across flats) | 46' 0" |
| Spud tank height | 23' 10" |
| Preload spud-can load | 4,855 lbs/ft$^2$ |
| Spud tank area | 1,600 sq. ft. |
| Loadline draft | 16' 6" |
| Preload each leg | 7,765 kips |
| Jack house leg length requirement | 51 ft |
| Storm elevated maximum variable deck load | 2,931 kips |
| Transit maximum variable deck load | 3,102 kips |
| Elevated maximum variable deck load in all drilling positions | 4,181 kips * |
| Elevated maximum variable deck load in center/forward drilling position | 5,151 kips * |

* See "Well Position vs. Allowable Substructure Load" Chart

### WATER DEPTH RATING:

| | |
|---|---|
| Minimum (depending on loading) | 22' 0" |
| Maximum (depending on leg penetration) | |
| - Non Hurricane season | 350' 0" |
| - Hurricane season (87 kt. wind and 42 ft. wave) | 260' 0" |

## DRILLING AREA:

15' wide 7'6" port or starboard of rig center line and 12'6" deep (10' from forward end of slot to 22'6" aft).

| | |
|---|---|
| - Maximum skid out | 22' 6" |
| - Minimum skid out | 10' 0" |

## MAXIMUM CAISSON OD THAT IS DRIVABLE:

Maximum outside diameter caisson that can be driven with the rotary skid and pollution pan removed:

| | |
|---|---|
| - No other modifications (max) | 48" |
| - Minor modifications such as unpin or remove rotary beams, etc (max) | 60" |
| - Removal of BOP tracks, guide dolley tracks, some welding, etc as controlled by main structural beams in drill floor (max) | 72" |

## AIR GAP:

| | |
|---|---|
| Hurricane Season (under 100' WD) | 40' to 50' |
| Hurricane Season (over 100' WD) | 50' to 43' |
| Non Hurricane Season (under 100' WD) | 26' to 34' |
| Non Hurricane Season (over 100' WD) | 34' to 33' |
| Maximum as controlled by water tower and lifeboats | 80' |

## NOMINAL TOW SPEED (using three (3) 4,200 hp tugs):

| | |
|---|---|
| With legs up when allowed by USCG (average) | 4 kts |
| Minimum top of can | 57' 0" |
| With legs at 73' draft (average) | 2-1/2 kts |

## CAPACITIES:

| | |
|---|---|
| Bulk Mud | 3,120 cu ft |
| Bulk Cement | 3,120 cu ft |
| Liquid Mud | 1,763 BBLS |
| Diesel Fuel | 2,085 BBLS |
| Potable Water | 1,025 BBLS |
| Drill Water | 5,425 BBLS |
| Sack Material | 5,000 sacks |
| Mineral/Oil Base Feed Stock | 900 BBLS |

QUARTERS:

Accommodations are provided for 69 men, complete with all normal living facilities and a sick bay for three (3) men.

DRILLING LOADS:

The substructure and associated structural components will accept the following maximum loads:

| | |
|---|---|
| Drive pipe support system | 200 kips |
| Setback load | 720 kips |
| Rotary load | 1,500 kips |
| Hook load* | 1,700 kips |
| Maximum combined hook, rotary, set back and drive pipe support** | 2,420 kips |

* Maximum depending on traveling equipment
** Will be less for some drilling positions

HELIDECK:

70.5 ft diameter cantilevered helicopter landing area on starboard side of Drilling Unit designed to accommodate Sikorsky S-61 helicopter.

JACKING:

Sixteen (16) motors power the movement of each of the three (3) legs. Each motor is 600 volt 60-cycle AC induction type motors. Power for AC motors is provided by main AC generators operated at one central console. The jacking system is capable of jacking the barge at a rate of 1-1/2' per minute.

CLASS:

ABS Maltese Cross A1 Self-Elevating Mobile Drilling Unit.

DESIGN:

Marathon LeTourneau Class ~~64~~ 53 slot jackup drilling unit.

REGISTRY:

U. S.

## B. DRILL FLOOR EQUIPMENT

1. Drawworks - National Model 1625 DE, driven by three (3) EMD M89 1000 hp DC motors rated for 1,700,000 lb hoist. Drawworks complete with sand reel assembly with 9/16" sandline, lebus grooving for 1-3/4" drill line, make up and break out catheads, crown-o-matic device, positive clutch, and master control.

   - One (1) Dretech Model 15050 electric brake with a back up power supply consisting of eighteen (18) lead acid batteries continuously charged.

2. Derrick - Brown Services 30' x 30' x 165' standard derrick rated 1,700,000 lbs. static hook load capacity with 16 lines strung to traveling block.

   The derrick is complete with all standard accessories which includes:

   - Two (2) racking platforms to accommodate 25,500' of 5" drill pipe and bottom hole assembly, or 20,000' of 5-1/2" drill pipe and bottom hole assembly complete with safe cat walk.
   - Brown Services traveling block guide, dolly for installation to a McKissock RP 750 ton traveling block.
   - One (1) adjustable casing stabbing platform (21.5' to 42.5' above derrick floor) complete with air hoist and safety lines.
   - Crown safety platform complete with safe handrails.
   - Derrick is complete with Class 1, Division 1, explosion proof fluorescence fixtures, all with safety chains.

3. Traveling equipment consisting of:

   - One (1) Brown Services, Inc. crown block, (960 ton) with nine (9) 60" sheaves grooved for 1-3/4" drill line, complete with sandline sheave grooved for 9/16" sandline.
   - One (1) McKissock traveling block, Model RP (750 ton) with seven (7) 60" sheaves grooved for 1-3/4" drill line, and adapted for use with the guide dolly.
   - One (1) BJ 5750 (750 ton) hook.
   - One (1) Varco TDS-4 top drive with GE752 series motor and closed loop cooling system. TDS-4 has raised back up system with hi-torque break out system rated at 90,000 ft. lbs.
   - National P-650 swivel (650 ton) static load and 452 ton rotating load.

- One (1) International Model A6C-2 air operated kelly spinner. (6-5/8 Reg. L. H. connections)

4. One (1) Hurcules Type HA130T-SG drill line anchor rated for 125,000 lb. line pull with 1-3/4" drill line.

5. Rotary - One (1) 37-1/2" National C-375 rotary table, with Gumbo Guard seal driven by an EMD D79 800 hp DC motor (load capacity 650 tons).

   - One (1) National 18CB500, two speed rotary transmission.

     Low gear ratio = 2:03:1
     High gear ratio = 1:1.02

   - Rotary complete with varco MPCH No. 6600 hinged pin master bushing and Varco HDP pin type kelly drive bushings.

   - One (1) air flex rotary brake.

6. One (1) Mathey wire line measuring unit with up to 15,000' of .092 wire line, line guide, depth indicator. Driven by a hydraulic motor.

7. One (1) Eastman deviation recorder, complete with one (1) recording instrument 0 to 6 and one (1) recording instrument 0 to 12 .

8. Standard drill floor instrumentation consisting of driller console with weight indicator and related indicators for mud pump pressure and SPM, mud pit volumns, mud flow, mud gain/loss, rotary torque and RPM.

9. Air winches consisting of:

   - Three (3) on drill floor (10,000 lbs nominal rating)
   - One (1) on cellar deck (6,000 lb nominal rating)
   - One (1) USCG approved "man-rider" Type for Texas deck basket (2,200 lbs nominal rating)

10. One (1) "Bear Cat" automatic driller.

11. One (1) Drilco Type D Ezy Torque hydraulic cathead rated for 150,000 ft. lbs. maximum torque.

## C. MUD SYSTEM AND EQUIPMENT

1. Three (3) National 12P-160 triplex mud pumps, each pump chain driven by two (2) EMD D79 800 hp DC motors. Each pump complete with discharge and suction pulsation dampeners and Harrisburg, 3" reset relief valve. Mud pump discharge lines, 4.063 ID x 5,000 psi WP with 4" x 5,000 psi WP valves run from mud pumps to stand pipe manifold. Pumps normally equipped with 6-1/2" liners rated for 3,980 psi.

2. Mud service pumps consisting of:

   - Three (3) Mission Magnum 6 x 8 centrifugal supercharging pumps driven by 50 hp AC motors. Rated output of 1,200 gpm at 48' of head with 17 ppg mud.

   - Two (2) Mission Magnum 6 x 8 centrifugal mud mix pumps driven by 100 hp AC motors. Rated output of 1,450 gpm at 60' of head with 17 ppg mud.

   - Two (2) Mission Magnum 6 x 8 centrifugal mud cleaning pumps driven by 75 hp AC motors. Rated output of 1,200 gpm at 50' of head with 17 ppg mud.

3. Mud cleaning equipment consisting of:

   - One (1) Brandt tandem shale shaker and one (1) retrofit tandem shale shaker. Capacity is 1,200 gpm with 18 ppg. mud.
   - Three (3) Derrick Flo-line Cleaner plus high speed shakers, capacity is 650 gpm with DX84 mesh screens and 18 ppg mud.

   - One (1) Demco Model 123 desander, with three (3) 12" cones (1,200 gpm capacity).

   - Two (2) Brandt single dual screen mud cleaners each with ten (10) 4" cones (1,200 gpm capacity).

   - Mud flow is cascaded from Brandt dual tandem shale shakers to the three (3) Derrick Flo-line Cleaners.

4. One (1) ODECO designed mud/gas separator, 48" OD x 12' tall, atmospheric type with 8" OD gas vent line extending to top of derrick, and with 8" liquid leg. System set up to accept a Swaco TOGA system (not included).

5. One (1) Swaco vacuum degasser (1,000 gpm capacity).

6. Liquid mud pits consisting of:

| | |
|---|---|
| 1 - active pit | 245 BBLS |
| 1 - active pit | 245 BBLS |
| 1 - reserve pit | 445 BBLS |
| 1 - active pit | 245 BBLS |
| 1 - active pit | 245 BBLS |
| slugging pit | 44 BBLS |
| sand traps | 269 BBLS |
| trip tank | 25 BBLS |
| TOTAL CAPACITY | 1,763 BBLS |

Mud cooling system on rig.

7. Three (3) Lightin' Model 85Q20 20 hp, one (1) Geosource Model 210 25 hp and one (1) Philadelphia Gear 25 hp mud agitators, one (1) in each of the active and reserve pits.

8. Eleven (11) Demco 33-LP (50 psi) low pressure mud guns. Two (2) in each of the four main pits, two (2) in the reserve pit and one (1) in the slug pit.

9. Pneumatic bulk and cement storage transfer system consisting of:

   - Three (3) 1,040 cu. ft. bulk mud storage P-tanks (3120 cu. ft. total capacity).
   - Three (3) 1,040 cu. ft. bulk cement storage P-tanks (3120 cu. ft. total capacity).
   - One (1) 80 cu. ft. pressurized surge tank for use in mud mix area.
   - One (1) Ingersoll Rand Model 75-BH Type 40 bulk air compressor. rated capacity is 460 cfm at 50 psi.
   - One (Ingersoll Rand HG-750 bulk air dryer. Rated capacity is 750 cfm at 50 psi.
   - Backup low pressure bulk system air furnished by rig air compressors through a 125/40 psi regulating station.
   - One (1) removable crossover line that allows bulk or cement to be stored in any P-tank.

10. Sack storage area located near the mud pits and mixing hoppers, capacity approximately 5,000 sacks.

11. Two (2) Demco 412 B low pressure mud hoppers. One (1) sack fed and one (1) surge tank or sack fed. Approximately 600 lb/min feed rate.

12. One (1) set basic mud testing equipment consisting of mud balance, viscosity funnel/cup, and sand content equipment, complete with sink and cabinet.

13. One (1) 5" dual stand pipe manifold, 5,000 psi WP with 4.063 ID standpipes, outlets for pressure gauges, sensors, and transducers with a crossover line to the choke manifold.

14. Two (2) rotary hoses, 3" ID x 75', 5,000 psi WP, with 4" Weco end connections (10,000 psi test).

15. One (1) 25 bbl trip tank. Continuous fill up of well bore is accomplished via one (1) 2 x 3 Mission centrifugal transfer pump driven by a 10 hp explosion proof AC motor. Rated out put of pump is 75 gpm at 90' of head with 17 ppg mud.

16. One (1) lot (approximate length 60 ft) of various length chicksan lines with 2" Weco No. 1502 end couplings (10,000 psi WP).

D. <u>WELL CONTROL EQUIPMENT</u>

1. Blowout preventers ($H_2S$ rated) consisting of:

   - One (1) 13-5/8" - 10,000 psi WP Cameron Type "U" double ram blowout preventer with manual locks, four (4) 4-1/16" x 10,000 psi WP flanged outlets and flanged 10M connections top and bottom.
   - One (1) 13-5/8" single - 10,000 psi WP Cameron Type "U" with manual locks, two (2) 4-1/16" x 10,000 psi WP flanged outlets and flanged 10M connections top and bottom.
   - One (1) 13-5/8" - 5,000 psi WP Shaffer sperical annular preventer, 5M flange lower with 5M x 10M DSA and studded 5M upper connections.
   - Two (2) 3-1/16" x 10M manual operated BOP stack valves.
   - Two (2) 3-1/16" x 10M hydraulic operated BOP stack valves.
   - Two (2) 15,000 WP choke and kill hoses with 3-1/16" flanged connections.

2. Diverter System consisting of:

   - One (1) 27-1/2" Regan KFDJ 1,000 psi diverter system with 12" overboard lines.
   - Two (2) 12" - 2,000 psi ball valves.
   - Two (2) 12" hydraulic operated 300 psi knife gate valves.
   - One (1) rotating low pressure head insert (replacement packers not included).

3. One (1) BOP and diverter control system consisting of:

   One (1) 3,000 psi WP automatic pump accumulator unit, complete with the following:

   - Six (6) 80 gallon spherical, guided float type accumulators.

- Three (3) 50:1 ratio air driven pumps with manifold and pressure switch, producing 1.75 gpm at 3,000 psi with 125 psi each.
- One (1) Koomey Model T315-15-3 triplex pump with 3/4" plungers driven by a 20 hp, 1,800 rpm AC motor, producing 6.2 gpm at 3,000 psi.
- One (1) 280 gallon mixed fluid reservoir.
- One (1) Model ARC-6 remote control panel.
- One (1) backup air supply consisting of three (3) bottles of nitrogen, regulated and plumbed into the rig air supply in case of loss of rig air.
- Six (6) 1" - four (4) way three (3) position selector valves.
- One (1) annular regulator.
- One (1) manifold (BOP) regulator.

4. One (1) 15,000 psi WP, $H_2S$ rated, choke manifold, complete with:

   - Two (2) Flocon $H_2S$ 2-1/16 x 15,000 psi WP manual adjustable chokes.
   - Two (2) remote adjustable choke.
   - Twelve (12) Flocon 2-1/16 x 15,000 psi WP valves.
   - Eight (8) Flocon 3-1/16 x 15,000 psi WP valves.
   - Two (2) buffer chambers. (splitting the manifold)

5. One (1) 200,000 lb. constant hydraulic drive pipe support system balanced with 30 gallons of accumulator capacity for drive pipe movement.

6. One (1) Marathon LeTourneau BOP handling overhead crane rated capacity of 60 tons.

## E. DRILL STRING AND HANDLING TOOLS

1. Drill pipe consisting of:

   a) 9,000' of 5" OD, 19.50 lb/ft, Grade "E", Range 2 drill pipe, internal external upset with 6-3/8" OD x 3-3/4" ID, 18° taper tool joints, with 4-1/2 IF (NC-50) connections. Pipe internally coated.

b) 6,000' of 5" OD, 19.50 lb/ft Range 2, Grade "G", drill pipe, internal external upset with 6-1/2" OD x 3-1/2" ID, 18° taper tool joints, with 4-1/2 IF (NC-50) connections. Pipe internally coated.

2. Drill Collars:

- Fifteen (15) 8" OD X 2-13/16" ID x 31 ft long, with 6-5/8" regular connections, slips and elevator recesses.

- Fifteen (15) 6-1/2" OD x 2-13/16" ID x 31 ft. long with 4-1/2 X-hole.

3. Bit breakers for standard three cone drill bits - 17-1/2", 16", 12-1/4" and 8-1/2".

4. Subs consisting of:

- Two (2) bit subs for 8" drill collars, bored for float.

- Two (2) bit subs for 6-1/2" drill collars, bored for float.

- Two (2) crossover subs 6-5/8 reg pin x 4-1/2 IF box.

- Two (2) crossover subs 4-1/2 IF box x 4-1/2 X-hole pin.

- Six (6) lift nipples each for 8" drill collars with 6-5/8" Reg. connections and 6-1/2" drill collars with (NC 46) connection.

- One (1) pump in sub with 4-1/2 IF pin and 2" Weco Fig. 1502 outlet.

- One (1) kelly test sub with 4-1/2 IF box and 2" Weco Fig. 1502 outlet.

5. Drill pipe/casing protectors for 5" OD drill pipe for use in surface casing. Additional and/or replacement rubber protectors furnished by operator.

6. Kelly valves consisting of:

- Two (2) inside BOP valve (float type) (10,000 psi WP) with 4-1/2 IF (NC-50) connections.

- Two (2) upper top drive valves (10,000 psi WP) with 7-5/8" box x 6-5/8" Reg. RH box.

- Two (2) lower top drive valves (10,000 psi WP) 6-5/8" pin x 6-5/8" Reg. RH box.

- Three (3) top drive saver subs 4-1/2" IF pin x 6-5/8" pin.

7. Fishing tools consisting of:

   - Boot baskets, grapples and overshots including accessories to catch Contractor furnished drill pipe and drill collars.

8. Drill pipe and drill collar elevators consisting of:

   - Two (2) BJ Type GG center latch elevators (350 ton) for 5" OD/18 taper drill pipe.
   - One (1) BJ Model SLA 100 (100 ton) 8" drill collar elevators.
   - One (1) BJ Model SLA 100 (100 ton) 6-1/2" drill collar elevators.

9. Elevator links consisting of:

   - One (1) set of BJ 2-3/4" x 108" (350 ton).
   - One (1) set of Baash Ross 3-1/2" x 180" (500 ton).

10. Two (2) BJ Type DB manual tongs with lug jaw assemblies for pipe sizes 3-1/2" to 17". Rated at 60,000 ft. lbs.

11. One (1) drill pipe spinner, Lamb Model J-29, to handle pipe sizes 3-1/2" to 5".

12. Slips consisting of:

    - Two (2) sets of Varco Type SDXL for 5" drill pipe.
    - Two (2) sets of Varco Type DCS-L for 6-3/4" - 8-1/4" drill collars.
    - Two (2) sets of Varco Type DCS-L for 5-1/2" - 7" drill collars.

13. One (1) Varco Type MRP drill collar safety clamp for 6-1/2" and 8" drill collars.

14. One (1) mud saver bucket, OTECO "mud guard".

15. One (1) Varco "Big Foot" iron roughneck drill pipe spinner and torque wrench.

    - Spinner wrench size range: 2-7/8" to 8"
    - Spinner wrench torque (5" D. P.): 1,000 ft. lbs.
    - Torque wrench size range: 4" to 8"
    - Torque wrench make-up torque (max): 63,000 ft. lbs.
    - Torque wrench break-out torque (max): 75,000 ft. lbs.

16. Drill pipe wipers for 5" drill pipe.

## F. AUXILIARY EQUIPMENT

1. Diesel electric rig power system consisting of:

   - Three (3) EMD Model 16-645-E1 diesel engines, each rated 2,200 hp at 900 rpm, each driving one (1) 1500 kw General Electric A-20-N6 AC generators.

   - One (1) EMD SR-8, 8 cylinder diesel engine, rated 1,150 hp at 900 rpm, driving one (1) 750 kw AC generator, used as a standby generator.

   - One (1) Ross Hill SCR system.

2. Compressors consisting of:

   - One (1) Ingersoll Rand Model SSR 300H rig air compressor. Rated capacity 300 CFM at 128 psi.

   - One (1) Ingersoll Rand Model SSR 400H rig air compressor. Rated capacity 400 CFM at 128 psi.

   - One (1) Ingersoll Rand Model 12 rig air dryer rated 750 CFM at 125 psi.

   - One (1) Garden Denver Model ACR, 2 stage emergency air compressor driven by a Lister diesel engine (120 psi capacity).

   - One (1) Ingersoll Rand Model 75 BH-Type 40 low pressure bulk air compressor rated capacity is 460 cfm at 50 psi.

   - One (1) Deltic Model HG-750 bulk air dryer rated capacity is 750 CFM at 50 psi.

3. Three (3) LeTourneau series PCM-120-AS crane with 100' booms, rated 25 tons at 50' and 48 tons at 26'.

4. Two (2) personnel transfer nets.

5. One lot of certified slings, bridles for loading and offloading rig.

7. Two (2) 500 amp rectifier type welding machines complete with normal rig welding supplies.

8. One (1) Alfa-Laval Model JWP-26-C80 water maker rated at 5,300 gal/day.

9. One (1) hot water pressure washer system for cleaning drilling unit.

10. One (1) oil/water separator system with required drip pans, drain lines and collection tanks to meet MMS requirements.

11. Safety equipment required to comply with USCG, Solas and ABS.

- Individual life preservers
- Fire extinguishers
- Station bill
- General alarms
- Identification signs
- Equipment guards
- Pollution pans
- Imperial exposure suits for 150% of drilling unit personnel capacity
- Four (4) 28-man Whittaker covered life capsules, complete with launch and recovery system
- Two (2) 300 lb. Fire Boss units located outside the motor room (one port and one starboard)
- One (1) 200 lb semi-portable $CO_2$unit in the engine room with 50' of hoses and applicator nozzle
- Two (2) Mission 2 x 3 fire pumps. Rated capacity is 300 gpm at 175 ft. of head
- Two (2) 20 man life rafts

13. Ships service pumps consisting of:

- Drill water pumps, two (2) Mission 2x3R centrifugal pumps driven by 40 hp ac motors. Rated out put of 300 GPM at 175' of head.

- Salt water pumps, three (3) 12" line shaft pumps driven by 50 hp AC motor. Rated output of 1,200 GPM at 120' of head.

- Bilge pumps, two (2) Mission 3x4 R11 centrifugal pumps driven by 7 hp AC motors. Rated output of 350 GPM at 40' of head.

- Fuel oil pumps, two (2) Roper Model 2AP32 gear pumps driven by 5 hp AC motors. Rated at 50 gpm.

- Fuel oil centrifuge, One (1) Alfa-Laval Model MAB-103B. Rated at 250 gpm.

- Lube oil centrifuge, One (1) Alfa-Laval Model MAB-103B. Rated at 85 gpm.

13. One (1) Gaitronics paging system with stations fixed through out the rig.

14. Communication equipment consisting of:

    - ODECO FM 30.6 HZ GOM system
    - VHF radios

15. One (1) Red Fox sewage treatment plant Model RF2500C.

16. One (1) personnel elevator in living quarters operating from the 1st floor to the 4th floor.

17. One (1) PSI foam educting system over the mud pits.

18. One (1) Toyota fork lift, 6,000 lb. U.S. Coast Guard approved.

G. THIRD PARTY EQUIPMENT

1. One (1) Halliburton Model FKDS twin HT-400 skid mounted cement unit with recirculating mixing system; 10,000 psi WP diesel driven. (Rental only).

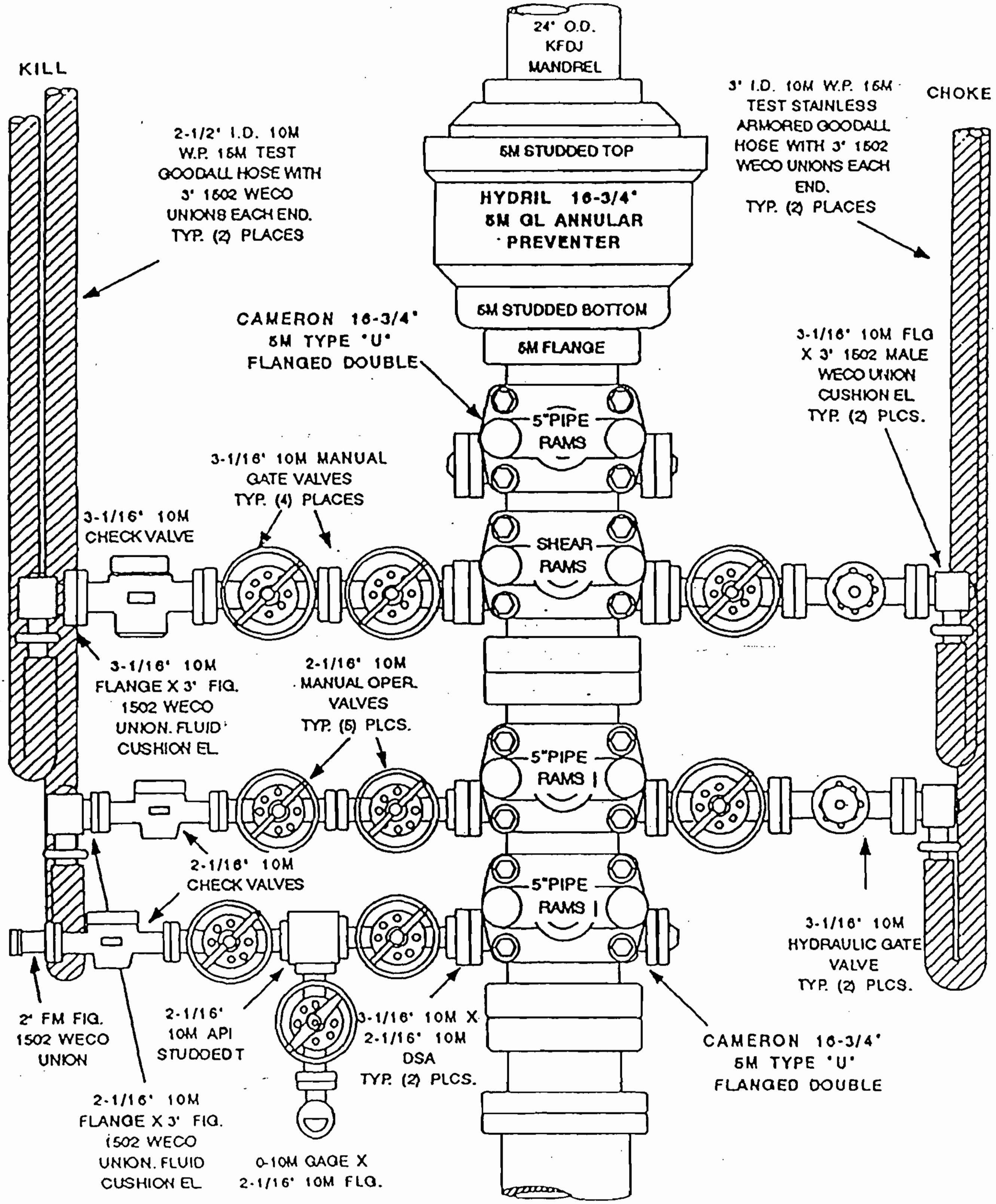
NOTE:

1) From time to time it will be necessary to substitute like or near like equipment for the reason of inspection, overhaul, manufacture recall, upgrade, etc. of the listed equipment in this exhibit.

2) Load ratings are normal and may vary, depending on manufacture wear tolerances.

3) From time to time it will be necessary to send in spare units, parts, etc. for repair and overhaul as needed.

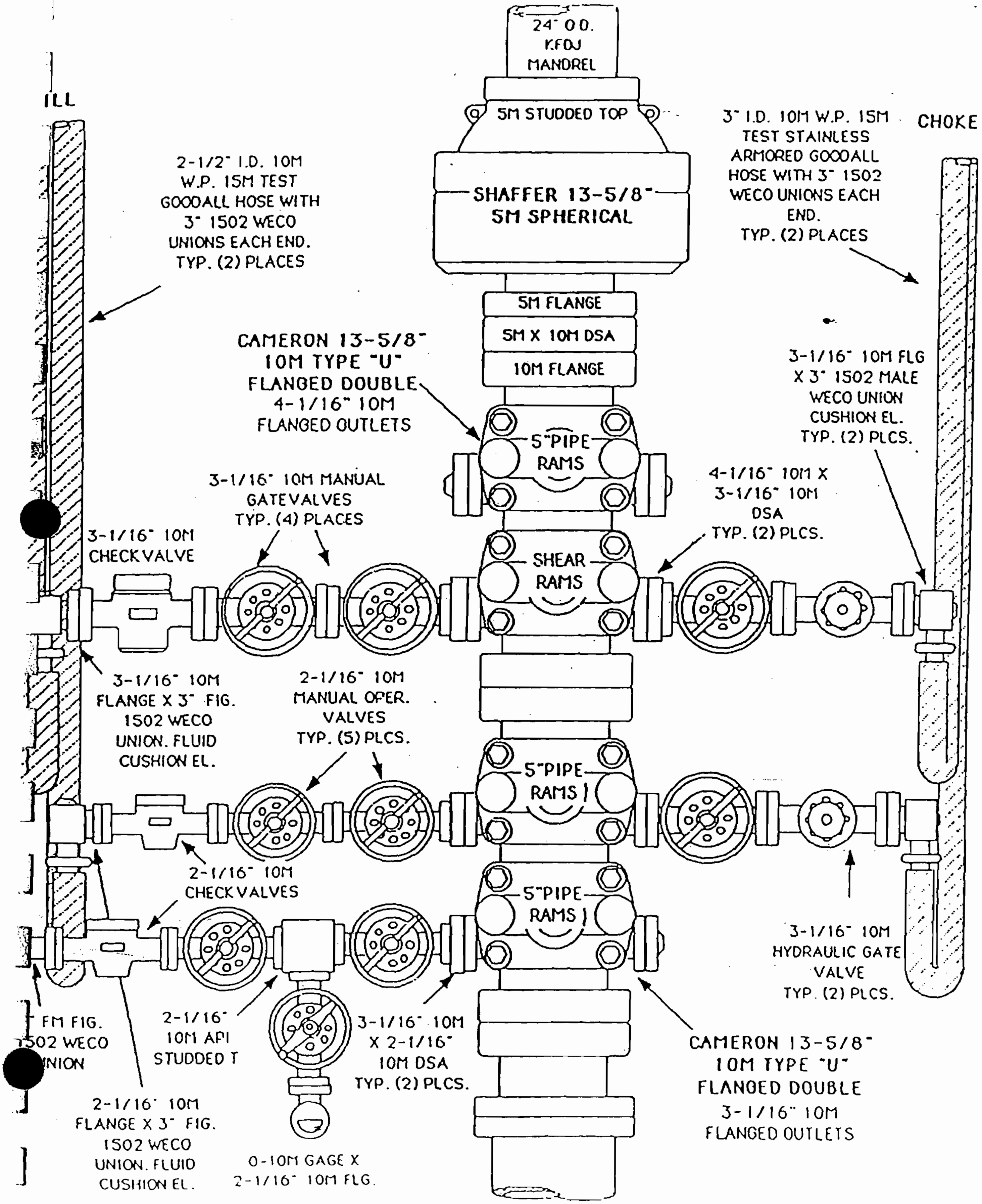
# OCEAN TITAN BOP LAYOUT



8/2/90

BEST AVAILABLE COPY

# OCEAN TITAN BOP LAYOUT



4/24/89

# DIVERTER OPERATION
# OCEAN TITAN

## DESCRIPTION:

The diverter system consist of a Regan KFDJ diverter with a two outlet housing, one for flowline and one for the vent lines. The flowline is constructed of 12" line pipe with a 12" class 900 ball valve to block flow. The vent lines are constructed of 12" line pipe and utilize a 12" class 900 ball valve to block flow and two 12" class 300 knife gate valves to direct flow port or starboard. Both the vent lines and flowline are constructed of XXS pipe up stream of the ball valves and Schedule 80 pipe down stream of the ball valves. The diverter can be operated from the main panel on the drill floor or from the mini panel located on the main deck near the quarters. The remote panel is Pneumantic. Air pilot signals from the remote panel are sent to the main panel through a multiple air hose bundle, then to the air actuators on the main control valves. The main panel hydraulic control valves are manually operated or indirectly operated by the mini panel as described above. See attached schematic.

## NORMAL OPERATION:

1) During drilling operations the valves are in the below position:
    - a.) Flowline Shut-In valve open
    - b.) Diverter Shut-In ball open or closed (depending on type of mud system)
    - c.) Port or Starboard Divert valve open
    - d.) Choke closed

2) To shut the Regan KFDJ diverter, the diverter packer valve is operated from either the main or remote panel. In order for the packer to close the diverter packer insert lockdown dog must be activated.

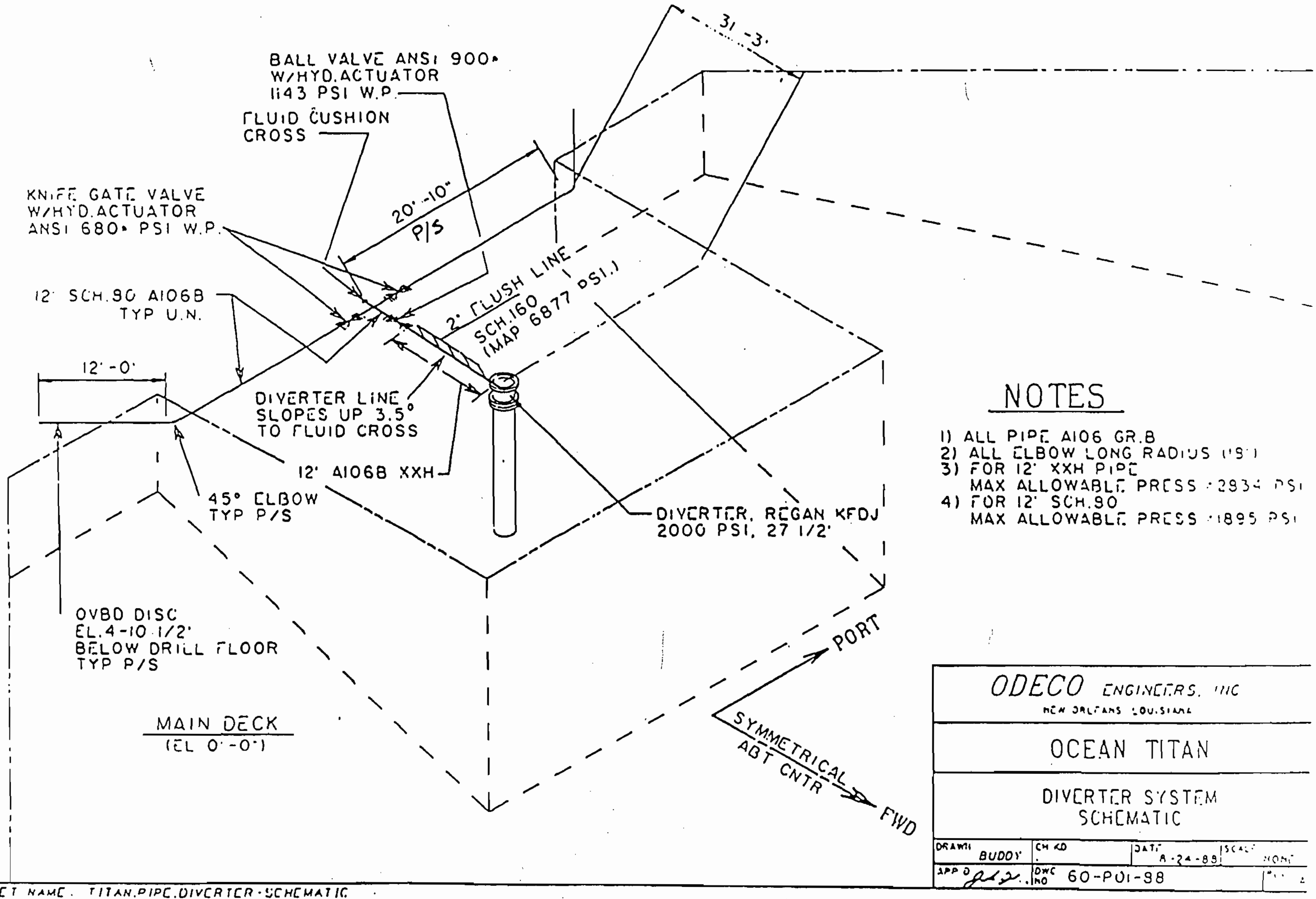
3) When the packer valve is closed the air over hydraulic circuitry places the valves in the following positions then closes the packer.

    - a.) Flowline valve closed
    - b.) Vent line ball valve open
    - c.) Port and starboard overboard valves open.
    - d.) Choke valve closed.

4.) After the packer is closed, either the port or starboard overboard valve can be closed but not both at the same time. The circuitry is such that only one valve can be closed, either with the packer open or closed.

## TEST FUNCTION:

1.) When the test function is operated from the main panel all valves can be closed simultaneously with the packer closed. This function allows the system to be hydro-tested with the packer closed on drill pipe or other suitable tubular.



## NOTES

1) ALL PIPE A106 GR.B
2) ALL ELBOW LONG RADIUS ([illegible])
3) FOR 12" XXH PIPE
MAX ALLOWABLE PRESS =2934 PSI
4) FOR 12" SCH.90
MAX ALLOWABLE PRESS =1895 PSI

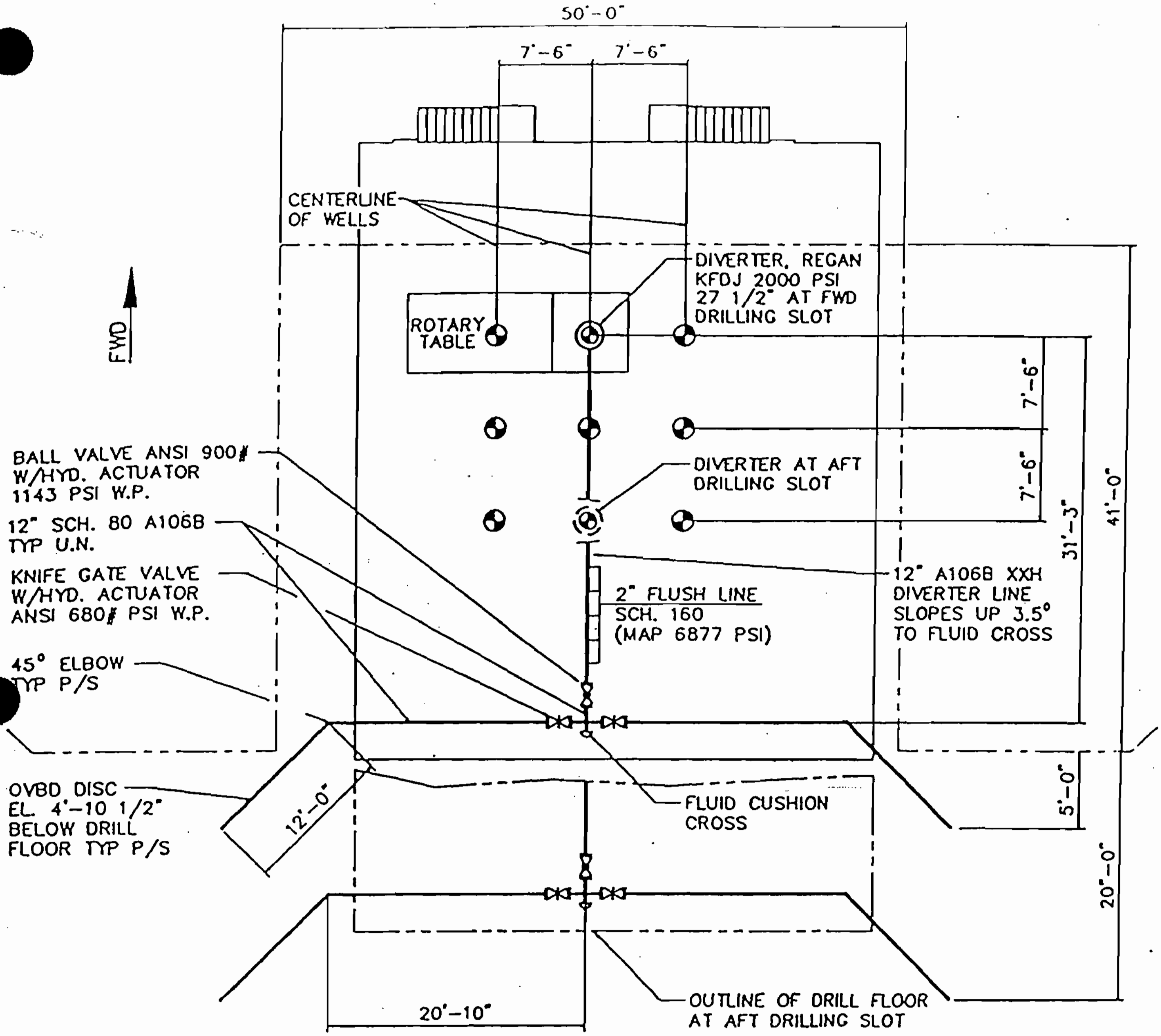
ODECO ENGINEERS, INC
NEW ORLEANS LOUISIANA

OCEAN TITAN

DIVERTER SYSTEM
SCHEMATIC

| | | | |
|---|---|---|---|
| DRAWN BUDDY | CH KD | DATE 8-24-89 | SCALE NONE |
| APP D | DWG NO 60-P01-98 | | |

DATASET NAME. TITAN.PIPE.DIVERTER-SCHEMATIC
DRAWING NAME: 1 PLOT LAYER:
DRAWING DATE. 05-10-89 08.26:31



PLAN

NOTES:

1. ALL PIPE A106 GR.B
2. ALL ELBOW LONG RADIUS (18")
3. FOR 12" XXH PIPE
   MAX ALLOWABLE PRESS.=2834 PSI
4. FOR 12" SCH.80
   MAX ALLOWABLE PRESS.=1895 PSI

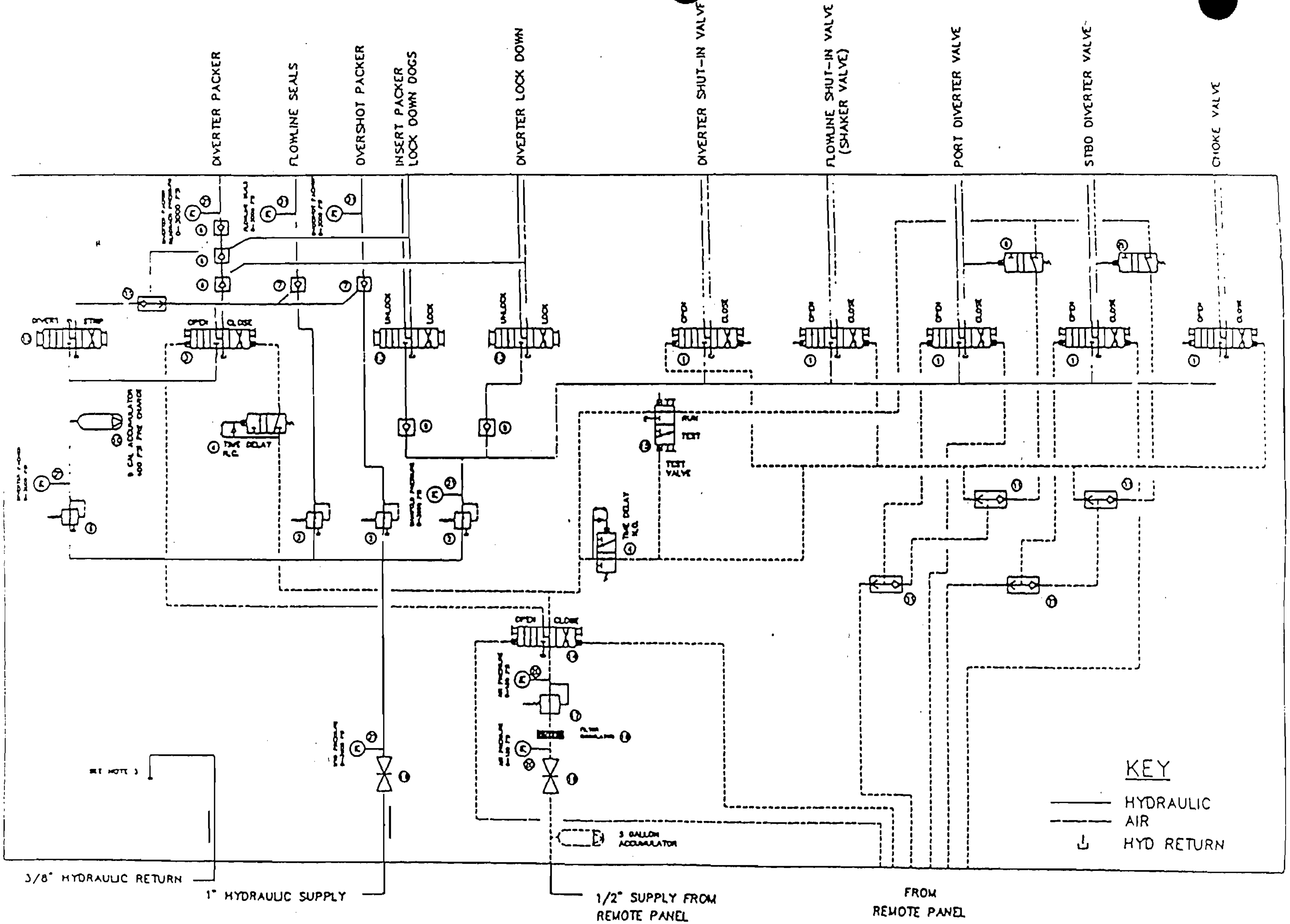
ODECO ENGINEERS, INC.
NEW ORLEANS, LOUISIANA

OCEAN TITAN

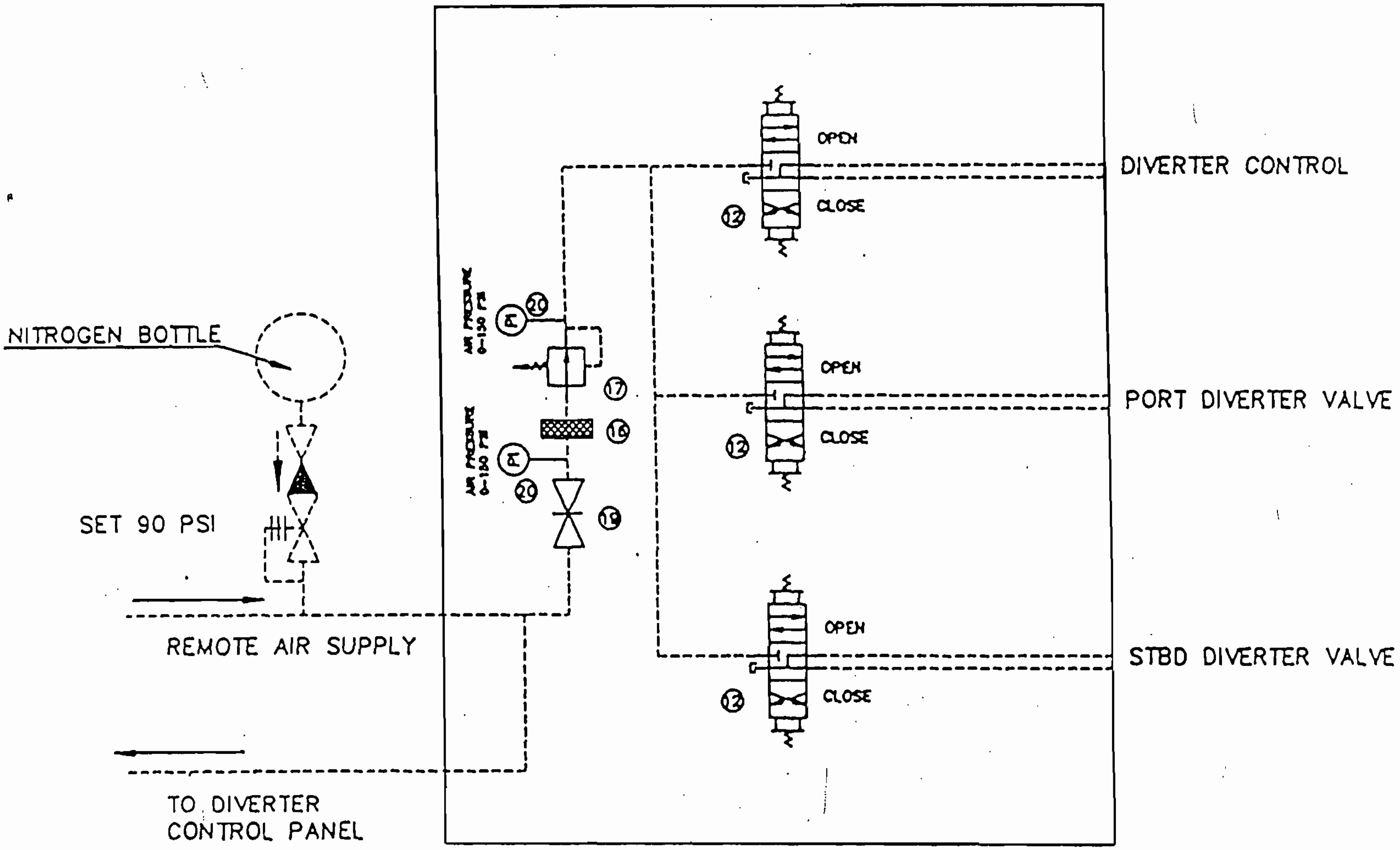
DIVERTER PIPING POSITIONS
AT DRILLING SLOT

| | | | |
|---|---|---|---|
| DRAWN APB | CHKD | DATE 9-30-89 | SCALE NONE |
| APP'D | DWG NO. 60-P02-89 | | REV |

BEST AVAILABLE COPY

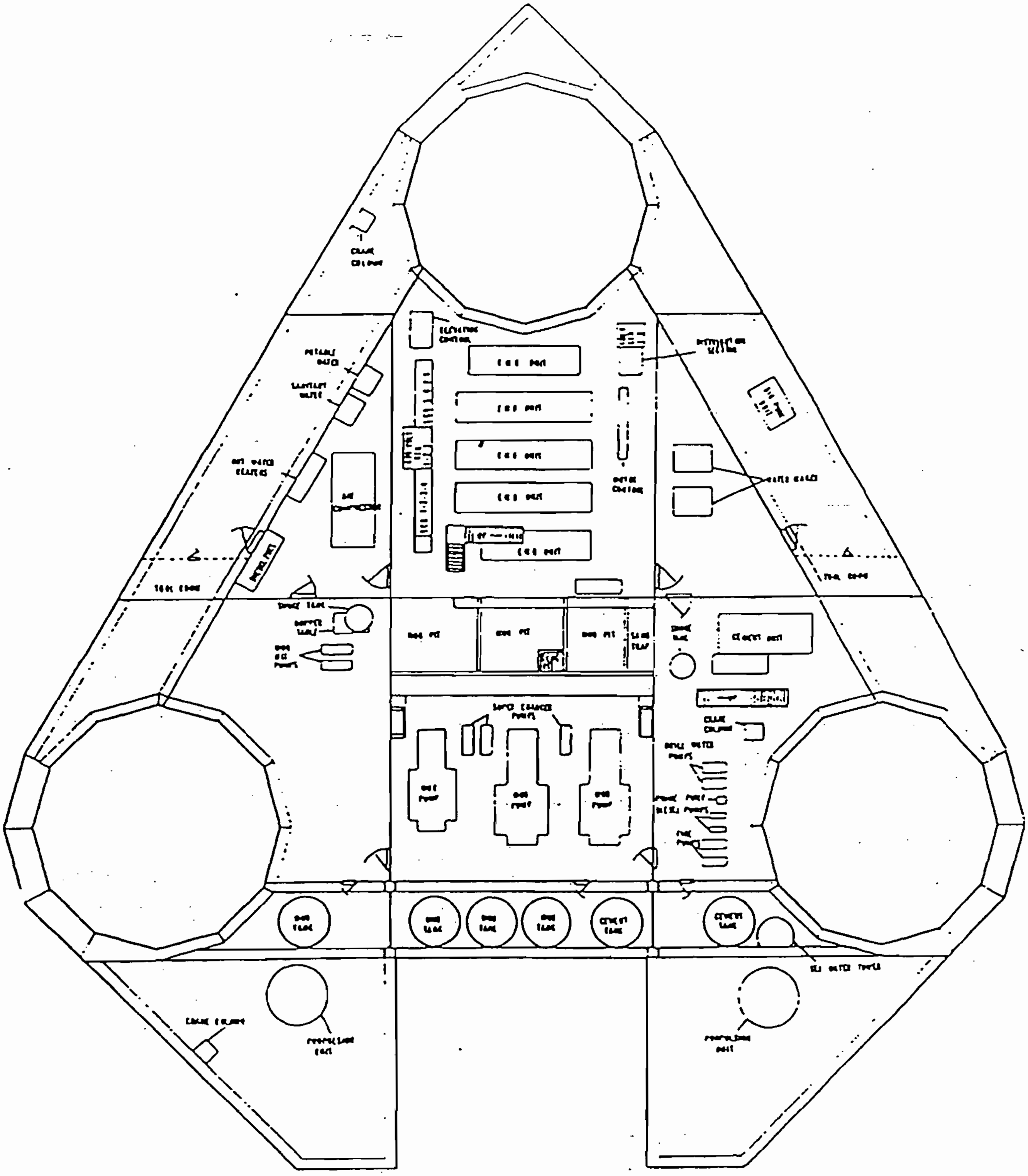


DIVERTER CONTROL PANEL



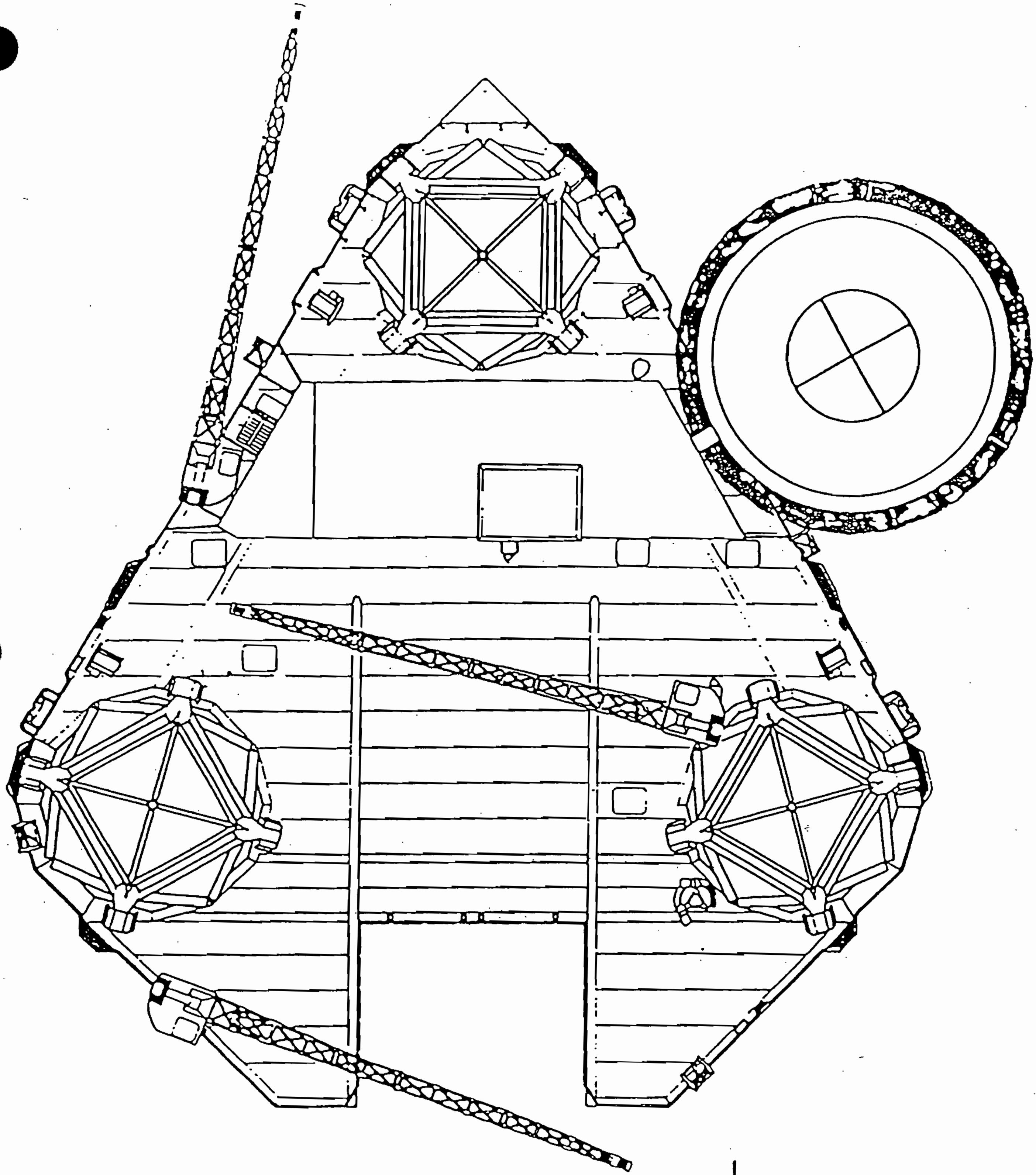
REMOTE PANEL

**BEST AVAILABLE COPY**



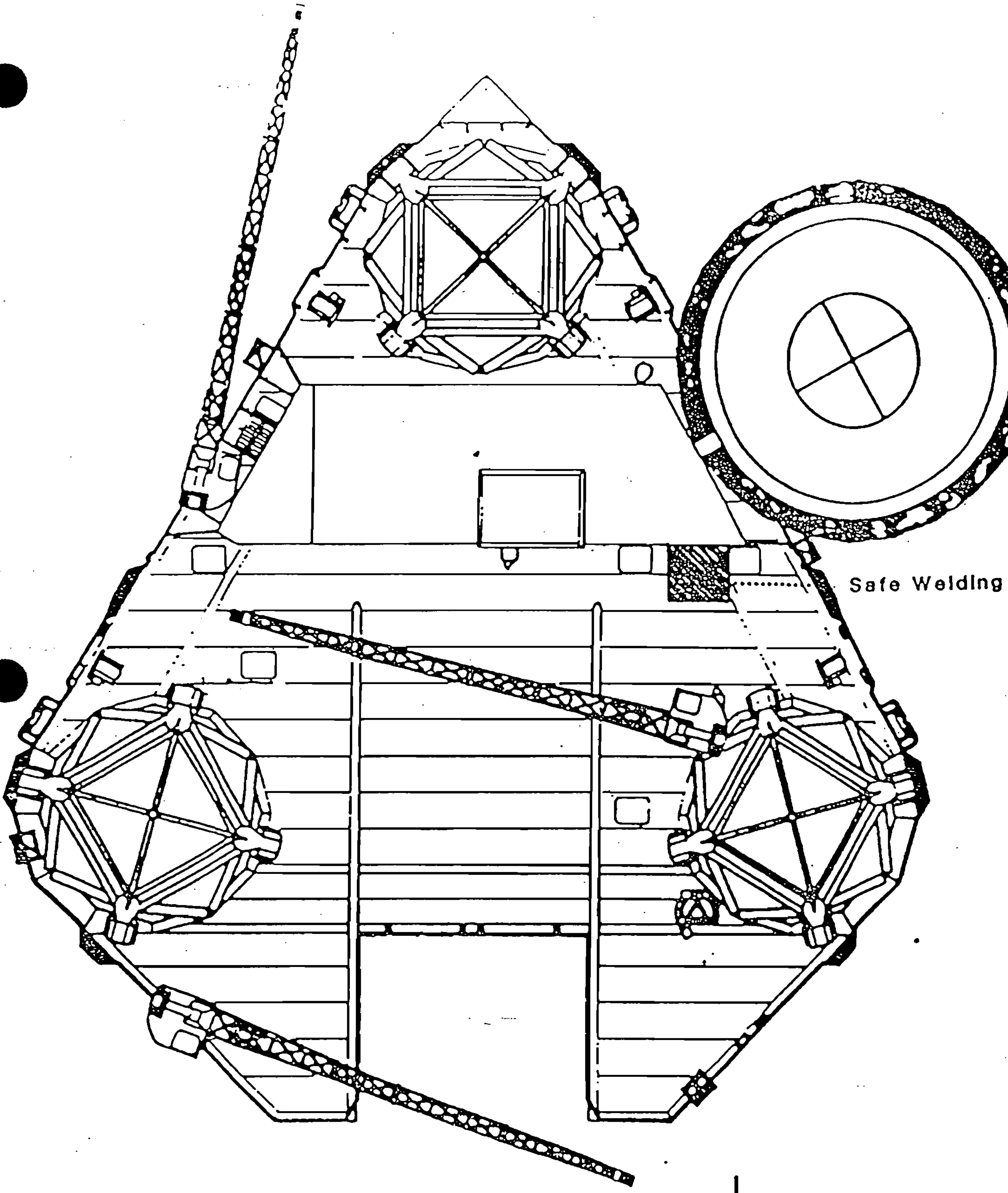
ODECO OCEAN TITAN

LOWER DECK
ARRANGEMENT



ODECO OCEAN TITAN

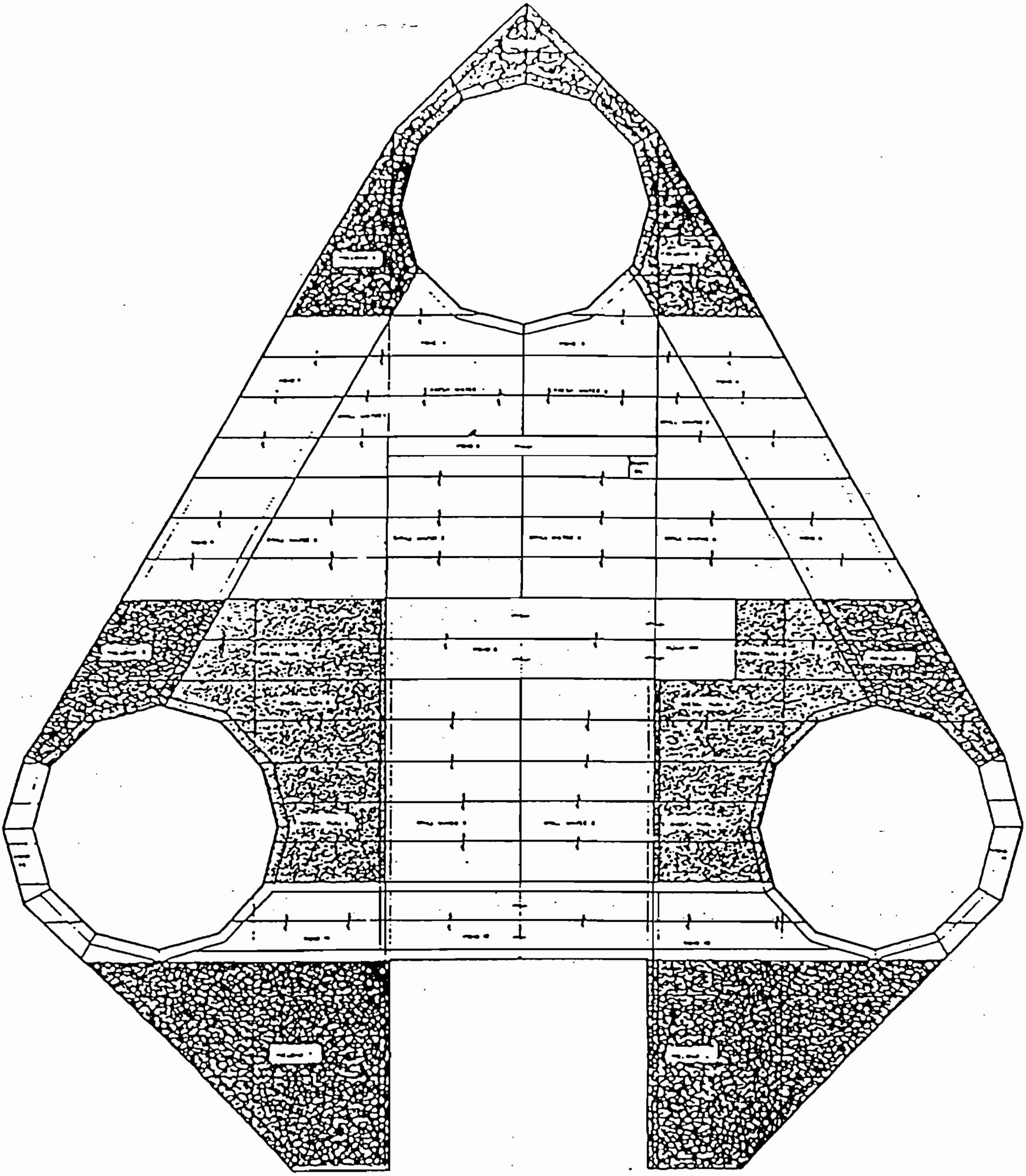
MAIN DECK ARRANGEMENT



ODECO OCEAN TITAN

▨ Safe Welding Area

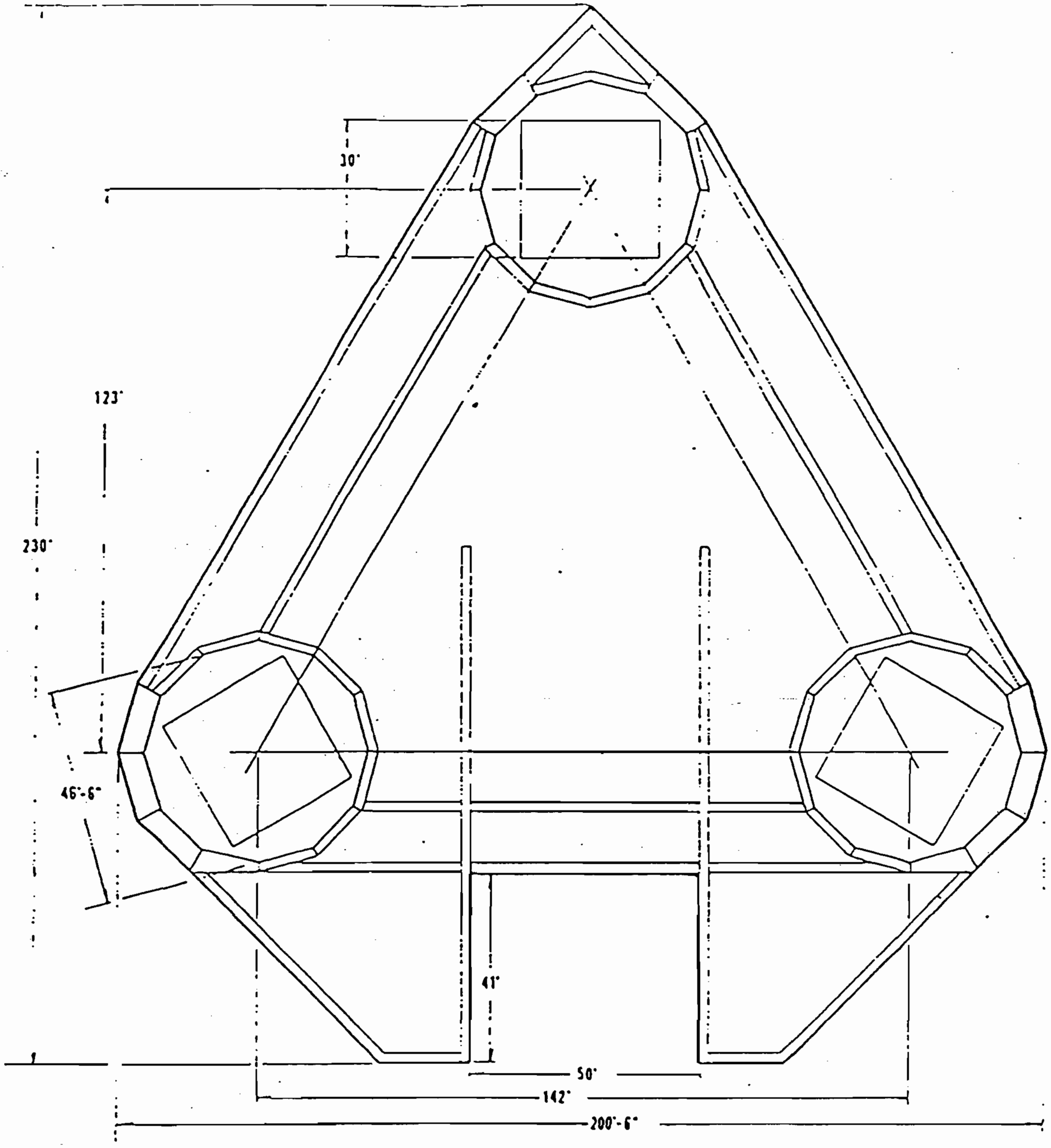
**BEST AVAILABLE COPY**



ODECO OCEAN TITAN

INTER-BOTTOM LAYOUT

# OVERALL DIMENSIONS

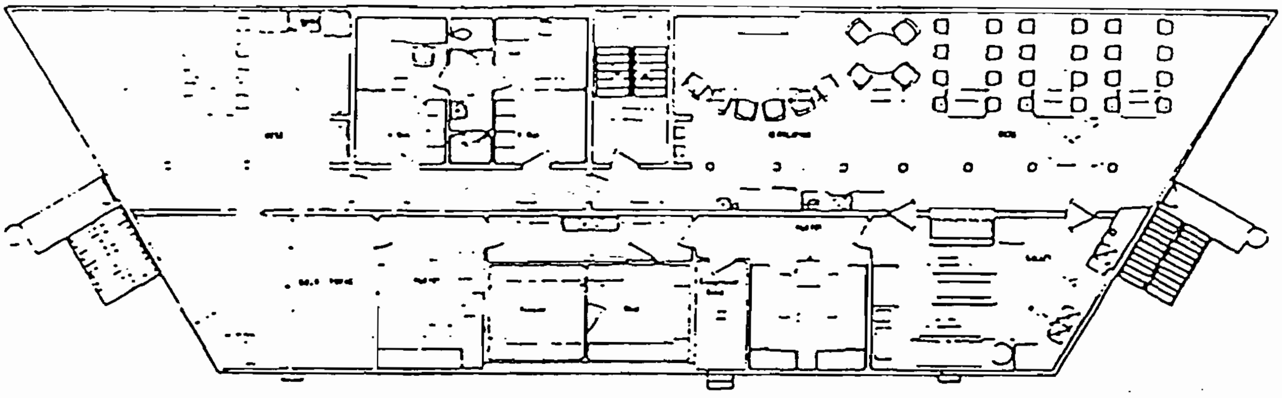


ODECO OCEAN TITAN

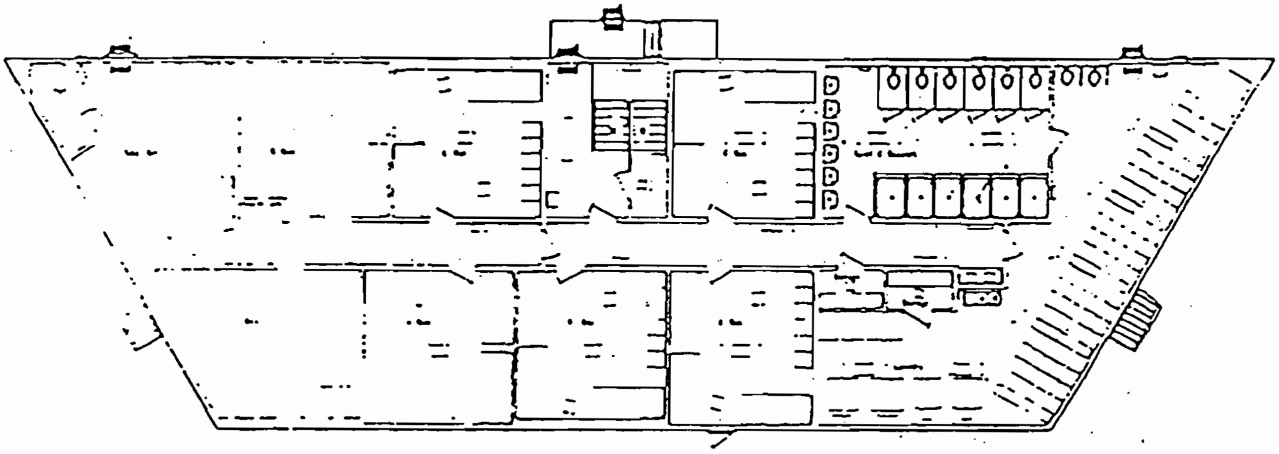
OVERALL DIMENSIONS

**BEST AVAILABLE COPY**

## QUARTERS



2nd LEVEL

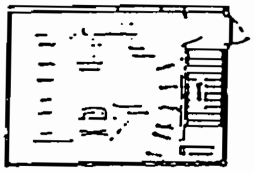


1st LEVEL

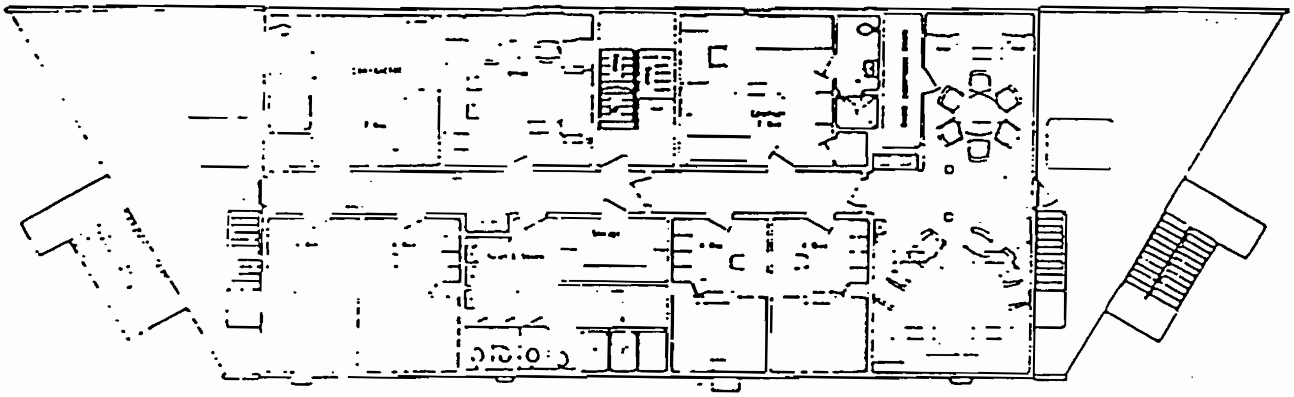
ODECO OCEAN TITAN

QUARTERS

## QUARTERS



CONTROL HOUSE



3rd LEVEL

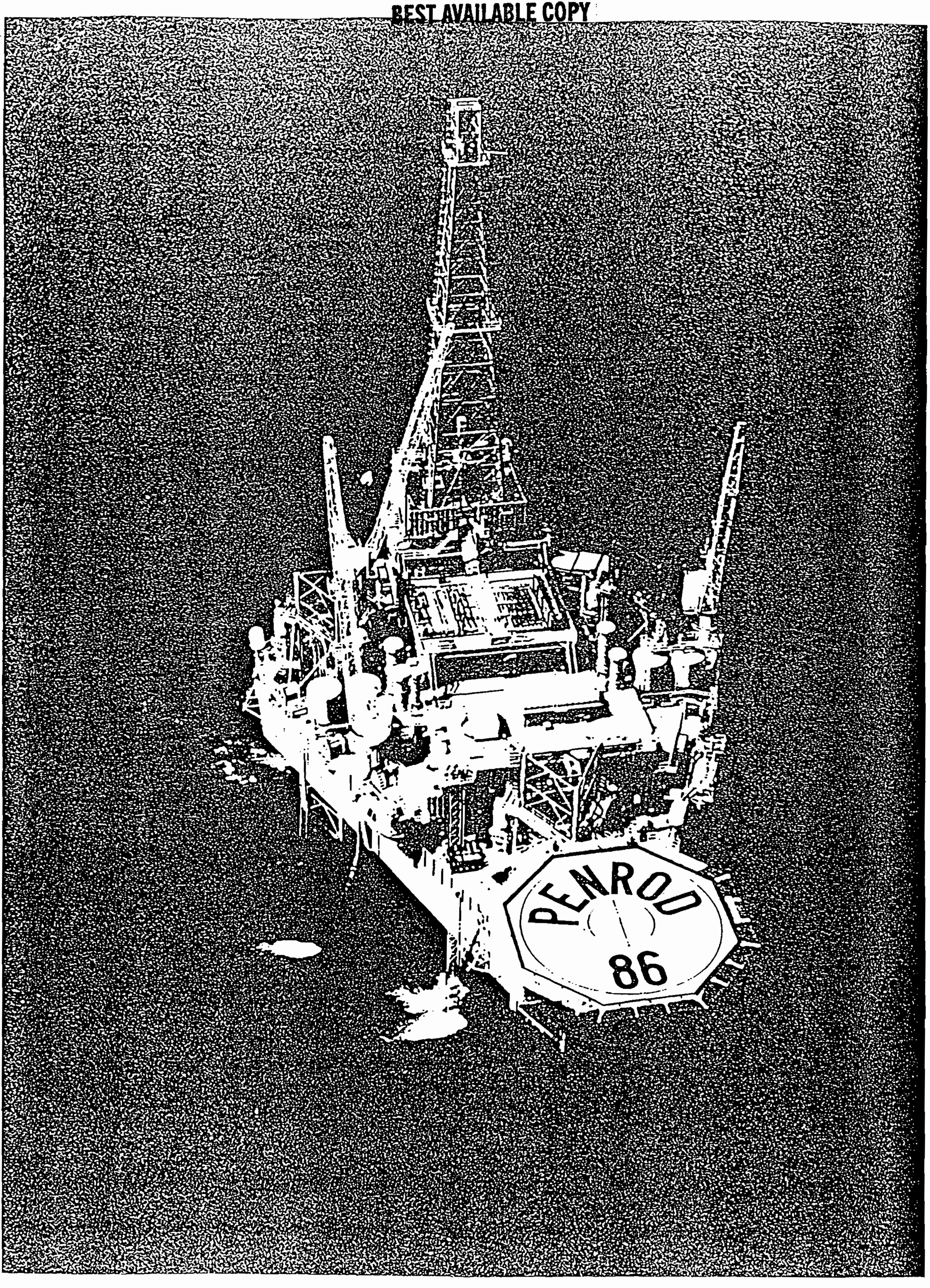
ODECO OCEAN TITAN

QUARTERS

Revision - △5

# PENROD RIG 86

# RIG INFORMATION BOOKLET


PENROD
86

PENROD 86
Cantilever Jack-up

---

Nominal water depth rating 250 ft.

---

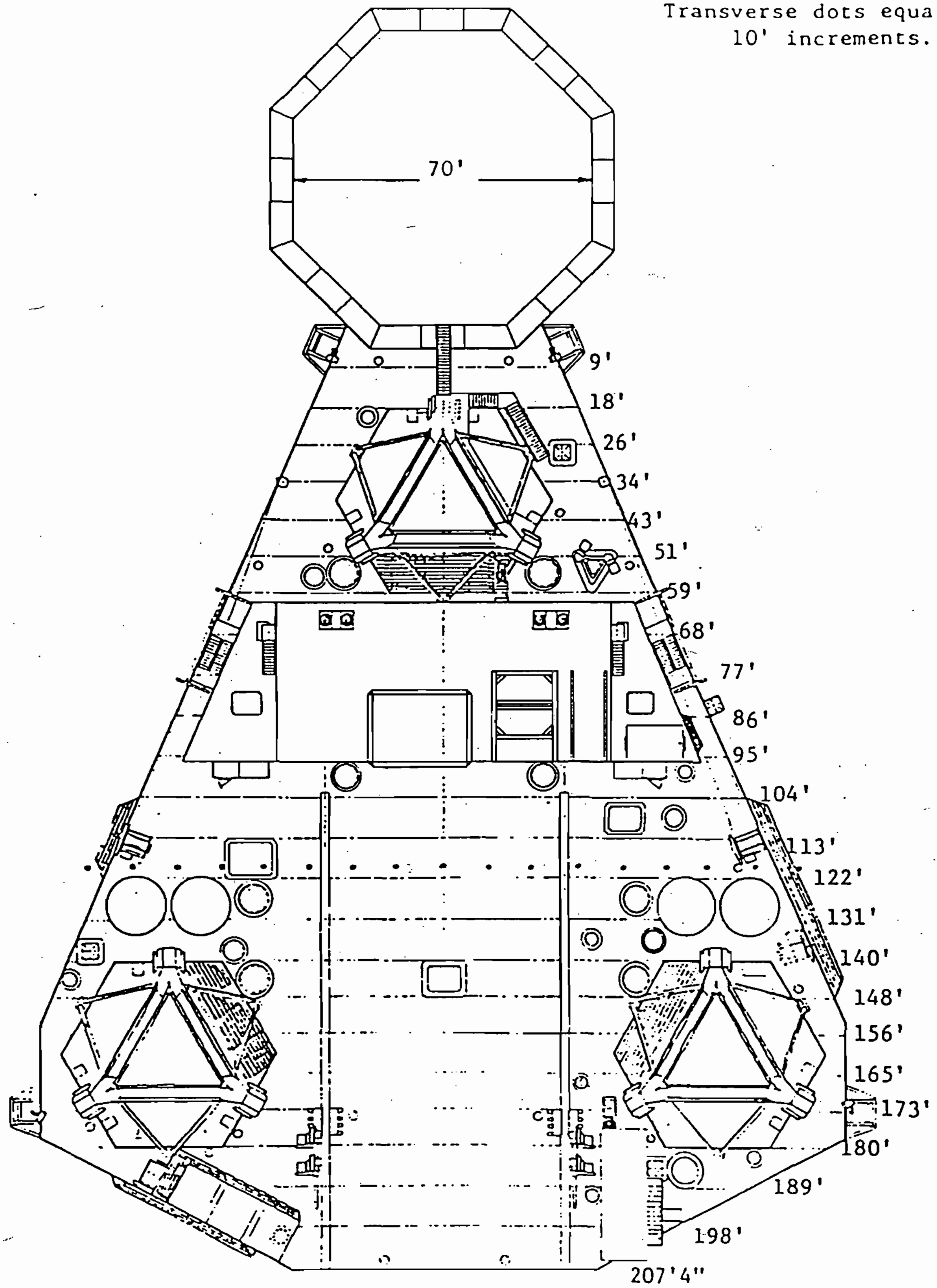
| | |
|---|---|
| Builder | Marathon LeTourneau Class 82 SD-C |
| Registered Flag | U.S.A. |
| Classification | A.B.S. |
| Certification | U.S.C.G. - Certificate of Inspection |
| Overall Length | 207 ft. |
| Overall Width | 176 ft. |
| Depth | 20 ft. |
| Leg Length | 360 ft. |
| Usable Leg Below Hull | 313 ft. |
| Number of Legs | 3 |
| Leg Type | Triangular Truss |
| Spud Tank Dia. | 40' Across Flats |
| Spud Tank Height | 21' |
| Cranes | Three LeTourneau PCM-120 AS Elect. |
| Anchoring System | Four Marathon LeTourneau W-1500 TS anchor winches with 5 Ton LWT anchors and 1500' of 1 1/2" wire. |
| Maximum Variable Load | Transit 2505.93 kips<br>Drilling 3482.28 kips<br>Survival 2482.28 kips<br>MOBILE BAY - 4,482,280 KIPS |
| Storage | |
| Drilling Water | 3,996 bbls. |
| Potable Water | 983 bbls. |
| Fuel Oil | 2,058 bbls. |
| Liquid Mud | 1,470 bbls. |
| Total Bulk Mud and Cement | 7,700 cu. ft. |
| Sack Storage | 2,500 sacks |
| Sewage Treating System | Red Fox 7500 USGS Type II |
| Desalinization Unit | One Maxim TCF 7.5<br>7,500 GPD |
| Heliport | S-61 or equivalent |
| Quarters | Bunks for 72 persons; certified for 69 persons; 6 bunk hospital; 2 galleys/ dining areas |

| | |
|---|---|
| Personnel Survival | Two davit launched self propelled 58 man and one 23 man Watercraft life boats. |
| Drilling Equipment | |
| | Rated to 30,000 ft. |
| Drawworks | National 1625-UDBE (3000 H.P.) with a hydraulic disk brake and a Baylor 7838 electric brake |
| Main Power Plant | 3-EMD 12-645 E4B diesel engines, each rated at 2500 brake hp., each driving an EMD AB 20-6 AC generator producing 1790 kw, 600 volts. Five bay Baylor/IPS 750 volt DC SCR conversion system. |
| Pumps | Two National 12P-160 Triplex 1600 H.P. mud pumps each powered by two EMD D79 electric motors. |
| Rotary | Nat'l D-375 with independent electric drive (1000 H.P.) |
| BOP Equipment | Hydril MSP 21 1/4" x 2000 psi<br>Shaffer 13 5/8" x 5000 psi<br>Cameron 13 5/8" x 10,000 psi Type U double<br>Two Cameron 13 5/8" x 10,000 psi Type U singles |
| Choke Manifold | 3 1/16" x 10,000 psi with a Swaco Super Choke. |
| Substructure Derrick | 160' x 30' Dreco with maximum hook load capacity of 1,300,000 lbs. |
| Drill Collars | 9 3/4" - 8" - 6 1/2" |
| Drill Pipe | 5" OD x 19.5 and 25.60 lb. Grade X-95 Range 2 |
| Mud Mixing Pumps | Two 5" x 6" centrifugals |
| Cementing Unit | Dowell CPS401 electric |
| Shale Shakers | Two Brandt Retro F.S. Baskets cascading over Three Derrick Flo-Line Cleaners. |
| Top Drive | Varco TDS4H |

Special Feature: Non-discharge equipped for Mobile Bay operations.

# MAIN DECK LAYOUT

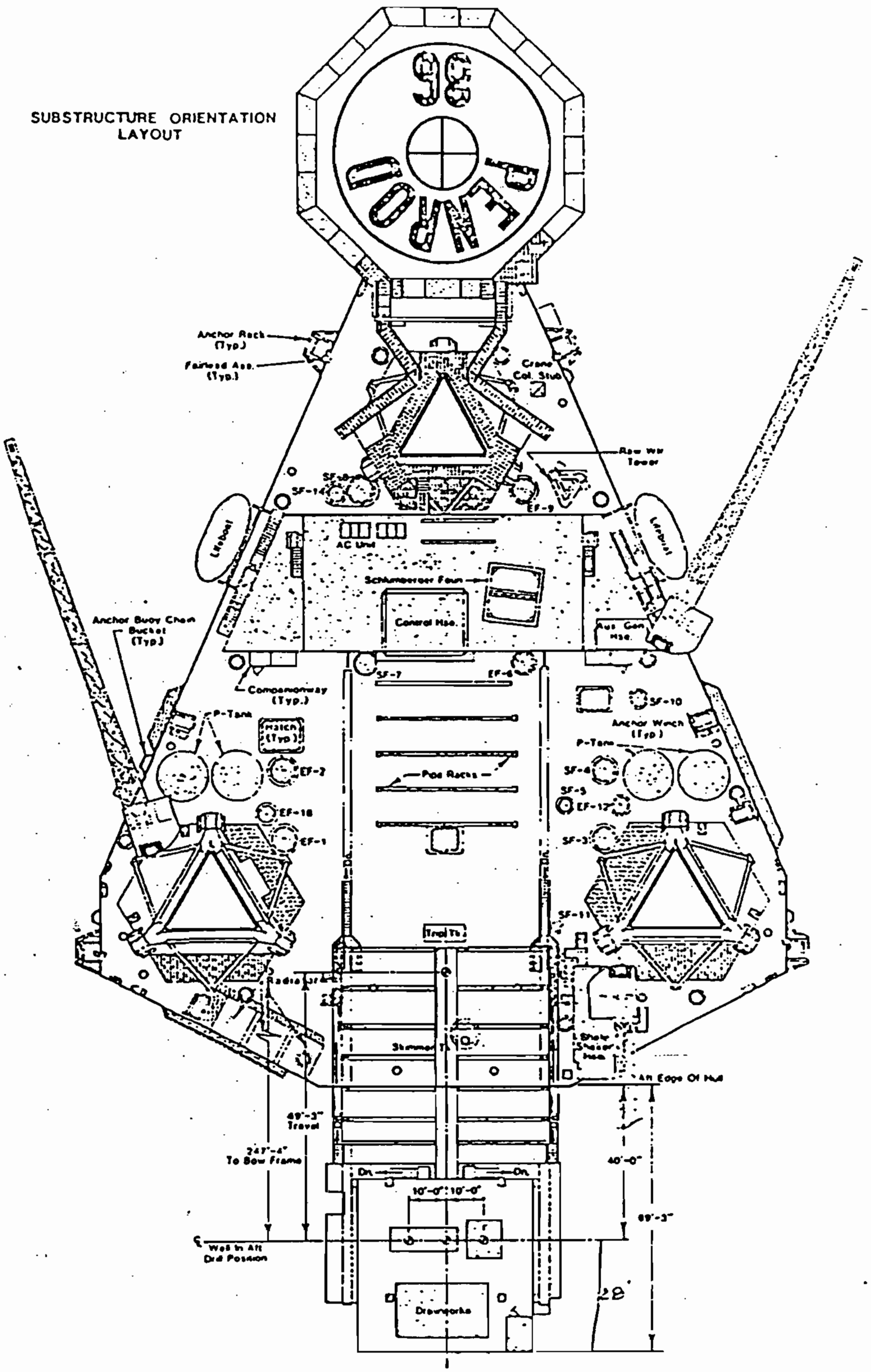
Transverse dots equal
10' increments.



PENROD 86

**BEST AVAILABLE COPY**

MAIN DECK LAYOUT



PENROD 86

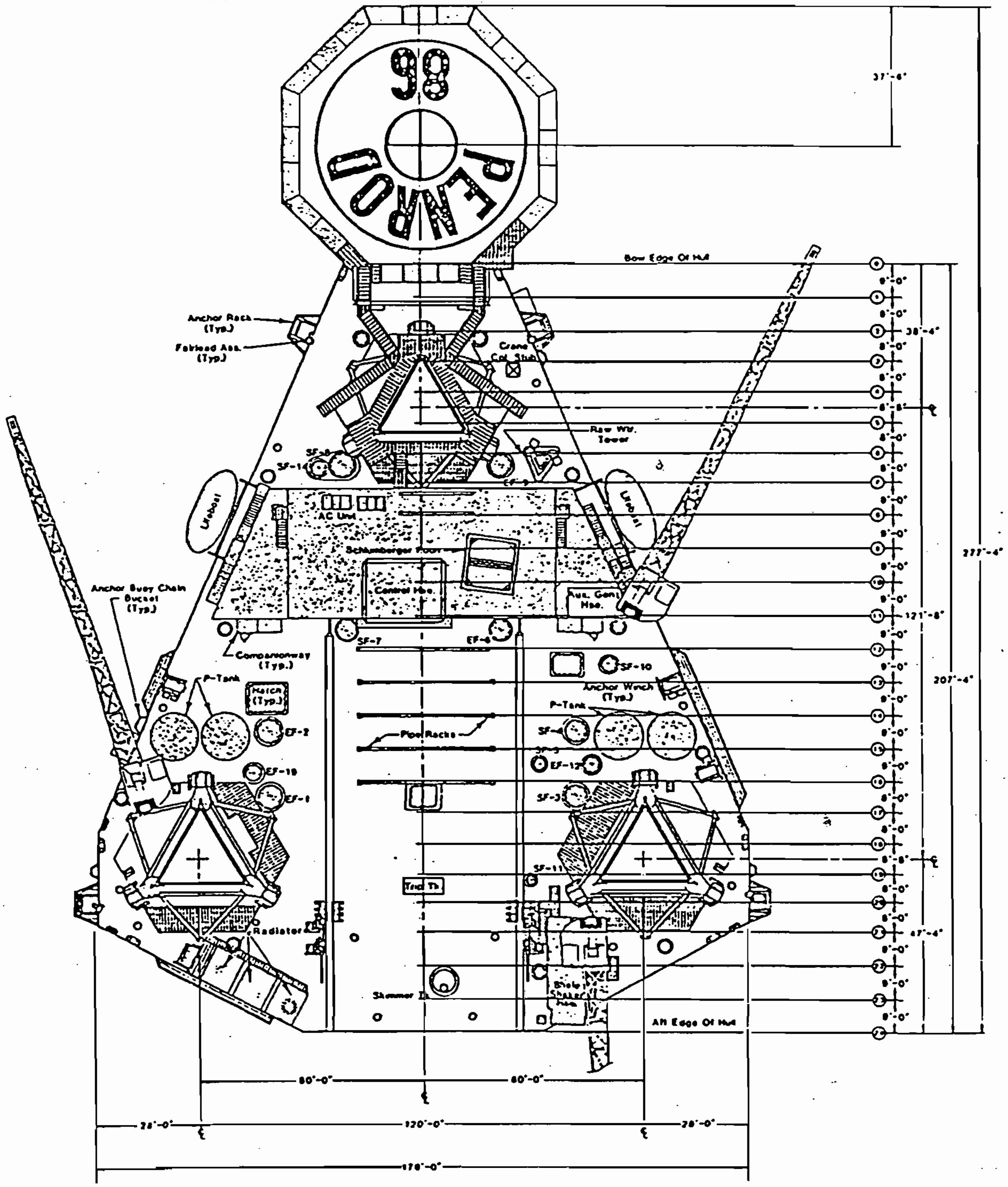
PLATFORM 165

Marathon LeTourneau Company

**BEST AVAILABLE COPY**

MAIN DECK LAYOUT

OVERALL DIMENSIONS



PENROD 86

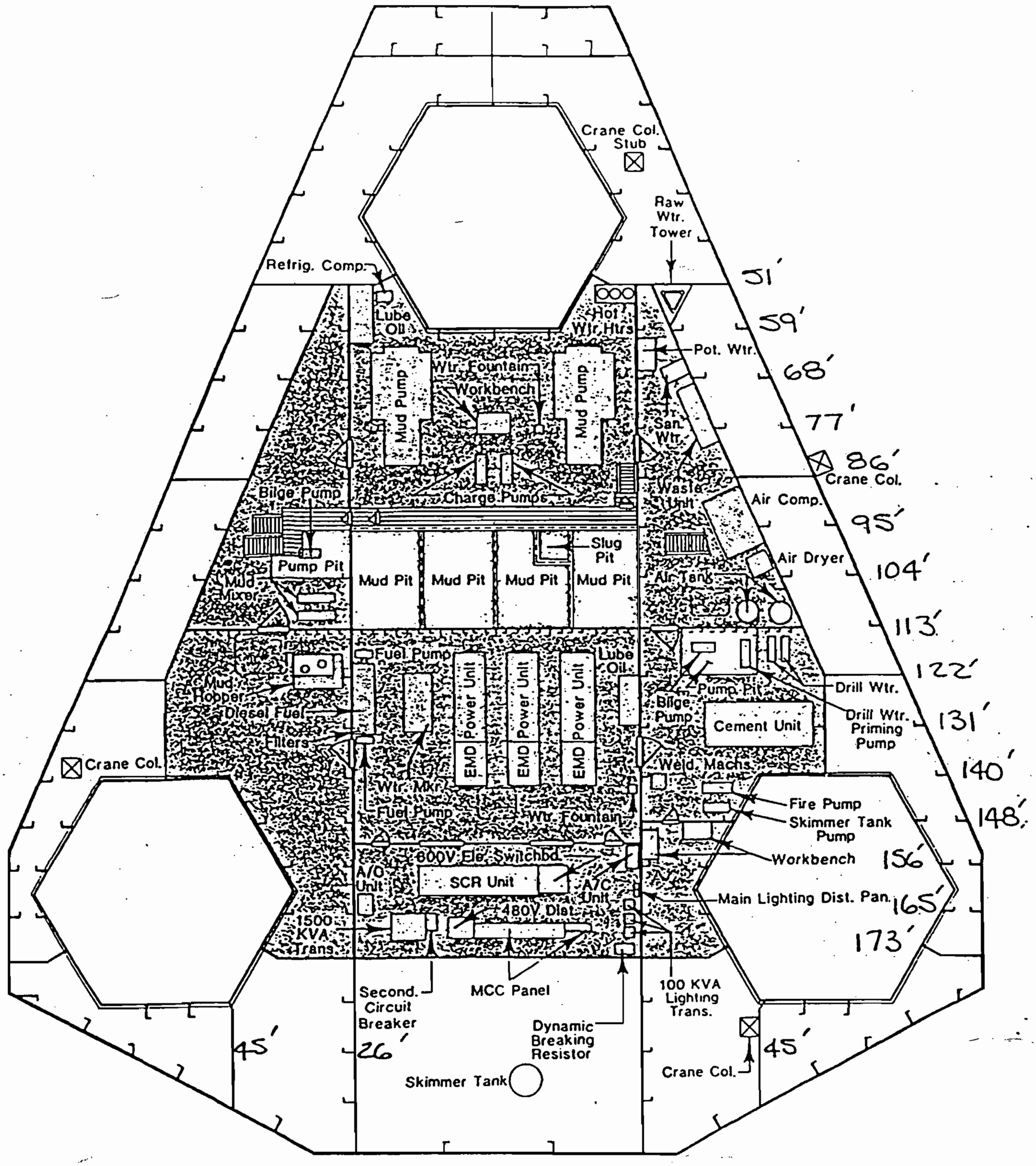
PLATFORM 165

656-9775-82

Marathon LeTourneau Company

BEST AVAILABLE COPY

# MACHINERY DECK LAYOUT



PENROD 86

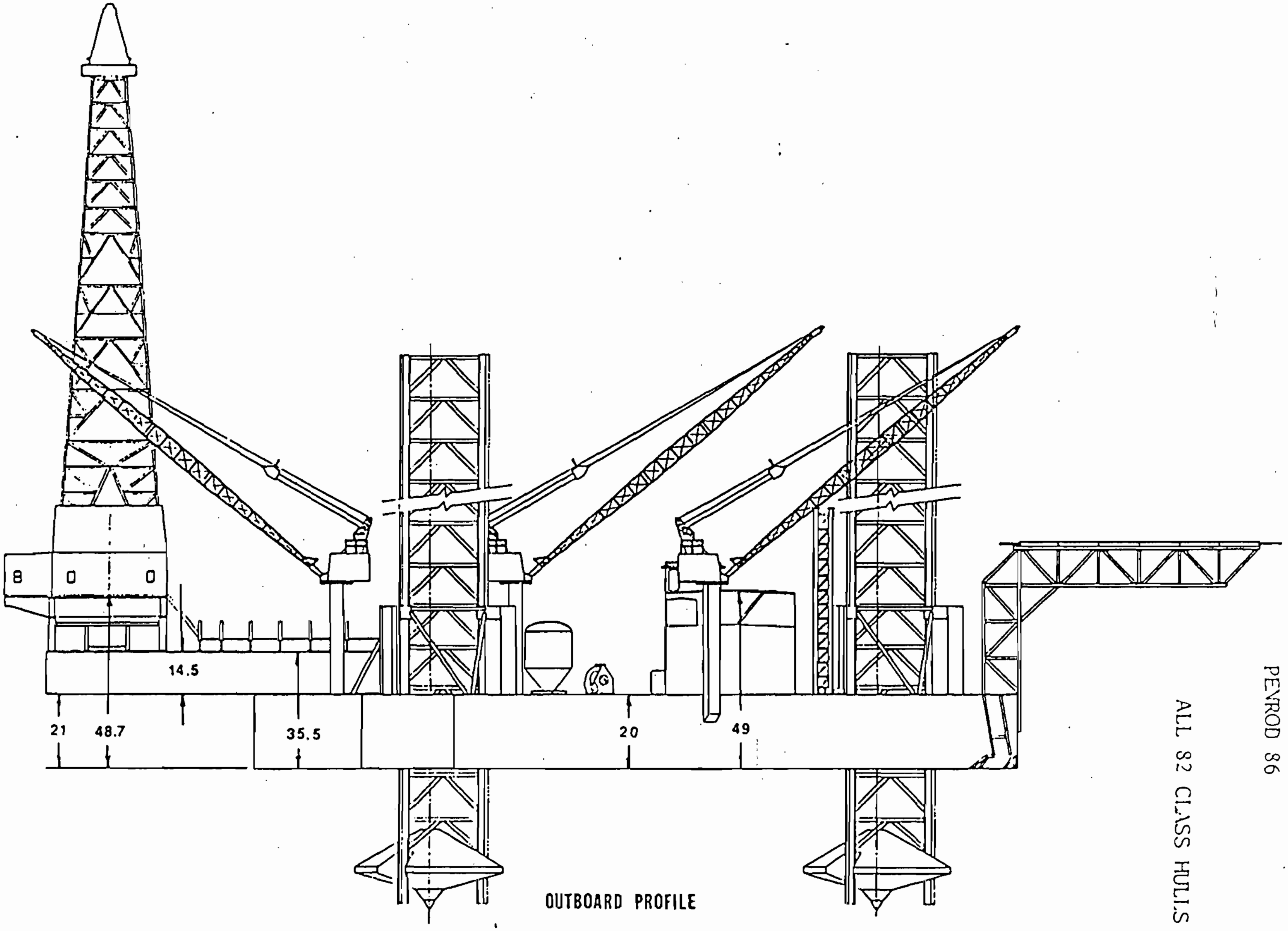
PLATFORM 165

656-9793-82

Marathon LeTourneau Company

marathon letourneau company

656-6285-77



OUTBOARD PROFILE

PENROD 86

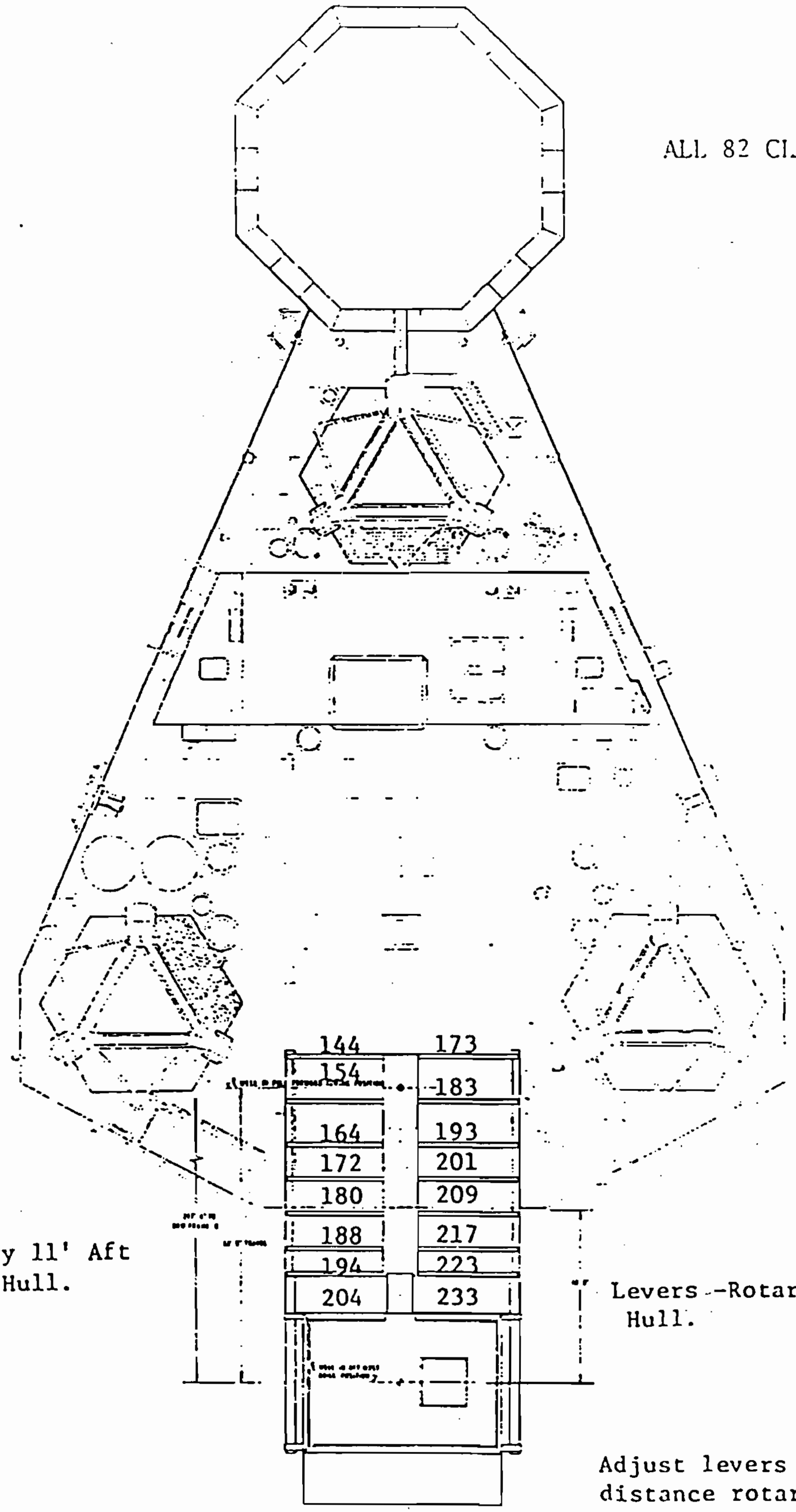
ALL 82 CLASS HULLS

marine division

vicksburg mississippi

MAIN DECK LAYOUT

ALL 82 CLASS HULLS



Levers – Rotary 11' Aft of Hull.

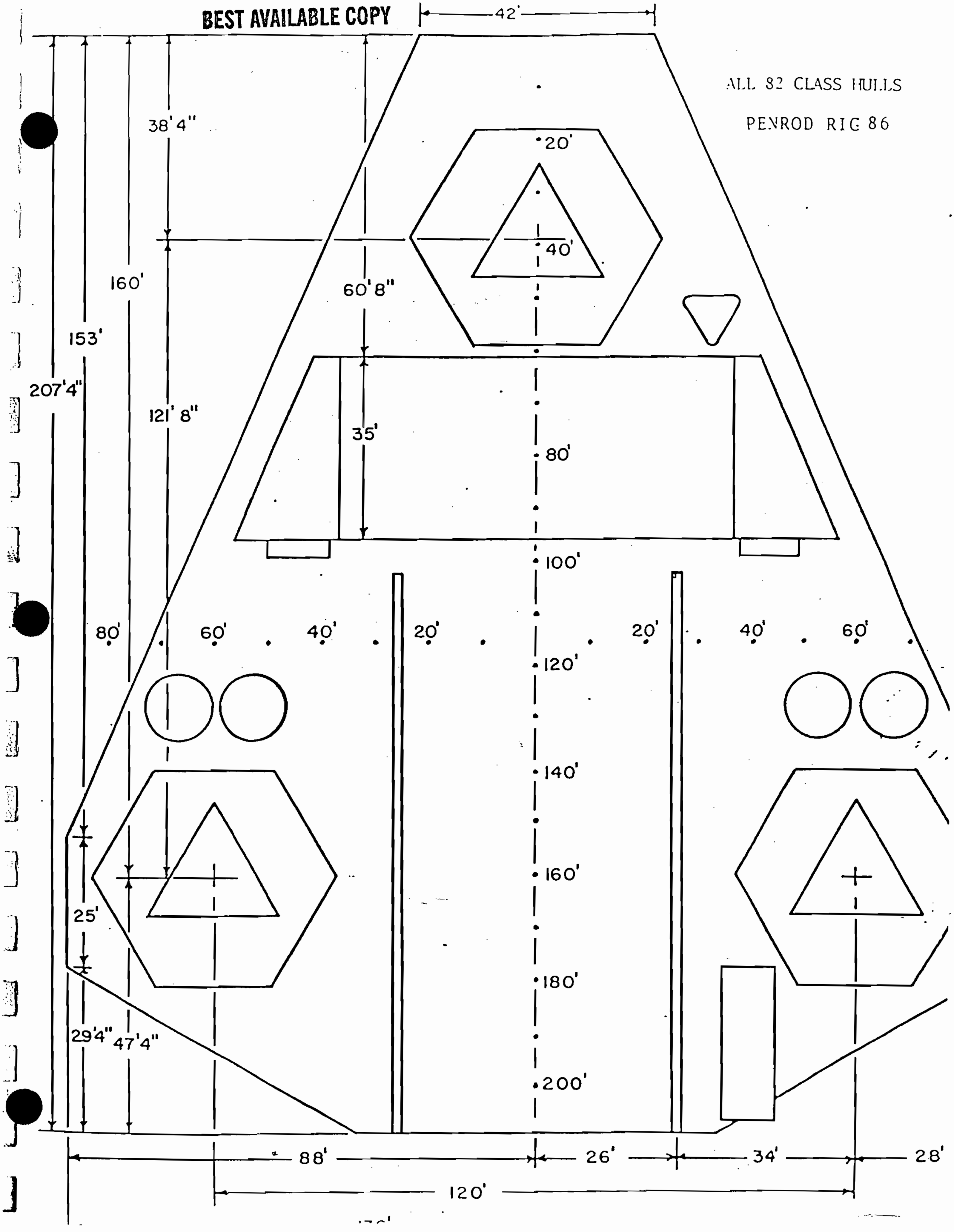
Levers –Rotary 40' Aft of Hull.

SUBSTRUCTURE OREINTATION LAYOUT

Adjust levers to actual distance rotary is aft of hull.

ALL 82 CLASS HULLS

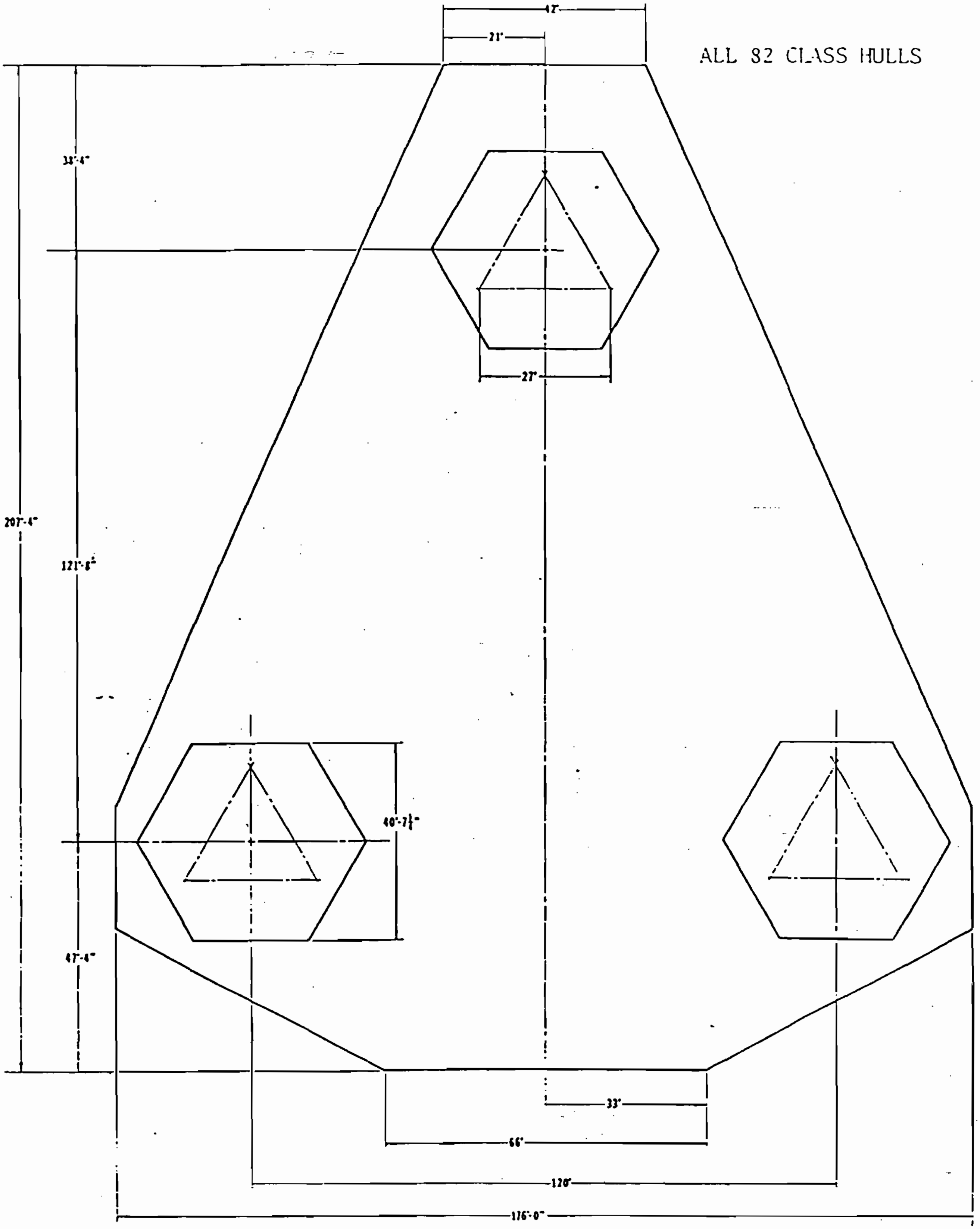
PENROD RIG 86

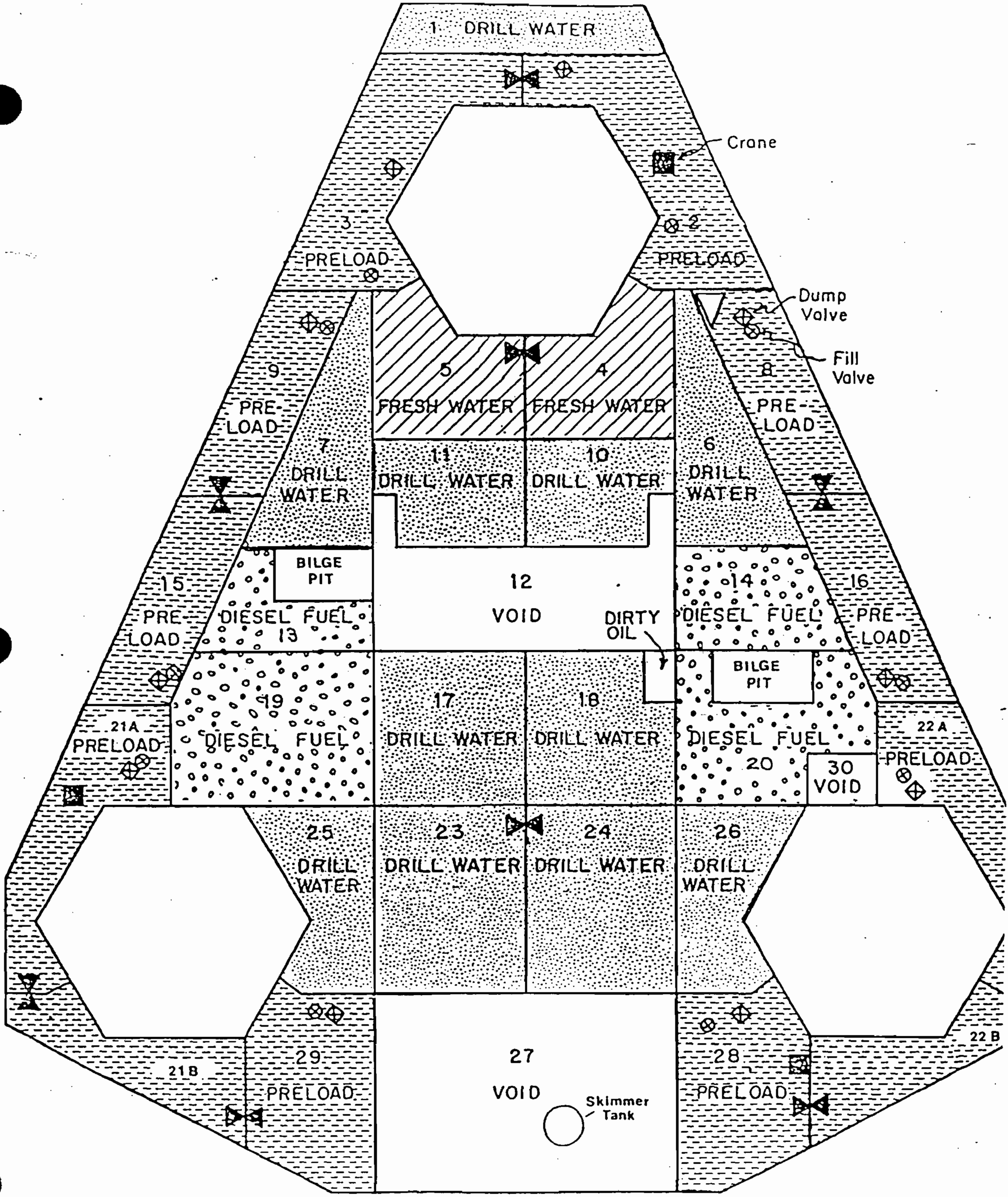


BEST AVAILABLE COPY

## OVERALL DIMENSIONS

ALL 82 CLASS HULLS

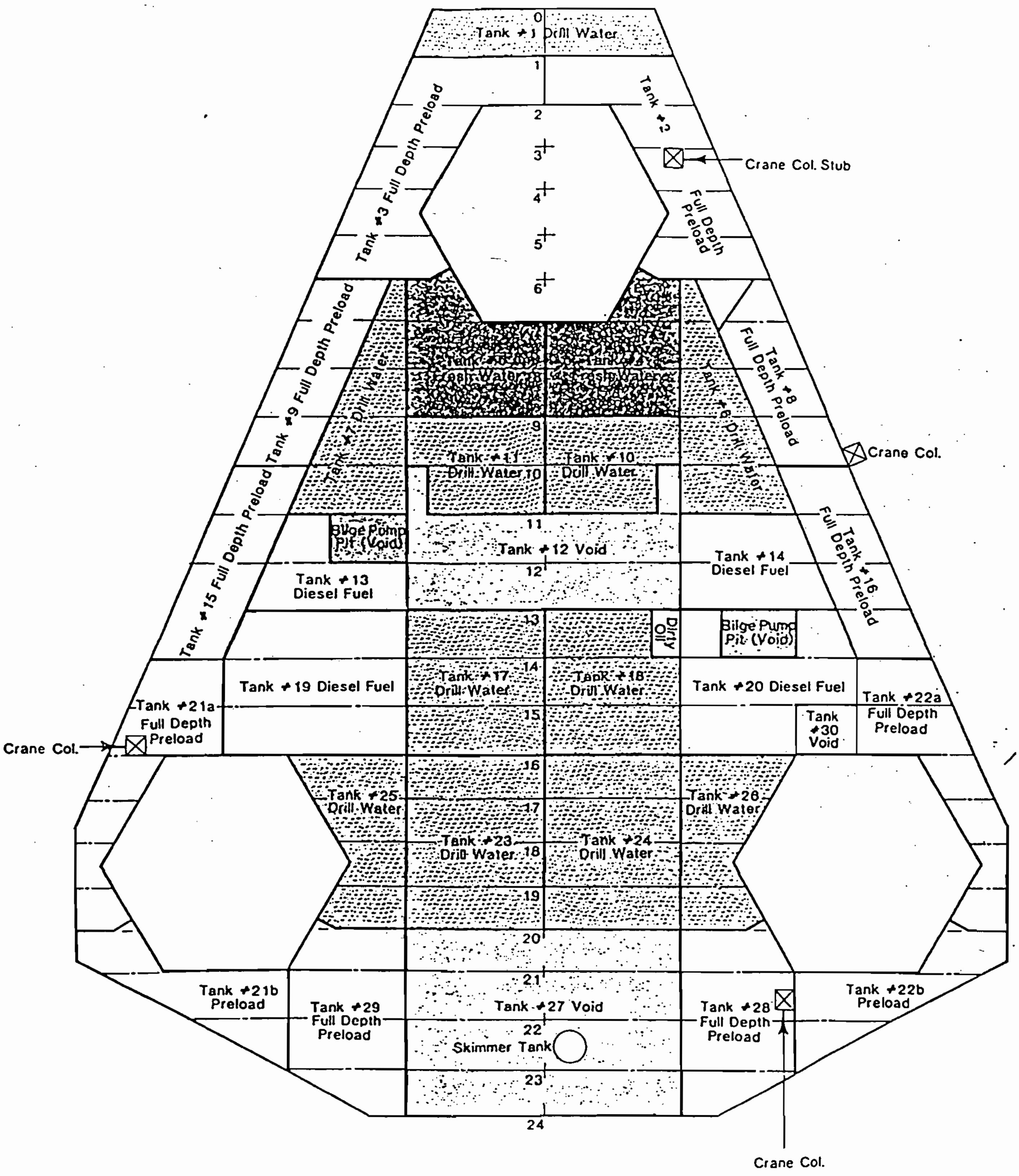




PENROD

86,88,90,98

# INNER BOTTOM TANK LAYOUT



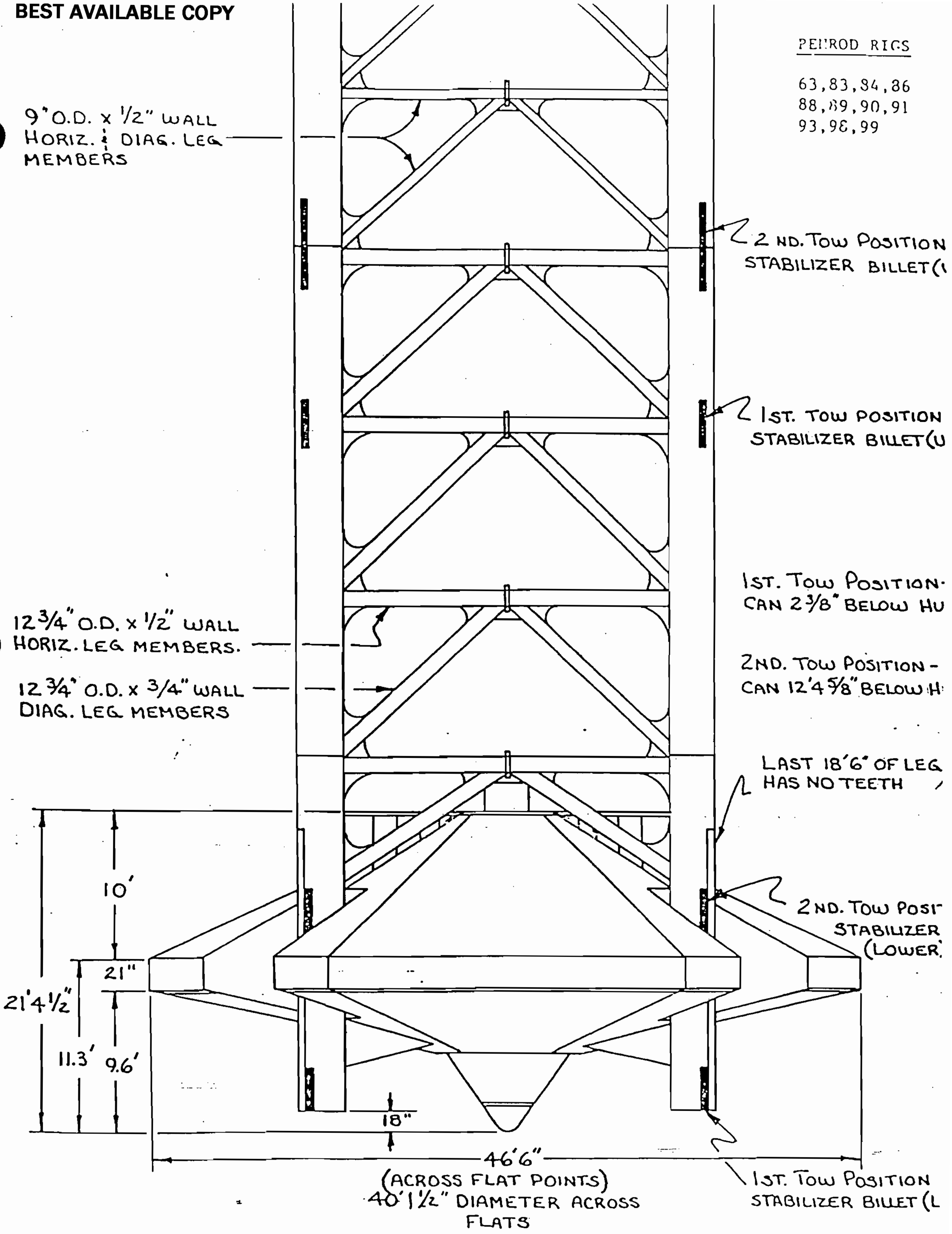
PENROD 86
PLATFORM 165

656-9771-82

Marathon LeTourneau Company

PENROD RIGS

63,83,84,86
88,89,90,91
93,98,99



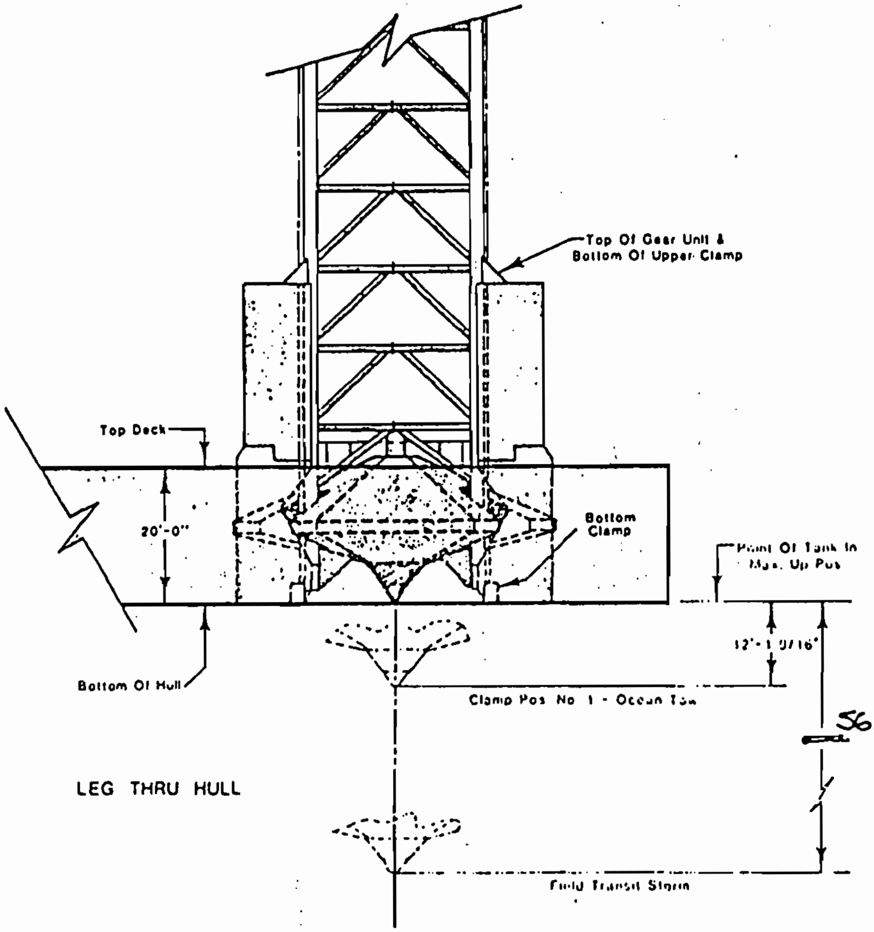
656-10868-82

PLATFORM 165

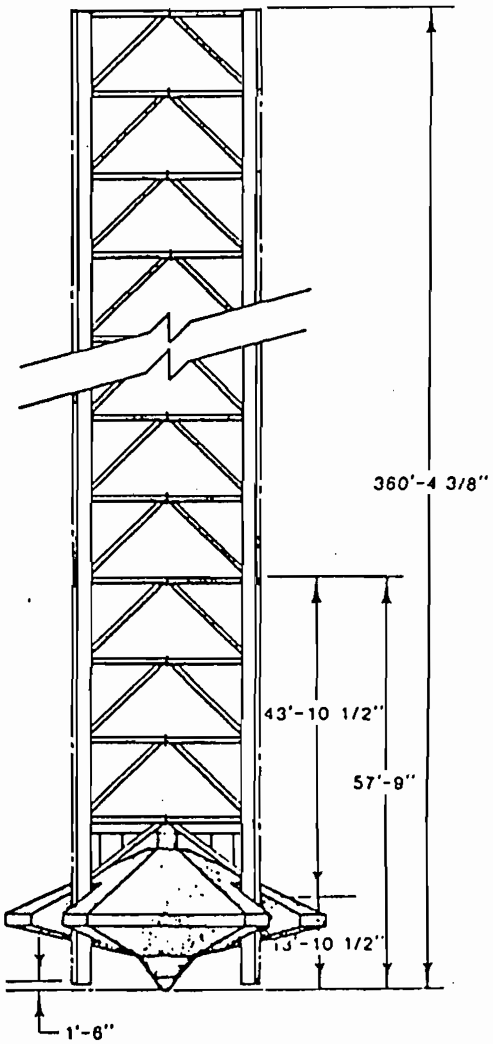
PENROD 86

Marathon LeTourneau Company

© Copyright 1983



LEG THRU HULL



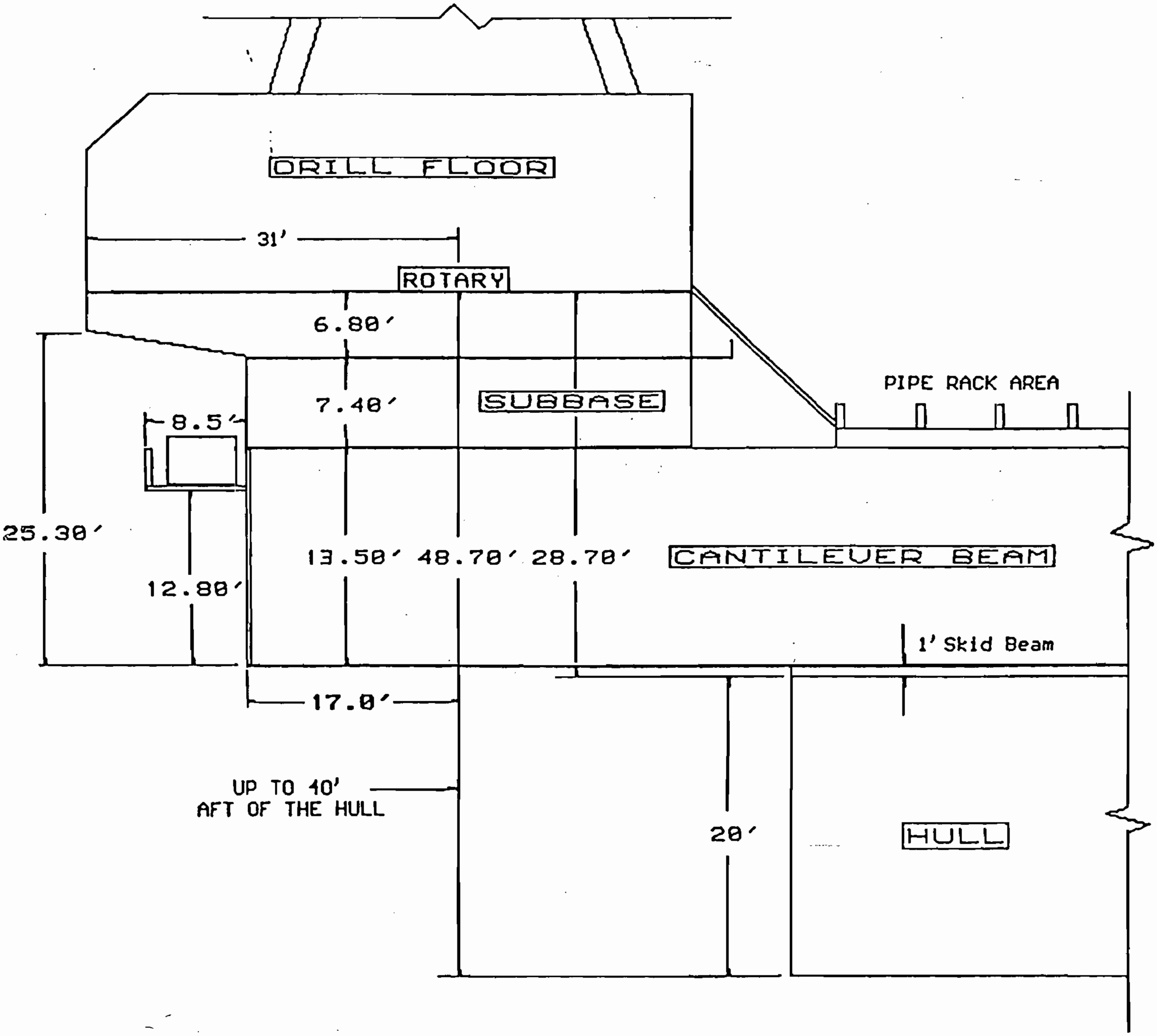
CLAMP BAR LOCATIONS ON LEG

## LEG CLAMPING ORIENTATION LAYOUT

# 82SDC CLASS HULL

## CANTILEVER ASSEMBLY

## SIDE PROFILE

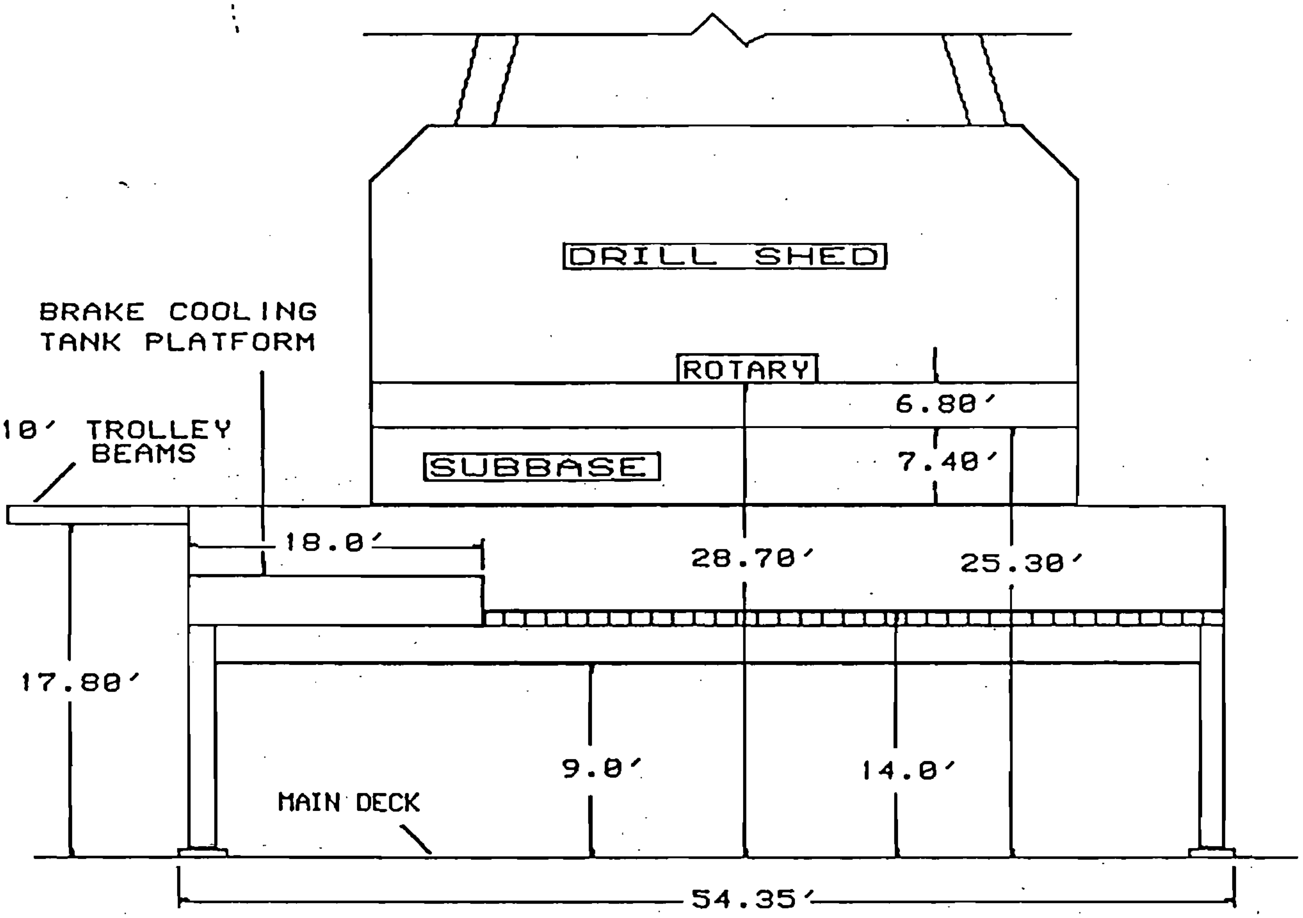


Revised: August 1992

# 82SDC CLASS HULLS

## CANTILEVER ASSEMBLY

## STERN VIEW



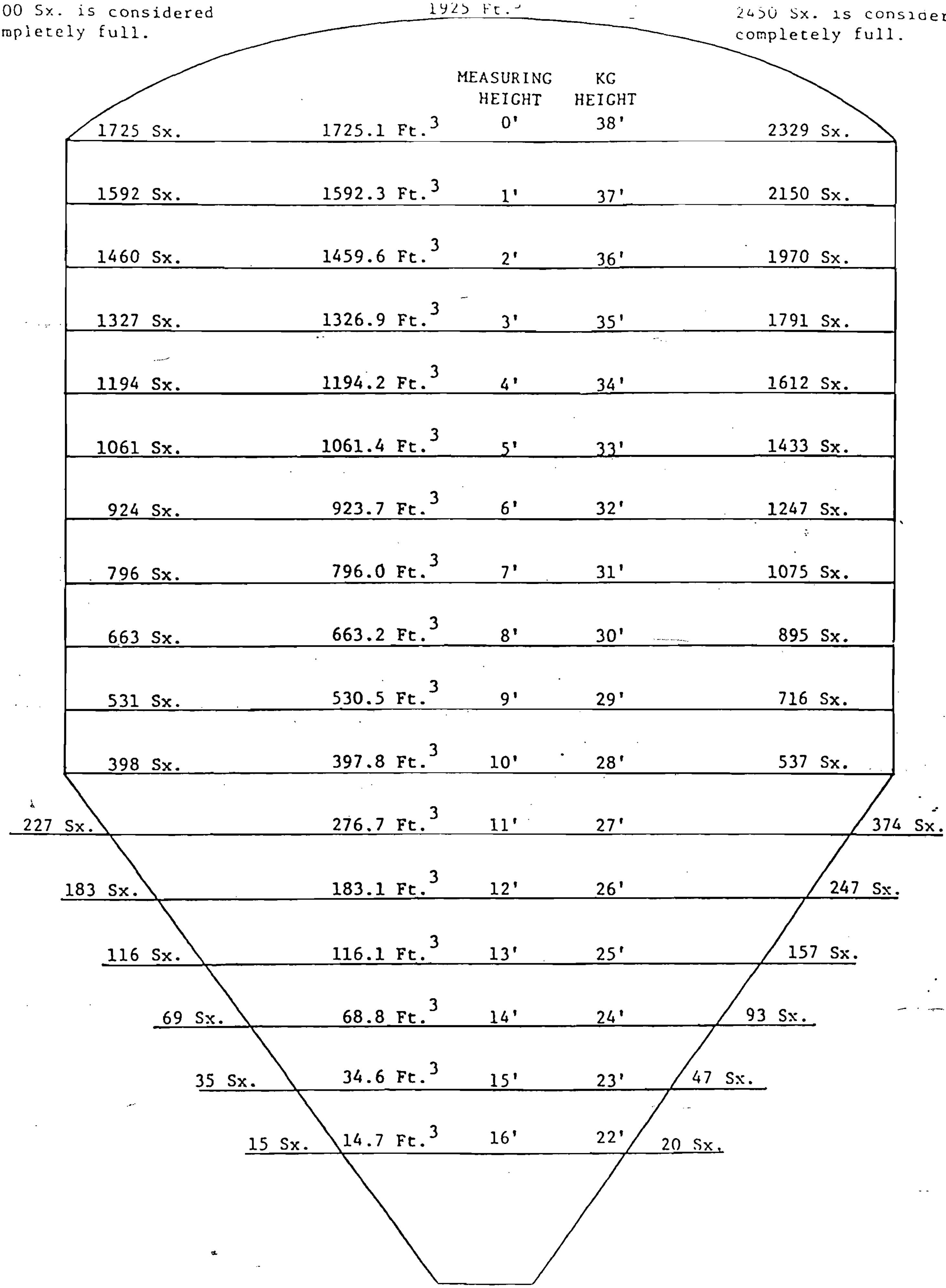
NOTE: 52′ WIDE CANTILEVER BEAMS

Revised: August 1992

1800 Sx. is considered
completely full.

1925 Ft.³

2450 Sx. is consider
completely full.



|  |  | MEASURING HEIGHT | KG HEIGHT |  |
|---|---|---|---|---|
| 1725 Sx. | 1725.1 Ft.$^3$ | 0' | 38' | 2329 Sx. |
| 1592 Sx. | 1592.3 Ft.$^3$ | 1' | 37' | 2150 Sx. |
| 1460 Sx. | 1459.6 Ft.$^3$ | 2' | 36' | 1970 Sx. |
| 1327 Sx. | 1326.9 Ft.$^3$ | 3' | 35' | 1791 Sx. |
| 1194 Sx. | 1194.2 Ft.$^3$ | 4' | 34' | 1612 Sx. |
| 1061 Sx. | 1061.4 Ft.$^3$ | 5' | 33' | 1433 Sx. |
| 924 Sx. | 923.7 Ft.$^3$ | 6' | 32' | 1247 Sx. |
| 796 Sx. | 796.0 Ft.$^3$ | 7' | 31' | 1075 Sx. |
| 663 Sx. | 663.2 Ft.$^3$ | 8' | 30' | 895 Sx. |
| 531 Sx. | 530.5 Ft.$^3$ | 9' | 29' | 716 Sx. |
| 398 Sx. | 397.8 Ft.$^3$ | 10' | 28' | 537 Sx. |
| 227 Sx. | 276.7 Ft.$^3$ | 11' | 27' | 374 Sx. |
| 183 Sx. | 183.1 Ft.$^3$ | 12' | 26' | 247 Sx. |
| 116 Sx. | 116.1 Ft.$^3$ | 13' | 25' | 157 Sx. |
| 69 Sx. | 68.8 Ft.$^3$ | 14' | 24' | 93 Sx. |
| 35 Sx. | 34.6 Ft.$^3$ | 15' | 23' | 47 Sx. |
| 15 Sx. | 14.7 Ft.$^3$ | 16' | 22' | 20 Sx. |

# PENROD 86 CANTILEVER LOAD CHART No. 1
(REVISED JULY 11, 1991)

Note: Allowable Drilling Loads indicated are the sum of setback, hook rotary and conductor tension loads (in kips) based on the Cantilever assembly weight and center of gravity specified in the Component Weight Information section of the Operating Manual (see Chapter 1, section 14). Any increase in Cantilever assembly weight will result in a decrease in the allowable drilling loads.

| | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 - | 125 | 190 | 260 | 340 | 430 | 535 | 430 | 340 | 260 | 190 | 125 | - 40 |
| 38 - | 210 | 280 | 355 | 440 | 540 | 655 | 540 | 440 | 355 | 280 | 210 | - 38 |
| 36 - | 305 | 380 | 460 | 555 | 660 | 785 | 660 | 555 | 460 | 380 | 305 | - 36 |
| 34 - | 405 | 485 | 575 | 680 | 795 | 930 | 795 | 680 | 575 | 485 | 405 | - 34 |
| 32 - | 520 | 610 | 705 | 820 | 945 | 1095 | 945 | 820 | 705 | 610 | 520 | - 32 |
| 30 - | 650 | 745 | 855 | 975 | 1115 | 1275 | 1115 | 975 | 855 | 745 | 650 | - 30 |
| 28 - | 795 | 900 | 1020 | 1150 | 1305 | 1425 | 1305 | 1150 | 1020 | 900 | 795 | - 28 |
| 26 - | 910 | 1015 | 1135 | 1270 | 1425 | 1425 | 1425 | 1270 | 1135 | 1015 | 910 | - 26 |
| 24 - | 1000 | 1115 | 1240 | 1415 | 1425 | 1425 | 1425 | 1415 | 1240 | 1115 | 1000 | - 24 |
| 22 - | 1105 | 1220 | 1370 | 1425 | 1425 | 1425 | 1425 | 1425 | 1370 | 1220 | 1105 | - 22 |
| 20 - | 1210 | 1340 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1340 | 1210 | - 20 |
| 18 - | 1330 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1330 | - 18 |
| 16 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 16 |
| 14 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 14 |
| 12 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 12 |
| or less | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | or less |

<------------------------------ | ---------------------------->

| | |
|---|---|
| Distance Stbd of Hull Centerline to Centerline of Rotary (in feet) | Distance Stbd of Hull Centerline to Centerline of Rotary (in feet) |

LOAD LIMITATIONS

Within the limits above, the maximum component loading are:

| | |
|---|---|
| HOOK LOAD | 1300 Kips |
| ROTARY LOAD | 1300 Kips |
| SETBACK | 125 Kips |
| Starboard | 100 Kips |
| Port | 25 Kips |
| PIPE RACK AREA + | 500 Kips Total |
| PIPE RACK DECKING | 270 PSF |
| INDIVIDUAL PIPE RACK BEAM | 5 Kips /Linear Ft. |

\+ Pipe to be uniformly distributed in rack area under all conditions

* Cantilever assembly weight -----------> 1717 kips

THE MAXIMUM ALLOWABLE DRILLING LOADS SHOWN ON THE CHART ABOVE HAVE BEEN CORRECTED FROM THE OPERATING MANUAL CANTILEVER LOAD CHART BY THE FOLLOWING AMOUNT DUE TO ADDITIONS (REFERENCE OPERATING MANUAL 3.6.2 ITEM 2) ----> 0 Kips

## PENROD 86 CANTILEVER LOAD CHART No. 3
(REVISED JULY 11, 1991)

Note: Allowable Drilling Loads indicated are the sum of setback, hook rotary and conductor tension loads (in kips) based on the Cantilever assembly weight and center of gravity specified in the Component Weight Information section of the Operating Manual (see Chapter 1, section 14). Any increase in Cantilever assembly weight will result in a decrease in the allowable drilling loads.

| | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 - | 95 | 135 | 185 | 235 | 290 | 385 | 290 | 235 | 185 | 135 | 95 | - 40 |
| 38 - | 150 | 195 | 245 | 300 | 395 | 500 | 395 | 300 | 245 | 195 | 150 | - 38 |
| 36 - | 215 | 265 | 325 | 415 | 515 | 630 | 515 | 415 | 325 | 265 | 215 | - 36 |
| 34 - | 285 | 355 | 440 | 535 | 645 | 765 | 645 | 535 | 440 | 355 | 285 | - 34 |
| 32 - | 390 | 470 | 565 | 670 | 790 | 925 | 790 | 670 | 565 | 470 | 390 | - 32 |
| 30 - | 515 | 605 | 705 | 820 | 955 | 1105 | 955 | 820 | 705 | 605 | 515 | - 30 |
| 28 - | 655 | 755 | 865 | 995 | 1140 | 1200 | 1140 | 995 | 865 | 755 | 655 | - 28 |
| 26 - | 795 | 895 | 1005 | 1130 | 1200 | 1200 | 1200 | 1130 | 1005 | 895 | 795 | - 26 |
| 24 - | 885 | 990 | 1110 | 1200 | 1200 | 1200 | 1200 | 1200 | 1110 | 990 | 885 | - 24 |
| 22 - | 990 | 1100 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1100 | 990 | - 22 |
| 20 - | 1095 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1095 | - 20 |
| 18 - | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | - 18 |
| 16 - | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | - 16 |
| 14 - | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | - 14 |
| 12 - or less | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | - 12 or less |
| | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | |

<------------------------------ | ------------------------------>

| | |
|---|---|
| Distance Stbd of Hull Centerline to Centerline of Rotary (in feet) | Distance Stbd of Hull Centerline to Centerline of Rotary (in feet) |

LOAD LIMITATIONS

Within the limits above, the maximum component loading are:

| | |
|---|---|
| HOOK LOAD | 1200 Kips |
| ROTARY LOAD | 1200 Kips |
| SETBACK | 965 Kips |
| Starboard | 665 Kips |
| Port | 300 Kips |
| PIPE RACK AREA + | 500 Kips Total |
| PIPE RACK DECKING | 270 PSF |
| INDIVIDUAL PIPE RACK BEAM | 5 Kips /Linear Ft. |

\+ Pipe to be uniformly distributed in rack area under all conditions

* Cantilever assembly weight -----------> 1717 kips

THE MAXIMUM ALLOWABLE DRILLING LOADS SHOWN ON THE CHART ABOVE HAVE BEEN CORRECTED FROM THE OPERATING MANUAL CANTILEVER LOAD CHART BY THE FOLLOWING AMOUNT DUE TO ADDITIONS (REFERENCE OPERATING MANUAL 3.6.2 ITEM 2) ----> 0 Kips

## PENROD 86 CANTILEVER LOAD CHART No. 4
(REVISED JULY 11, 1991)

Note: Allowable Drilling Loads indicated are the sum of setback, hook rotary and conductor tension loads (in kips) based on the Cantilever assembly weight and center of gravity specified in the Component Weight Information section of the Operating Manual (see Chapter 1, section 14). Any increase in Cantilever assembly weight will result in a decrease in the allowable drilling loads.

| | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 - | 135 | 200 | 270 | 350 | 440 | 550 | 440 | 350 | 270 | 200 | 135 | - 40 |
| 38 - | 220 | 290 | 365 | 455 | 555 | 670 | 555 | 455 | 365 | 290 | 220 | - 38 |
| 36 - | 315 | 390 | 475 | 570 | 675 | 800 | 675 | 570 | 475 | 390 | 315 | - 36 |
| 34 - | 420 | 500 | 590 | 695 | 810 | 945 | 810 | 695 | 590 | 500 | 420 | - 34 |
| 32 - | 535 | 620 | 720 | 835 | 960 | 1110 | 960 | 835 | 720 | 620 | 535 | - 32 |
| 30 - | 665 | 760 | 865 | 990 | 1130 | 1290 | 1130 | 990 | 865 | 760 | 665 | - 30 |
| 28 - | 810 | 915 | 1030 | 1165 | 1320 | 1425 | 1320 | 1165 | 1030 | 915 | 810 | - 28 |
| 26 - | 915 | 1025 | 1145 | 1280 | 1425 | 1425 | 1425 | 1280 | 1145 | 1025 | 915 | - 26 |
| 24 - | 1010 | 1125 | 1250 | 1395 | 1425 | 1425 | 1425 | 1395 | 1250 | 1125 | 1010 | - 24 |
| 22 - | 1110 | 1230 | 1365 | 1425 | 1425 | 1425 | 1425 | 1425 | 1365 | 1230 | 1110 | - 22 |
| 20 - | 1220 | 1345 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1345 | 1220 | - 20 |
| 18 - | 1335 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1335 | - 18 |
| 16 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 16 |
| 14 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 14 |
| 12 - | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | 1425 | - 12 |
| or less | 10.0 | 8.0 | 6.0 | 4.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | or less |

<------------------------------ | ------------------------------>

| | |
|---|---|
| Distance Stbd of Hull<br>Centerline to Centerline<br>of Rotary (in feet) | Distance Stbd of Hull<br>Centerline to Centerline<br>of Rotary (in feet) |

LOAD LIMITATIONS

Within the limits above, the maximum component loading are:

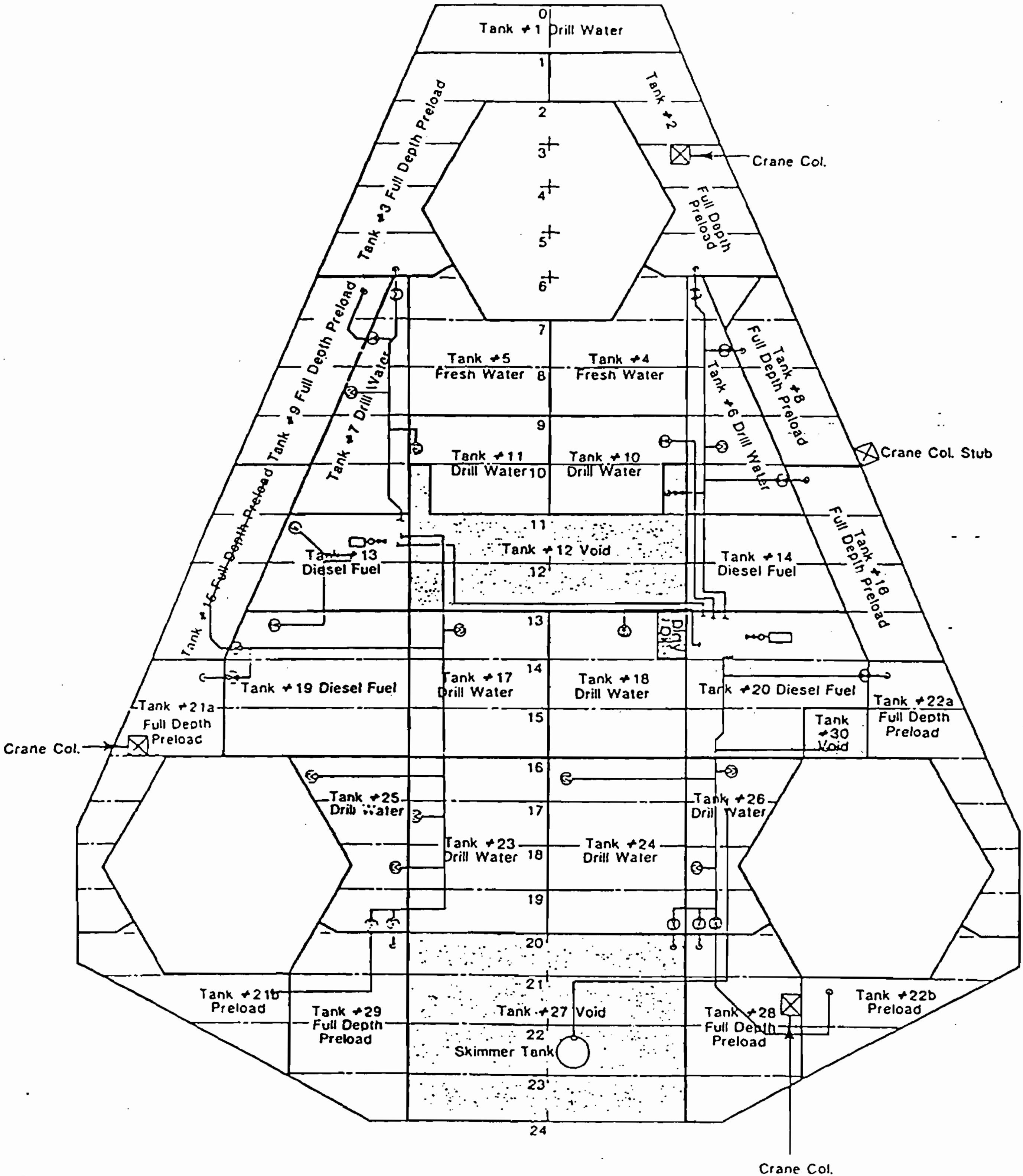
| | |
|---|---|
| HOOK LOAD | 1300 Kips |
| ROTARY LOAD | 1300 Kips |
| SETBACK | 0 Kips |
| PIPE RACK AREA + | 500 Kips Total |
| PIPE RACK DECKING | 270 PSF |
| INDIVIDUAL PIPE RACK BEAM | 5 Kips /Linear Ft. |

\+ Pipe to be uniformly distributed
in rack area under all conditions

* Cantilever assembly weight -----------> 1717 kips

THE MAXIMUM ALLOWABLE DRILLING LOADS SHOWN ON THE CHART ABOVE HAVE BEEN CORRECTED FROM THE OPERATING MANUAL CANTILEVER LOAD CHART BY THE FOLLOWING AMOUNT DUE TO ADDITIONS (REFERENCE OPERATING MANUAL 3.6.2 ITEM 2) ----> 0 Kips

# INNER BOTTOM TANK LAYOUT



PENROD 86

BILGE SUCTION PIPING

PLATFORM 165

656-9460-82

Marathon LeTourneau Company
Gulf Marine Division

# C-3 PREVIOUS TECHNICAL CORRESPONDENCE FOR BLOCK 97 PERMIT

Chevron U.S.A. Production Company
935 Gravier Street, New Orleans, LA 70112

Gulf of Mexico
Production Business Unit

New Orleans, LA
June 24, 1993

Technical Supplement
Air Permit Application
Destin Dome Block 97

U.S. Environmental Protection Agency, Region IV
Air, Pesticides, and Toxics Management Division
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Attention: Mr. Jewell A. Harper, Chief
Air Enforcement Branch

Gentlemen:

Pursuant to our meeting on June 2, 1993, and your letter of June 15, 1993, Chevron U.S.A. Production Company is hereby submitting a technical supplement to the Air Permit Application dated May 14, 1993, for the exploratory drilling program in Destin Dome Block 97. Given that specific information concerning the rig and boats to be utilized for the activity have become available, a revision to the emission estimates to more accurately reflect the emission rates expected from the drilling program is warranted. Furthermore, these revised calculations reflect the EPA's (Agency's) interpretation of 40 C.F.R Part 55, given the clarification on the regulations provided by your office. Additional explanation concerning our revised calculations follow:

Drilling Rig Emissions

As noted in both the original application and the supplement, fuel usage is the primary basis for estimating emissions from the drill rig. We have attempted to be conservative in our proposed fuel use and operating factors used to characterize these emissions to assure the Agency that the emission estimates provided herein would not be exceeded. Toward that end, we have proposed to operate the main rig engines with ignition retard, thus substantially lowering daily NOX emissions and providing additional operating margin for the drilling program.

Fuel usage by the rig can be easily tracked and would be an acceptable permit operating condition. Likewise, we are prepared to attest to retardation of the rig's main engines through certification to the Agency by an independent engine service representative.

Vessel Emissions
Vessel emissions have been revised to reflect operation by the boats and helicopters expected to service the operation, limited to within 25 miles of the drill site.

The total emissions from the drilling program, reflecting the revised emissions from the drill rig and vessels operating within 25 miles of the OCS source, will be less than 250 tons per year of any regulated pollutant. As indicated in your letter of June 15, 1993, total emissions on this basis would not subject the project to PSD review.

Chevron would again like to express appreciation for the time allotted by your staff to meet to discuss the proposed activity and would welcome additional meetings, as deemed necessary. Please contact Ms. Sandi Fury at (504) 592 - 6095 or Mr. David Scalfano at (504) 592 - 6835 if you have any questions concerning this supplement and / or would like to schedule a meeting to clarify any remaining questions. The Agency's expeditious review and handling of this application to date are greatly appreciated.

Sincerely,

H. J. Colligan
Manager, Special Projects

cc: Mr. Clair Fancy, FDER
Mr. John Brown, FDER
Mr. Preston Lewis, FDER

# TECHNICAL SUPPLEMENT
# TO
# AIR PERMIT APPLICATION
# FOR
# OUTER CONTINENTAL SHELF (OCS) SOURCE
# DESTIN DOME AREA BLOCK 97

## Introduction

This technical supplement is submitted as an addendum to the previously filed Air Permit Application for proposed drilling operations in the Destin Dome Block 97. This document contains presentation and discussion of the following changes from the original application filed with the Environmental Protection Agency (EPA), dated May 14, 1993:

1) A change in the level of emissions from the main electric power engines associated with the drilling of the well based upon information on the specific rig contracted for this operation;

2) An adjustment to the total volume of diesel to be consumed by the main engines on the rig;

3) A refinement of the emissions from vessels servicing the OCS source (i.e. drilling rig) and operating within 25 miles of the source.

## Main Electric Power Engines

The drilling rig secured for the proposed operation has three main engines, each with a rated power output of 1650 brake-horsepower (BHP). The engines are model EMD 12 - 645 with a maximum diesel consumption of 650 lb/hour (90.3 gals/hr). This represents a change from the larger rig engines presented in the original application (e.g. 2200 BHP with a maximum diesel consumption of 875 lb/hr or 122 gal/hr). The expected emissions from the aforementioned EMD engines are presented in revised Table 3-1 with supporting calculations presented in revised Table B-1. Reflected in these emission calculations is the use of engine retardation which for the purpose of this application reduces the emission of nitrogen oxide (NOX) by 20 percent, however, results in an increase in carbon monoxide emissions (CO) of 30 percent, and fuel consumption by 1 to 2 percent. The effects of engine retardation on expected NOX emission levels for the proposed activity were secured specifically for the engines referenced above, through an authorized engine service representative.

The overall emissions projected from the main engines on the drill rig are conservative due to the uncertainties associated with the time required to complete the activity. AP-42 data for large stationary diesel engines would instead suggest the use of a lower expected emission level of 11 grams/BHP. This is less than the 12 grams/BHP assumed in our calculations for the main engines, with ignition retard. The calculated 20 percent reduction in NOX attributed to engine retardation is recognized as an effective NOX control technique and is less than that cited in previous studies (EPA, 1979: Radian, 1982; and EPA, 1992).

Table 3-2 has been revised to reflect specific information on the EMD 12 - 645 engines on the rig contracted for the drilling of the well.

**Fuel Usage**
The amount of fuel used for the main rig engines has been increased from 680,000 gallons/year as presented in the original application to 793,333 gallons/year as reflected by this supplement. The emissions presented in the revised Tables 3-1 and B-1 reflect the increased volume of diesel to be consumed for power generation on the drill rig, however, a lower total level of NOX emissions than originally estimated. The EMD 12 - 645's, the rig's main engines and upon which these calculations are based, generate a lower level of emissions per gallon of diesel consumed than that shown in the original application.

The best means of defining cumulative emissions from the drilling rig is by total diesel consumption by the rig engines over the duration of the activity. The major source of emissions on the rig remain to be the main engines. The change to a greater volume of diesel to be consumed by the main engines during the activity reflects the desire to be more conservative in estimating the maximum level of emissions for the drilling program. For purposes of projecting engine emissions for the activity, the diesel volumes presented in this supplemental application reflect a total fuel consumption by the main engines of 793,333 gallons, and assumed full load on the engines. Relative to the time period expected for the proposed activity, the calculations presented suggest that overall emissions by the rig as represented in this supplemental application are conservative by 33 percent or greater, thus providing assurance that the emissions presented here would not be exceeded by the activity.

**Vessel Emissions**
The vessel emissions presented in Tables B-4a and 4b have been revised to reflect the following three changes from the original application:

1) Fuel use and maximum estimated emissions are based upon specific information received on the type of engines, speed and fuel consumption for the boats which are expected to support the proposed operation;

2) The vessel emissions shown are limited to those emissions to be incurred within 25 miles of the drilling rig. The original application contained emission estimates not limited to this radius but instead extended to the shorebase which is over 70 miles from the proposed drilling location.

3) An additional vessel operation category of "maneuvering" was added in the description of vessel activities.

The projected NOX emissions for the crew boat supporting the activity were computed using Detroit Diesel 12V-71TI, 550 BHP diesel engines, equipped with turbocharging and intercooling. A maximum NOX emission rate of 12 grams/BHP has been assumed in the calculations. Actual reported data indicate NOX emissions ranging from 8.6 to 11 grams/BHP (Santa Barbara County, 1987). The supply boat proposed for use is equipped with 12 cylinder Caterpillar 1125 BHP diesel engines also with turbocharging and intercooling. The NOX emission data for this engine obtained from a service representative was 5 grams/BHP. The calculations presented are conservative, being based upon a higher NOX emission rate of 6 grams/BHP. These emission rates are consistent with EPA information (EPA, 1991; EPA, 1992). Moreover, the effect of turbocharging and intercooling reduces overall NOX emissions (EPA, 1979).

Emissions from the helicopters have also been included in the total projected vessel emissions, regardless of the uncertainty of whether or not a helicopter is considered a marine vessel by the EPA. Also, vessel emissions shown have assumed inclusion of emissions within a 25 miles radius from the drill site, although there remains uncertainty over whether or not inclusion of emissions west of the 87.5° longitudinal line is appropriate.

## Total Emissions

The total maximum estimated emissions from the OCS source and supporting vessels in tons per year follow:

| | Emissions ( TPY) | | |
|---|---|---|---|
| Pollutant | OCS Source | Vessels | Total |
| PM10 | 3.04 | 1.77 | 4.81 |
| SO2 | 0.30• | 7.35 | 7.65• |
| NOX | 204.48 | 33.79 | 238.27 |
| CO | 84.56 | 6.35 | 90.91 |
| VOC | 7.00 | 3.45 | 10.45 |

• This value based on actual data obtained from the Destin Dome area; upper level estimate from AP-42 is 219.32 TPY for the OCS Source and 226.63 TPY total.

Total projected emissions generated as a result of the proposed OCS activity including emissions from the proposed OCS Source and all associated vessels are less than 250 tons per year. Prevention of Significant Deterioration (PSD) / New Source Review therefore is not applicable to the proposed activity (see PSD/New Source discussion in original application; Section 2.4).

# References

U.S. Environmental Protection Agency (EPA). 1992. Compilation of Air Pollutant Emission Factors. AP-42.

U.S. Environmental Protection Agency (EPA). 1991. Nonroad Engine and Vehicle Emission Study - Report. EPA-460/3-91-02

U.S. Environmental Protection Agency (EPA). 1979. Stationary Internal Combustion Engines, Standards Support and Environmental Impact Statement Volume I: Proposed Standards of Performance. EPA-450/2-78-125a.

Radian Corporation. 1982. Assessment of NOX Control Measures for Diesel Engines on Offshore Exploratory Drilling Vessels and Rigs. Joint Industry/Government Task Force.

Santa Barbara County. 1987. Crew and Supply Boat NOX Control Development Program. Santa Barbara Air Pollution Control District with Technical Assistance from Arthur D. Little, Inc.

Table 3-1. Estimated Emissions for Primary Facilities Associated with Destin Dome Block 97 Drilling Rig

| Pollutants | Main Electric Power Engines[a] | Crane Logging & Auxiliary Diesels[b] | Well Testing Flare[c] |
|---|---|---|---|
| Particulates (PM10) | | | |
| lb/hr | 1.74 | 0.26 | 9.55 |
| tons/year | 2.56 | 0.14 | 0.35 |
| Sulfur Dioxide | | | |
| lb/hr | 19.50 | 3.00 | 21.1 - 5,216.9 |
| tons/year | 28.56 | 1.56 | 0.3 - 189.2 |
| Nitrogen Oxides | | | |
| lb/hr | 131.57 | 18.17 | 64.96 |
| tons/year | 192.70 | 9.42 | 2.36 |
| Carbon Monoxide | | | |
| lb/hr | 47.58 | 3.96 | 353.46 |
| tons/year | 69.69 | 2.06 | 12.82 |
| Hydrocarbons | | | |
| lb/hr | 4.59 | 0.53 | 133.7 |
| tons/year | 6.72 | 0.27 | 4.85 |
| Lead | | | |
| lb/hr | 3.33E-04 | 3.42E-05 | Neg. |
| tons/year | 4.88E-04 | 2.66E-05 | Neg. |
| Arsenic | | | |
| lb/hr | 1.57E-04 | 1.61E-05 | Neg. |
| tons/year | 2.30E-04 | 1.25E-06 | Neg. |
| Beryllium | | | |
| lb/hr | 9.36E-05 | 9.60E-06 | Neg. |
| tons/year | 1.37E-05 | 7.46E-06 | Neg. |
| Mercury | | | |
| lb/hr | 9.36E-05 | 9.60E-06 | Neg. |
| tons/year | 1.37E-05 | 7.46E-06 | Neg. |
| Fluoride | | | |
| lb/hr | 1.22E-03 | 1.25E-04 | Neg. |
| tons/year | 1.78E-03 | 9.72E-05 | Neg. |
| Sulfuric Acid Mist | | | |
| lb/hr | 1.49 | 0.15 | Neg. |
| tons/year | 2.19 | 0.12 | Neg. |

[a] lb/hr based on three 1,650-BHP engines running at full load; tons/year based on fuel usage of 2,833 gallons/day for 280 days, or 793,333 gallons/year.

[b] lb/hr based on three 250-BHP engines running at full load; tons/year based on fuel usage of 480 gallons/day for 90 days, or 43,200 gallons/year.

[c] lb/hr based on maximum of 22.5 MMcf/day actual maximum expected to be 2.5 MMcf/hr for 2 hours only; tons/year based on a total of 68 MMcf.

Table 3-2. Stack Parameters for Destin Dome Block 97 Drilling Rig

| Parameter | Main Electric Power Engines[a] | Crane Logging & Auxiliary Diesels[a] | Well Testing Flare[b] |
|---|---|---|---|
| Number of Sources | 3 | 3 | 1 |
| Stack Height (ft) | 75 | 89.0 | 61.0 |
| Diameter (ft) | 1.5 | 0.5 | 0.3 |
| Flow (scfm) | 4,765.0 | 625.0 | 15,625.0 |
| (acfm) | 11,414.0 | 1,456.0 | – |
| Temperature (°F) | 800 | 770 | ~1,000 |
| Velocity (ft/sec) | 107.7 | 123.6 | 3,684 |

[a] Per engine; stack heights reflect height above sea level for non-hurricane season. During hurricane season (June - November), height increases by 15 ft.

[b] Flow rate and velocity based on average daily gas usage only, not combustion products.

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 1 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Source Characteristics: | | | |
| Type | | Diesel | Diesel |
| Number | | 3 | 5 |
| Brake Horsepower | | 1,650 | 250 |
| RPP | | 900 | 900 |
| Fuel Characteristics: | | | |
| Heat Content | Btu/lb | 19,200 | 19,200 |
| Density | Lb/gal | 7.2 | 7.2 |
| Operation | days | 280 | 90 |
| Fuel Usage: | | | |
| Maximum | gal/hr | 90 | 14 |
| | lb/hr/eng. | 650 | 100 |
| | MMBtu/hr | 12.48 | 1.92 |
| Average[a] | lb/hr | 850 | 144 |
| | gal/hr | 118 | 20 |
| | gal/day | 2,833 | 480 |
| | $10^3$ lb/yr | 5,712 | 311 |
| | $10^3$ BHP/yr | 14,500 | 778 |
| | MMBtu/yr | 109,670 | 5,972 |
| | gal/yr | 793,333 | 43,200 |
| Criteria Pollutant Emissions: | | | |
| Particulates (PM10) | | | |
| Basis | | AP-42 | AP-42 |
| Rate | g/BHP | 0.16 | 0.16 |
| Maximum[b] | lb/hr/eng. | 0.6 | 0.09 |
| | lb/hr/rig | 1.7 | 0.26 |
| Annual[c] | TPY | 2.6 | 0.14 |
| Sulfur Dioxide | | | |
| Basis | | 0.5% Sulfur | 0.5% Sulfur |
| Rate | g/BHP | 1.8 | 1.8 |
| Maximum | lb/hr/eng. | 6.5 | 1.0 |
| | lb/hr/rig | 19.5 | 3.0 |
| Annual | TPY | 28.6 | 1.6 |
| Nitrogen Oxides | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 12.1 | 11.00 |
| Maximum | lb/hr/eng. | 43.9 | 6.06 |
| | lb/hr/rig | 131.6 | 18.17 |
| Annual | TPY | 192.7 | 9.42 |

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 2 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Carbon Monoxide | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 4.4 | 2.40 |
| Maximum | lb/hr/eng. | 15.9 | 1.32 |
| | lb/hr/rig | 47.6 | 3.96 |
| Annual | TPY | 69.7 | 2.06 |
| Hydrocarbons | | | |
| Basis | | Vendor | AP-42 |
| Rate | g/BHP | 0.4 | 0.32 |
| Maximum | lb/hr/eng. | 1.5 | 0.18 |
| | lb/hr/rig | 4.6 | 0.53 |
| Annual | TPY | 6.7 | 0.27 |
| Lead | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 8.9 | 8.9 |
| Maximum | lb/hr/eng. | 1.11E-04 | 1.71E-05 |
| | lb/hr/rig | 3.33E-04 | 3.42E-05 |
| Annual | TPY | 4.88E-04 | 2.66E-05 |
| Regulated Pollutants: | | | |
| Arsenic | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 4.2 | 4.2 |
| Maximum | lb/hr/eng. | 5.24E-05 | 8.06E-06 |
| | lb/hr/rig | 1.57E-04 | 1.61E-05 |
| Annual | TPY | 2.30E-04 | 1.25E-05 |
| Beryllium | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 2.5 | 2.5 |
| Maximum | lb/hr/eng. | 3.12E-05 | 4.80E-06 |
| | lb/hr/rig | 9.36E-05 | 9.60E-06 |
| Annual | TPY | 1.37E-04 | 7.46E-06 |
| Mercury | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 2.5 | 2.5 |
| Maximum | lb/hr/eng. | 3.12E-05 | 4.80E-06 |
| | lb/hr/rig | 9.36E-05 | 9.60E-06 |
| Annual | TPY | 1.37E-04 | 7.46E-06 |

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 3 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Fluoride | | | |
| Basis | | EPA(1980) | EPA(1980) |
| Rate | lb/$10^{12}$ Btu | 32.5 | 32.5 |
| Maximum | lb/hr/eng. | 4.06E-04 | 6.25E-05 |
| | lb/hr/rig | 1.22E-03 | 1.25E-04 |
| Annual | TPY | 1.78E-03 | 9.72E-05 |
| Sulfuric Acid Mist | | | |
| Basis | | 5% of SO2 | 5% of SO2 |
| Rate | g/BHP | 0.14 | 0.14 |
| Maximum | lb/hr/eng. | 0.5 | 0.1 |
| | lb/hr/rig | 1.5 | 0.2 |
| Annual | TPY | 2.2 | 0.1 |
| Non-Regulated Pollutants: | | | |
| Manganese | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 14.0 | 14.0 |
| Maximum | lb/hr/eng. | 1.75E-04 | 2.69E-05 |
| | lb/hr/rig | 5.24E-04 | 5.38E-05 |
| Annual | TPY | 7.68E-04 | 4.18E-05 |
| Nickel | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 170.0 | 170.0 |
| Maximum | lb/hr/eng. | 2.12E-03 | 3.26E-04 |
| | lb/hr/rig | 6.36E-03 | 6.53E-04 |
| Annual | TPY | 9.32E-03 | 5.08E-04 |
| Cadmium | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 10.5 | 10.5 |
| Maximum | lb/hr/eng. | 1.31E-04 | 2.02E-05 |
| | lb/hr/rig | 3.93E-04 | 4.03E-05 |
| Annual | TPY | 5.76E-04 | 3.14E-05 |
| Chromium | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 47.5 | 47.5 |
| Maximum | lb/hr/eng. | 5.93E-04 | 9.12E-05 |
| | lb/hr/rig | 1.78E-03 | 1.82E-04 |
| Annual | TPY | 2.60E-03 | 1.42E-04 |

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 4 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Copper | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 280.0 | 280.0 |
| Maximum | lb/hr/eng. | 3.49E-03 | 5.38E-04 |
| | lb/hr/rig | 1.05E-02 | 1.08E-03 |
| Annual | TPY | 1.54E-02 | 8.36E-04 |
| Vanadium | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 69.5 | 69.5 |
| Maximum | lb/hr/eng. | 8.67E-04 | 1.33E-04 |
| | lb/hr/rig | 2.60E-03 | 2.67E-04 |
| Annual | TPY | 3.81E-03 | 2.08E-04 |
| Selenium | | | |
| Basis | | EPA(1990) | EPA(1990) |
| Rate | lb/$10^{12}$ Btu | 23.4 | 23.4 |
| Maximum | lb/hr/eng. | 2.92E-04 | 4.50E-05 |
| | lb/hr/rig | 8.77E-04 | 8.99E-05 |
| Annual | TPY | 1.28E-03 | 6.99E-05 |
| Benzene | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 776.0 | 776.0 |
| Maximum | lb/hr/eng. | 9.68E-03 | 1.49E-03 |
| | lb/hr/rig | 2.91E-02 | 2.98E-03 |
| Annual | TPY | 4.26E-02 | 2.32E-03 |
| Toluene | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 281.0 | 281.0 |
| Maximum | lb/hr/eng. | 3.51E-03 | 5.40E-04 |
| | lb/hr/rig | 1.05E-02 | 1.08E-03 |
| Annual | TPY | 1.54E-02 | 8.39E-04 |
| Xylenes | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 193.0 | 193.0 |
| Maximum | lb/hr/eng. | 2.41E-03 | 3.71E-04 |
| | lb/hr/rig | 7.23E-03 | 7.41E-04 |
| Annual | TPY | 1.06E-02 | 5.76E-04 |
| Propylene | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 2,790.0 | 2,790.0 |
| Maximum | lb/hr/eng. | 3.48E-02 | 5.36E-03 |
| | lb/hr/rig | 6.96E-02 | 1.07E-02 |
| Annual | TPY | 1.53E-01 | 8.33E-03 |

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 5 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Formaldehyde | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 78.9 | 78.9 |
| Maximum | lb/hr/eng. | 9.85E-04 | 1.51E-04 |
| | lb/hr/rig | 2.95E-03 | 3.03E-04 |
| Annual | TPY | 4.33E-03 | 2.36E-04 |
| Acetaldehyde | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 25.2 | 25.2 |
| Maximum | lb/hr/eng. | 3.14E-04 | 4.84E-05 |
| | lb/hr/rig | 9.43E-04 | 9.68E-05 |
| Annual | TPY | 1.38E-03 | 7.52E-05 |
| Acrolein | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 7.9 | 7.9 |
| Maximum | lb/hr/eng. | 9.83E-05 | 1.51E-05 |
| | lb/hr/rig | 2.95E-04 | 3.03E-05 |
| Annual | TPY | 4.32E-04 | 2.35E-05 |
| Polycyclic Aromatic Hydrocarbons | | | |
| Basis | | EPA(1992) | EPA(1992) |
| Rate | lb/$10^{12}$ Btu | 212.0 | 212.0 |
| Maximum | lb/hr/eng. | 2.65E-03 | 4.07E-04 |
| | lb/hr/rig | 7.94E-03 | 8.14E-04 |
| Annual | TPY | 1.16E-02 | 6.33E-04 |
| Antimony | | | |
| Basis | | EPA(1980) | EPA(1980) |
| Rate | lb/$10^{12}$ Btu | 21.8 | 21.8 |
| Maximum | lb/hr/eng. | 2.73E-04 | 4.19E-05 |
| | lb/hr/rig | 8.18E-04 | 8.39E-05 |
| Annual | TPY | 1.20E-03 | 6.52E-05 |
| Barium | | | |
| Basis | | EPA(1980) | EPA(1980) |
| Rate | lb/$10^{12}$ Btu | 19.5 | 19.5 |
| Maximum | lb/hr/eng. | 2.44E-04 | 3.75E-05 |
| | lb/hr/rig | 7.31E-04 | 7.50E-05 |
| Annual | TPY | 1.07E-03 | 5.83E-05 |
| Cobalt | | | |
| Basis | | EPA(1980) | EPA(1980) |
| Rate | lb/$10^{12}$ Btu | 9.1 | 9.1 |
| Maximum | lb/hr/eng. | 1.13E-04 | 1.74E-05 |
| | lb/hr/rig | 3.39E-04 | 3.48E-05 |
| Annual | TPY | 4.97E-04 | 2.71E-05 |

Table B-1. Estimated Emissions for Destin Dome Block 97 Drilling Rig (Page 6 of 6)

| | Units | Main Electric Power Engines | Crane Logging & Auxiliary Diesels |
|---|---|---|---|
| Zinc | | | |
| Basis | | EPA(1980) | EPA(1980) |
| Rate | lb/$10^{12}$ Btu | 683.3 | 683.3 |
| Maximum | lb/hr/eng. | 8.53E-03 | 1.31E-03 |
| | lb/hr/rig | 2.56E-02 | 2.62E-03 |
| Annual | TPY | 3.75E-02 | 2.04E-03 |
| Chlorine | | | |
| Basis | | 0.5 ppm | 0.5 ppm |
| Rate | lb/$10^{12}$ Btu | 2,604.2 | 2,604.2 |
| Maximum | lb/hr/eng. | 3.25E-02 | 5.00E-03 |
| | lb/hr/rig | 9.75E-02 | 1.00E-02 |
| Annual | TPY | 1.43E-01 | 7.78E-03 |

[a] Annual fuel usage based on 793,333 gal/yr which is 280 days of operation at the average daily fuel usage of 2,833 gal/day

[b] Maximum lb/hr/rig based on 3 main electric operating at full load and 3 crane/logging/auxiliary engines operating at full load. Calculations on lb/hr/eng. based on emission rate (example for PM: 0.16 g/BHP x 1,650 BHP-hr x 1/454 g/lb = 0.6 lb/hr; lb/hr/rig based on number of engines).

[c] Annual emissions based on average fuel usage.Calculations of tons/year based on emission rate times annual fuel usage (example for PM: 0.16 g/BHP-hr x 14,5000 $10^3$ BHP/yr x 1/454 g/lb x 1/2,000 lb/ton = 2.6 tons/yr)

Table B-4a. Fuel Usage for Mobile Emission Estimates

| Source[a] | Trips[b] | Fuel Usage per Hour (gal/hour)[c] | Hours (to and from 25 mile Distance and at rig)[d] | Total Fuel Used (gal) |
|---|---|---|---|---|
| Crew Boat 120 ft | | | | |
| Travel to Rig | 200 | 130.0 | 3.33 | 86,667 |
| Maneuvering | 200 | 32.5 | 0.5 | 3,250 |
| Hotelling | NA | 5 | 600 | 3,000 |
| Supply Boat 180 ft | | | | |
| Travel to Rig | 80 | 110.0 | 4.17 | 36,667 |
| Maneuvering | 80 | 27.5 | 12 | 26,400 |
| Hotelling | NA | 5 | 240 | 1,200 |
| Helicopter #1 | 280 | 28 | 0.50 | 3,920 |
| Helicopter #2 | 100 | 90 | 0.38 | 3,462 |
| Utility Boat 120 ft | | | | |
| Travel to Rig | 3 | 65 | 6.67 | 1,300 |
| Maneuvering | NA | 16.3 | 104 | 1,690 |
| Hotelling | NA | 5 | 8,760 | 43,800 |

[a] Hotelling defined as only the auxiliary electric generators running. Crew Boat has 40 kW generator and Supply and Utility Boats have about 200 kW generators operating.

[b] Based on 5 trips/week for the Crew Boat and 2 trips/week for the Supply Boat; 40 weeks operation assumed. Helicopter #1 operates everyday and Helicopter #2 operates 3 trips/week.

[c] Travel fuel usage for boats and helicopters provided by contractors; margins (>25%) added to produce conservative fuel usage; maneuvering fuel use conservatively assumed to be 25% of full load; hotelling fuel use includes margin of 50%.

[d] Travel time based on the speeds obtained from contractors and a distance of 50 miles (i.e., 25 miles to and from the rig).

Crew Boat = 15 miles/hour (mph)
Supply Boat = 12 mph
Helicopter #1 = 100 mph
Helicopter #2 = 130 mph
Hotelling based on 3 hours of generators running independently from maneuvering.

Table B-4b. Emission Estimates for Vessels (Page 1 of 2)

| Source | Pollutant | Emission Factor ($lb/10^3$ gal) | Estimated Emissions (tons/yr) |
|---|---|---|---|
| Crew Boat 120 ft | | | |
| Traveling | PM | 17 | 0.74 |
| Maneuvering | PM | 17 | 0.03 |
| Hotelling | PM | 17 | 0.03 |
| Supply Boat 180 ft | | | |
| Travel to Rig | PM | 17 | 0.31 |
| Maneuvering | PM | 17 | 0.22 |
| Hotelling | PM | 17 | 0.01 |
| Utility Boat 120 ft | | | |
| Travel to Rig | PM | 17 | 0.01 |
| Maneuvering | PM | 17 | 0.01 |
| Hotelling | PM | 17 | 0.37 |
| | | Total: | 1.73 |
| Crew Boat 120 ft | | | |
| Traveling | $SO_2$ | 72 | 3.12 |
| Maneuvering | $SO_2$ | 72 | 0.12 |
| Hotelling | $SO_2$ | 72 | 0.11 |
| Supply Boat 180 ft | | | |
| Travel to Rig | $SO_2$ | 72 | 1.32 |
| Maneuvering | $SO_2$ | 72 | 0.95 |
| Hotelling | $SO_2$ | 72 | 0.04 |
| Utility Boat 120 ft | | | |
| Travel to Rig | $SO_2$ | 72 | 0.05 |
| Maneuvering | $SO_2$ | 72 | 0.06 |
| Hotelling | $SO_2$ | 72 | 1.58 |
| | | Total: | 7.34 |
| Crew Boat 120 ft | | | |
| Traveling | $NO_x$ | 450 | 19.50 |
| Maneuvering | $NO_x$ | 450 | 0.73 |
| Hotelling | $NO_x$ | 226 | 0.34 |
| Supply Boat 180 ft | | | |
| Travel to Rig | $NO_x$ | 300 | 5.50 |
| Maneuvering | $NO_x$ | 300 | 3.96 |
| Hotelling | $NO_x$ | 140 | 0.08 |
| Utility Boat 120 ft | | | |
| Travel to Rig | $NO_x$ | 300 | 0.20 |
| Maneuvering | $NO_x$ | 300 | 0.25 |
| Hotelling | $NO_x$ | 140 | 3.07 |
| | | Total: | 33.63 |

Table B-4b. Emission Estimates for Vessels (Page 2 of 2)

| Source | Pollutant | Emission Factor ($lb/10^3$ gal) | Estimated Emissions (tons/yr) |
|---|---|---|---|
| Crew Boat 120 ft | | | |
| Traveling | CO | 61 | 2.64 |
| Maneuvering | CO | 61 | 0.10 |
| Hotelling | CO | 61 | 0.09 |
| Supply Boat 180 ft | | | |
| Travel to Rig | CO | 61 | 1.12 |
| Maneuvering | CO | 61 | 0.81 |
| Hotelling | CO | 61 | 0.04 |
| Utility Boat 120 ft | | | |
| Travel to Rig | CO | 61 | 0.04 |
| Maneuvering | CO | 61 | 0.05 |
| Hotelling | CO | 61 | 1.34 |
| | | Total: | 6.22 |
| Crew Boat 120 ft | | | |
| Traveling | HC | 24 | 1.04 |
| Maneuvering | HC | 24 | 0.04 |
| Hotelling | HC | 24 | 0.04 |
| Supply Boat 180 ft | | | |
| Travel to Rig | HC | 24 | 0.44 |
| Maneuvering | HC | 24 | 0.32 |
| Hotelling | HC | 24 | 0.01 |
| Utility Boat 120 ft | | | |
| Travel to Rig | HC | 24 | 0.02 |
| Maneuvering | HC | 24 | 0.02 |
| Hotelling | HC | 24 | 0.53 |
| | | Total: | 2.45 |

---

[a] Emission Factors for PM, CO and VOC based on EPA (1991). $NO_x$ Based on the following:

Crew Boat: 4 x 550 BHP; 12 g/BHP; assume 450 lb/1000 gal; (12 g/bhp x 550 BHP x 4/130 gal/hr x 1000 gal x lb/454g = 447.3 lb/100gal). Engines are turbocharged and intercooled resulting in lower $NO_x$ emissions. Hotelling based on AP-42 for 40 kW generator.

Supply Boat: 2 x 1,125 BHP; 6 g/BHP; assume 300 lb/1000 gal; (6 g/bhp x 1,125 BHP x 2/100 gal/hr x 1,000 gal x lb/454g = 297 lb/1,000 gal). Engines are turbocharged and intercolled resulting in lower $NO_x$ emissions. Hotelling based on AP-42 for 200 KW generator.

Utility Boat: Same $NO_x$ emissions as Supply Boat.

Table B-4c. Emission Estimates for Helicopter

| Pollutant | Emission Factor (lb/lb fuel) | Estimated Emissions (tons) |
|---|---|---|
| Particulate Matter | 0.0009 | 0.020 |
| Sulfur Dioxide | 0.0005 | 0.011 |
| Nitrogen Oxides | 0.0072 | 0.162 |
| Carbon Monoxide | 0.0056 | 0.126 |
| Total Hydrocarbons | 0.0008 | 0.018 |

[a] Based on AP-42 for T58 engine at climb-out and approach. See Table II-1-8 in AP-42.

[b] Based on total fuel usage from Table B-4a and 6.1 lb/gal for Jet A kerosene.

Table B-4d. Mobile Source and Fugitive Emissions

| Pollutant | Estimated Emissions (tons) |
|---|---|
| Particulate Matter | 1.77 |
| Sulfur Dioxide | 7.35 |
| Nitrogen Oxides | 33.79 |
| Carbon Monoxide | 6.35 |
| Total Hydrocarbons | 3.45 |

Chevron
Chevron U.S.A. Production Company
935 Gravier Street, New Orleans, LA 70112

Gulf of Mexico
Production Business Unit

New Orleans, LA
August 30, 1993

**Request for Data**
**DD 97 OCS Air Permit**

U. S. Environmental Protection Agency
345 Courtland Street N. E.
Atlanta, GA 30365

Attention: Mr. Brian L. Beals
Source Evaluation Unit
Air Enforcement Branch

Dear Mr. Beals:

In response to your letter of August 18, 1993, Chevron U. S. A. Production Company offers the following information:

**Manufacturer's Specifications for Main Rig Electric Power Engines**
Exhibit 1 attached, which was provided to Chevron by Stewart and Stevenson Services, Inc., gives the uncontrolled emission specifications on the EMD 12 - 645 Model E - 8 engine, which is the same engine as that on the rig considered for the operation. As the specifications indicate, the uncontrolled nitrogen oxides (NOX) emission rate for this engine is 15.1 grams/brake-horsepower (g/bhp). The permit application submitted by Chevron U.S.A. production Company reflects a 20 percent reduction in NOX due to ignition retard, to 12.1 g/bhp (15.1 x 0.8 = 12.1). A twenty percent reduction was used since it reflects the reduction over the duty cycle, as represented by the engine manufacturer. The NOX reduction expected from ignition retard under full load conditions as stated by the engine manufacturer is in fact much higher, given at 35 percent.

**Specific Fuel Information for Marine Vessels**
While the contract vessels have fuel usage logs, direct interpretation of this information to provide the data that you desire is difficult. The vessels expected to service our proposed operation are typical of that operating in many capacities throughout the Gulf of Mexico. It is extremely difficult to decipher fuel consumption as a function of activity primarily due to the following:

- lack of sophisticated instrumentation onboard the vessels
- high degree of variability of activities,
- affect of weather conditions on actual boat operations, load on engines, etc., and
- limited duration of some of the various activities.

The information provided in the application was based on information obtained directly from the owners and captains of the contract vessels expected to be utilized to support our drilling operations. The fuel consumption estimates utilized by Chevron to project vessel emissions in the subject application exceed any of the rates obtained from these sources, in an effort to be conservative. Exhibit 2 provides a recap of the data obtained by Chevron as reported by the vessel owners; estimated by the vessel captains per data obtained through actual operation; and the ultimate assumptions used by Chevron in the application.

## NOX Emissions for the Marine Vessel Engines

Exhibits 3 and 4 provide emission specifications for the Detroit Diesel 12V - 645 (Model 12V - 71TI) and Caterpillar 16 cylinder 1125 horsepower (Model D399) engines, respectively. This information was likewise obtained through Stewart & Stevenson Services, Inc. Due to the need to provide information by mode of vessel operation, (e.g., cruise, maneuver and hotelling modes) additional information was secured from independently conducted studies designed to measure engine emissions under field conditions, see Exhibit 5. The estimate of maximum emissions projected in our application primarily reflects data reported in these studies. Moreover, the emission factors utilized remain consistent, if not conservative, in comparison to the applicable emission factors as reported in AP - 42 and the Non-road Engine and Vehicle Emission Study (EPA, 1991). A summary of NOX emission data by source follows:

| | | NOX emissions, gm/bhp-hr | | |
|---|---|---|---|---|
| Vessel | Engine Model | Manufacturer's Specifications | Study Findings | Permit Application |
| crewboat | 12V-71TI | 12.41 | 8 - 11 | 12 |
| supply boat | D399 | 5 | 6 | 6 |

## Performance Guarantees

The above referenced and attached information provided to Chevron by Stewart & Stevenson Services, Inc represents Original Engine Manufacturer (OEM) specifications. Your letter however asks for guaranteed emission rates. The information provided is believed indicative of engine performance under operating conditions; however, even the OEM will not provide such performance guarantees. To our knowledge, the engines under consideration have been maintained and / or refurbished on a routine basis to assure acceptable performance. We have no reason to believe that the actual emissions from our activity would be substantially different than that estimated, with one exception. We believe they will in fact be lower. In most cases, our application reflects maximum projected emissions at full load conditions. Our operations do not call for the subject engines to be continually operated under full load conditions. Therefore the maximum emission estimates provided in the application are believed to be conservative.

Other

In our supplemental application, Chevron expressed that an acceptable permit condition would be a limit on the total fuel consumption by the rig during the proposed operation. Likewise, Chevron maintains the position that emissions from supporting marine vessels that are not attached to the OCS source are not subject to regulation. Therefore, we hope that we have provided you with sufficient information supporting our projection of vessel emissons for your office to complete a review of the project's "potential to emit". Permit conditions proposed specifically for the control of vessel emissions, however, are not believed appropriate.

Chevron remains sensitive to the impact of vessel emissions on the cumulative emissions for the proposed exploratory activity. The supplemental application therefore reflects that the number of marine vessel trips to the rig during the activity would in fact be limited. The number of trips specified in the supplemental applications are believed adequate to support this ongoing field operation.

We greatly appreciate the cooperation you and your staff have shown in reviewing our application. If you have additional questions or need further information, please feel free to contact Ms. Sandi Fury at (504) 592 - 6095.

Sincerely,

H. J. Colligan
Manager, Special Projects

cc: Mr. Scott Davis - EPA
Mr. Clair Fancy - FDER
Mr. John Brown - FDER
Mr. Preston Lewis, FDER

# EXHIBIT 1

## EMISSION DATA: EMD 12 - 645 - E8 ENGINES

# STEWART & STEVENSON SERVICES, INC.

## EMD Emissions Data

**TO:** Chevron
**FAX #:** 504-592-8223
**ATTENTION:** Sandi Fury

The following data is from the EMD Engineering Department concerning the engine models specified.

| | | | | |
|---|---|---|---|---|
| | (100%) | | | (100%) |
| **ENGINE MODEL:** | 12-645-E9 | | | 12-645-E8 |
| **B.H.P.:** | 2305 | | | 1650 |
| **R.P.M.:** | 900 | | | 900 |

(Emissions data is given as pounds per hour.)

| | | | | | |
|---|---|---|---|---|---|
| **CO** | | 10.0 | | | 12.22 | 
| **NOX** | 13.2 gr/bhp | 66.9 | | | 54.82 15.1 grms / bhp |
| **Unburned Hydrocarbons** | | 1.9 | | | 1.53 |
| **Particulates** | | N/A | | | N/A |
| **SO2** | | 4.2 | | | 3.25 |
| **Nominal Fuel Rate** | | 851 | | | 650 |

If I may be of additional assistance please do not hesitate to contact me.

Regards,

Brett Nichols,
EMD Service Manager

STEWART & STEVENSON SERVICES, INC.
HOUSTON BRANCH
8631 EAST FREEWAY HOUSTON, TEXAS 77029
SALES & ADMINISTRATION (713) 671-6220 PARTS (713) 671-6200 SERVICE (713) 671-6100
TOLL FREE (800) 234-5550 RCA TELEX 221663 FAX (713) 671-6107

June 8, 1993

Chevron U.S.A. Production Company
Gulf of Mexico Production Business Unit
Special Projects Group

Attention: Sandi Fury

Fax No. 504-592-6223

Reference: EMD Emissions Data

EMD emissions are measured as follows:

1.) CO is measured with an NDIR (Non-Dispersive Infra-Red) analyzer.

2.) The U.S. EPA procedure for stationary diesel engine NOx emission measurement (Method 20, as modified) allows NOx values to be measured by either the (1) NDIR plus NDUV (Non-Dispersive Ultra-Violet) method, or (2) chemiluminescent (CL) method. NOx measurements made by method (1) represent the summation of nitric oxide (NO) as measured by NDIR instrumentation and nitrogen oxide (NO2) as measured by NDUV instrumentation. Utilization of the chemiluminescent method to measure NOx, allows NOx values to be obtained which are approximately 11% lower than those reported herein for the NDIR/NDUV method.

3.) Unburned hydrocarbons are measured with a flame ionization detector.

4.) Sulfur dioxide is calculated based on the assumption of 100% oxidation of the sulfur in the fuel to sulfur dioxide (SO2). For this reason, sulfur dioxide emissions will vary in proportion to fuel bound sulfur. Sulfur dioxide for testing is based on a fuel sulfur content of 0.25%.

5.) Emission data is reported "as run" at LaGrange, Illinois, conditions of 640 feet altitude, 90 degree F. air inlet temperature, and 175 degree F water inlet temperature. No corrections are made.

All emissions data is based upon the engine utilizing genuine OEM components. If aftermarket components are utilized then EMD's data may not be accurate.

At present the only option available for NOx reduction is to retard the injection timing to four (4°) degrees after top dead center (TDC). This will give a 20% NOx reduction over a duty cycle and 35% reduction at full load (1650 B.H.P.). Fuel consumption will increase one (1) to two (2) percent.

Chevron U.S.A. Production Company
Gulf of Mexico Production Business Unit
Special Projects Group
*Attention: Sandi Fury*

A reduction in fuel consumption of three (3) to five (5) percent is possible if you upgrade the current engines to accept EMD's 18:1 compression ratio power assemblies. The exact percentage of reduction will depend upon the current type of power assemblies that are in operation. The following pages will give you additional information regarding this upgrade.

I hope this satisfies some of questions that you have. I will forward additional information to you as it becomes available from EMD. If I can be of additional assistance, please do not hesitate to contact me at (713) 671-6157.

Sincerely,
STEWART & STEVENSON SERVICES, INC.

Brett Nichols

Brett Nichols
EMD Service Manager

Gabriel Guzman
Mark Bartoszewicz (Bartachevitz)

# EXHIBIT 2

# MARINE VESSEL FUEL CONSUMPTION

Crewboat
Engine Model: Detroit Diesel 12V - 71 TI , 4 @ 550 horsepower

1) The boat is expected to primarily be operated in the cruise mode, enroute to / from the rig. Over 90 % of the toatl fuel estimated to be consumed by the crewboat is expected to be consumed when the boat is in transit.
2) Boat owner estimates fuel consumption at 90 - 100 gals/hr in open water.
3) Field test data:
    - usage of 322 gallons
    - 40 mile round trip
    - 2.74 hrs running time
    - 6' - 8' seas
    - 117.5 gals/hr
4) Chevron application reflects a maximum fuel consumption in the travel mode of 130 gals/hr.

Supply Boat
Engine Model: Caterpillar D399, 2 @ 1125 horsepower

1) This boat is expected to spend significant time on the well site due to the need to offload equipment.
2) Boat owner estimates fuel consumption at 80 gals/hr, full open.
3) Per vessel captain, the following information was provided:

| | |
|---|---|
| - running mode: | 88 gals/hr |
| - stand-by mode (engines engaged): | 11.73 gals/hr |
| - hotelling mode: | 3.3 gals/hr |

| time period | runs made/ travel hours | stand-by* hours at rig | hotelling hours at base | total fuel gallon |
|---|---|---|---|---|
| 1/1 - 1/31 | 9 @ 80 | 209.75 | 454.25 | 11,566 |
| 2/1 - 2/28 | 12 @ 105 | 148.5 | 418.5 | 12,493 |
| 3/1 - 3/31 | 8 @ 78 | 234.75 | 431.25 | 11, 142 |
| 4/1 - 4/30 | 9 @ 68.75 | 105.75 | 545.5 | 9,143 |
| 5/1 - 5/31 | 12 @ 104.25 | 232 | 407.75 | 13,503 |

**(*stand-by typically reflects boat in maneuver mode as it is generally offloading equipment or cargo)**

4) Chevron application reflects the following fuel consumption estimates:

| | |
|---|---|
| - running mode: | 110 gals/hr |
| - maneuvering mode: | 27.5 gals/hr |
| - hotelling mode: | 5 gals /hr |

# EXHIBIT 3

# EMISSION DATA: DETROIT DIESEL 12V-71TI ENGINE

**BEST AVAILABLE COPY**

```
 IPUT DATA for engine -       7123-7309
 IR - CFM     FUEL LB/HR       BHP           DENSITY          RPM
 2150           205.6          555            .0722           2300
NO PPM        CO PPM          HC PPM        %S IN FUEL        INJ
 1005           236            140             .5             N70
OUTPUT DATA       GM/HR    GM/BHP-HR    LB/HR    PPM
NO MASS =       4493.19       8.10       9.91
NOX MASS =      6889.50      12.41      15.19
CO MASS =        984.78       1.77       2.17
HC MASS =        292.09       0.53       0.64
SO2 MASS =       932.60       1.68       2.06     97.78
CO2 MASS =    305843.00     551.07     674.26
CO2 PPM=       46642.14      CO2 % VOL =     4.66
O2 PPM=        142484.6      O2 % VOL =     14.25
N2 PPM=        770992.2      N2 % VOL =     77.10
EXHAUST MASS -  LB/MIN     CFM     AIR FUEL  EXTO
                                    RATIO
                158.66 4380.00     45.30   625.00
```

12-V-71 TE

```
INPUT DATA for engine -       1034-7000
AIR - CFM     FUEL LB/HR       BHP           DENSITY          RPM
 330            41.1            97            .0722           1800
NO PPM        CO PPM          HC PPM        %S IN FUEL        INJ
 1500           3450           134             .5             N65
OUTPUT DATA       GM/HR    GM/BHP-HR    LB/HR    PPM
NO MASS =       1036.05      10.68       2.28
NOX MASS =      1588.62      16.38       3.50
CO MASS =       2224.06      22.93       4.90
HC MASS =         43.19       0.45       0.10
SO2 MASS =       186.43       1.92.      0.41    126.52
CO2 MASS =      62216.52    641.41     137.16
CO2 PPM=        61416.19     CO2 % VOL =     6.14
O2 PPM=         123823.2     O2 % VOL =     12.38
N2 PPM=         763233.4     N2 % VOL =     76.32
EXHAUST MASS -  LB/MIN     CFM     AIR FUEL  EXTO
                                    RATIO
                 24.51   830.00    34.78   870.00
```

3-71

# EXHIBIT 4

# EMISSION DATA: CATERPILLAR D-399 ENGINE

BEST AVAILABLE COPY

## 30-2408 EMISSIONS DATA-ENGINE

ENGINE EMISSION DATA- DO NOT USE WITHOUT REFERENCE TO TD7096

| SALES MODEL | REFERENCE NUMBER | TYPE | RATING SETTING HP AT RPM | UNBURNED HYDROCARBONS (HC)-GRAMS/HR | CARBON MONOXIDE (CO)-GRAMS/HR | OXIDES OF NITROGEN $(NO_X)$-GRAMS/HR | SULFUR DIOXIDE $(SO_2)$-GRAMS/HR | DPM GRAMS/HR |
|---|---|---|---|---|---|---|---|---|
| 3304 | 1W2468 | INT | 100 2200 | 40 | 105 | 337 | 82 | 16 |
| 3304 | 1W2468 | CONT | 85 2000 | 20 | 60 | 720 | 64 | 10 |
| 3304 | 1W3871 | INT | 165 2200 | 80 | 170 | 1560 | 111 | 15 |
| 3304 | 1W3871 | IRRIG | 150 2000 | 90 | 180 | 1456 | 97 | 13 |
| 3304 | 1W3876 | CONT | 125 2000 | 30 | 80 | 1195 | 84 | 8 |
| 3304 | 1W3880 | INT | 100 2200 | 16 | 640 | 1038 | 73 | 16 |
| 3304 | 1W3880 | CONT | 85 2000 | 125 | 360 | 1165 | 59 | 12 |
| 3304 | 1W3880 | IRRIG | 90 2000 | 125 | 380 | 1165 | 63 | 17 |
| 3304 | 7N3301 | INT | 165 2200 | 15 | 200 | 1315 | 127 | 10 |
| 3304 | 7N3301 | CONT | 125 2000 | 15 | 145 | 645 | 94 | 22 |
| 3304 | 7W5765 | INT | 100 2200 | 40 | 105 | 337 | 82 | 16 |
| 3304 | 7W5765 | CONT | 85 2000 | 20 | 60 | 720 | 64 | 10 |
| 3304 | 7W5765 | INT | 100 2200 | 40 | 105 | 337 | 82 | 16 |
| 3304 | 7W5765 | CONT | 85 2000 | 20 | 60 | 720 | 64 | 10 |
| 3208 | PL3270 | INT | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3270 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3270 | IRRIG | 150 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3271 | INT | 120 2800 | 60 | 200 | 980 | 96 | 42 |
| 3208 | PL3271 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | PL3272 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | PL3273 | INT | 120 2800 | 60 | 200 | 980 | 96 | 42 |
| 3208 | PL3273 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | PL3273 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3274 | INT | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3274 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3274 | IRRIG | 175 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3275 | INT | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3275 | IRRIG | 175 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3276 | INT | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3276 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3276 | IRRIG | 175 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3277 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3277 | IRRIG | 175 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3278 | INT | 120 2800 | 60 | 200 | 980 | 96 | 42 |
| 3208 | PL3278 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | PL3279 | INT | 210 2800 | 10 | 1100 | 1370 | 150 | 175 |
| 3208 | PL3279 | AGRIC | 210 2800 | 10 | 1100 | 1370 | 150 | 174 |
| 3208 | PL3279 | IRRIG | 175 2400 | 117 | 300 | 1270 | 117 | 37 |
| 3208 | PL3280 | INT | 120 2800 | 60 | 200 | 980 | 96 | 42 |
| 3208 | PL3280 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | PL3281 | INT | 120 2800 | 60 | 200 | 980 | 96 | 42 |
| 3208 | PL3281 | INT | 130 2800 | 60 | 190 | 1070 | 102 | 38 |
| 3208 | 2W8219 | INT | 250 2600 | 60 | 350 | 2000 | 180 | 80 |
| 3208 | 2W8227 | INT | 250 2600 | 60 | 350 | 2000 | 180 | 80 |
| D399 | PL2464 | INT | 1215 1200 | 50 | 480 | 6100 | 850 | 160 |
| D398 | PL2455 | INT | 910 1200 | 50 | 725 | 6500 | 643 | 52 |
| D398 | PL2455 | INT | 975 1300 | 60 | 960 | 7721 | 716 | 87 |
| D398 | PL2457 | INT | 1000 1200 | 100 | 500 | 5660 | 690 | 144 |

# EXHIBIT 5

# INDEPENDENT ENGINE PERFORMANCE STUDIES

# CREW AND SUPPLY BOAT $NO_x$ CONTROL DEVELOPMENT PROGRAM

*Prepared by*
SANTA BARBARA COUNTY
AIR POLLUTION CONTROL DISTRICT
with Technical Assistance from
ARTHUR D. LITTLE INC.

Funding Provided by
CHEVRON U.S.A., INC.

June 1987

## Table 1

## RECOMMENDED $NO_x$ EMISSION FACTORS FOR CREW AND SUPPLY BOATS

(lbs $NO_x$/1000 gal)

| Boat/Control Measure | Idle | Maneuver | Cruise |
|---|---|---|---|
| **A. Supply Boat**(1) | | | |
| • Uncontrolled | 325 | 350 | 550 |
| • Turbocharged/Intercooled plus 4° timing retard | 300 | 320 | 415 |
| • Turbocharged/Enchanced Intercooling plus 4° timing retard | 240 | 260 | 330 |
| **B. Crew Boats** | | | |
| • Uncontrolled(1) | 325 | 350 | 550 |
| • Turbocharged/Intercooled(2) plus 4° timing retard | 140 | 190 | 310 |

---

(1) Assumes an EMD-645 engine. These values may vary depending on the actual engine type.

(2) Assumes a DDA-12V-71TI engine. These values may vary depending on the actual engine type.

RADIAN
CORPORATION

DCN# 82-250-012-

# ASSESSMENT OF $NO_x$ CONTROL MEASURES FOR DIESEL ENGINES ON OFFSHORE EXPLORATORY DRILLING VESSELS AND RIGS

## FINAL REPORT

Presented to:

The Joint Industry/Government Task Force

Prepared by:

Rob Klausmeier
Pam Beekley
Jim Norton
Jim Rouge

Radian Corporation

July 30, 1982

8501 Mo-Pac Blvd./P.O. Box 9948/Austin, Texas 78766/(512)454-4797

from diesel engines were tested as a function of engine load. The baseline $NO_x$ emission factors selected for use in this study were based on brake-specific emission rates for engines operated at approximately 40 percent of maximum rated load. Again, brake-specific $NO_x$ emission rates are relatively independent of engine load, except at extremely low or high loads. Diesel engines used on exploratory drilling vessels are usually operated at mid-range loads.

Important in marine applications, the relative humidity of the intake air to the diesel engines is known to affect the $NO_x$ emission rate of the engines. Typically, the relative humidity of intake air in the marine environment is approximately 80 percent. The data reported for Caterpillar engines were collected under laboratory conditions of 80 percent relative humidity (75 grains water/lb dry air), assuming a temperature of 65° F. The data reported for GE and EMD engines were collected in several laboratory tests; relative humidity varied from 50 to 80 percent. Based on standard humidity correction factors, if relative humidity in the marine environment is up to 40 percent higher than that measured in the laboratory tests, $NO_x$ emission rates would decrease, at most, by approximately 10 percent (assuming a temperature of 65° F).

Within the limitations of the available data, baseline brake-specific emission rates were selected for use as emission factors for the three engine types. The emission factors used in this study to calculate $NO_x$ emission rates are presented below:

| Diesel Engine Type | Baseline $NO_x$ Emission Factor (g/hp·hr) |
|---|---|
| EMD Diesels - 2 engine series | |
| EMD 645-16-E8 (blower-scavenged) | 13 |
| EMD 645-16-E9 (turbocharged) | 14 |
| CAT D-399 Diesel Engines - with separate circuit aftercooling | 6 |
| GE 7 FDS Diesel Engines | 18 |

Chevron

Chevron U.S.A. Production Co.
Special Projects Group
935 Gravier Street
New Orleans, LA 70112

December 6, 1993

**Outer Continental Shelf Air Permit**
**Destin Dome 97**

U. S. Environmental Protection Agency, Region IV
Air, Pesticides and Toxics Management Division
345 Courtland Street
Atlanta, Georgia 30365

Attention: Mr. Scott Davis

Dear Mr. Davis:

In response to our recent telephone conversation, I have put together the following information relevant to the flaring of natural gas expected during the well testing operations associated with the proposed Destin Dome 97 drilling operations.

Well Testing Procedure

Chevron's air permit application reflected that the well's performance will be assessed utilizing a 4 point isochronal well test. The well testing period is expected to span a period of approximately 7 days and will occur near the completion of our offshore activities. The actual cumulative flowing hours for the well over the duration of the test, however, are expected to be far less than the 7 days described above as the testing procedure calls for multiple periods of flowing the well followed by periods of like duration during which the well will be shut in and downhole characteristics monitored. The actual time required for each individual period in which the well will be flowed and the gas flared will depend on the well's reservoir characteristics.

Measurement of Gas Volumes Produced and Flared

Gas measurement devices will be utilized to measure the volume of natural gas produced and subsequently flared during the well testing program. The service company assisting Chevron with the well test will provide documentation of the charts recording the volume of gas produced during said operation along with the calculations of actual gas flowed. The natural gas flowed from the well will be produced to a test separator, measured, and routed to the flare boom where the gas will be combusted and the resultant emissions from the well testing operations generated.

### Gas Composition

Throughout the flowing periods of the well, samples of the well stream will be taken at a minimum of once hourly to determine the H2S and CO2 content of the natural gas being produced and flared. H2S and CO2 will be determined with the use of Draegger or similar type calorimetric tube type indicators. Once the well has stabilized a gas sample will be obtained for further compositional analysis by a laboratory. Gas composition will be documented along with the volume of the natural gas produced and flared.

### Flare Equipment

The equipment proposed to be utilized for the Destin Dome 97 well test includes the following:

Flare Boom: manufactured by Schlumberger (Model No. U160).

Flame Retention Ring (located at the end of the flare boom): manufactured by the John Zink Co. of Tulsa Oklahoma; no model number available. Combustion efficiency due to the use of the flame retention ring is expected to be in excess of 99% (reference tables from excerpt of Flare Efficiency Study performed for the Chemical Manufacturer's Association which have been attached).

Pilot: manufactured by the John Zink Co. (Model No. CK20). Fuel consumption required by the pilot to ignite the flare is estimated at 70 scf/day. Propane will be utilized as the fuel to ignite the pilot.

In closing, I would like to emphasize that the flaring of natural gas associated with Chevron's drilling operations in Destin Dome Block 97 is expected to be limited to the period in which the well will be flowed and tested. This period is expected to be short in duration as described above. The documentation developed during the well testing program should suffice in providing adequate information relative to the emissions generated from the well flaring operations associated with the proposed OCS drilling activity. If you have any questions or if additional information is necessary, please give me a call at (504) 592-6095.

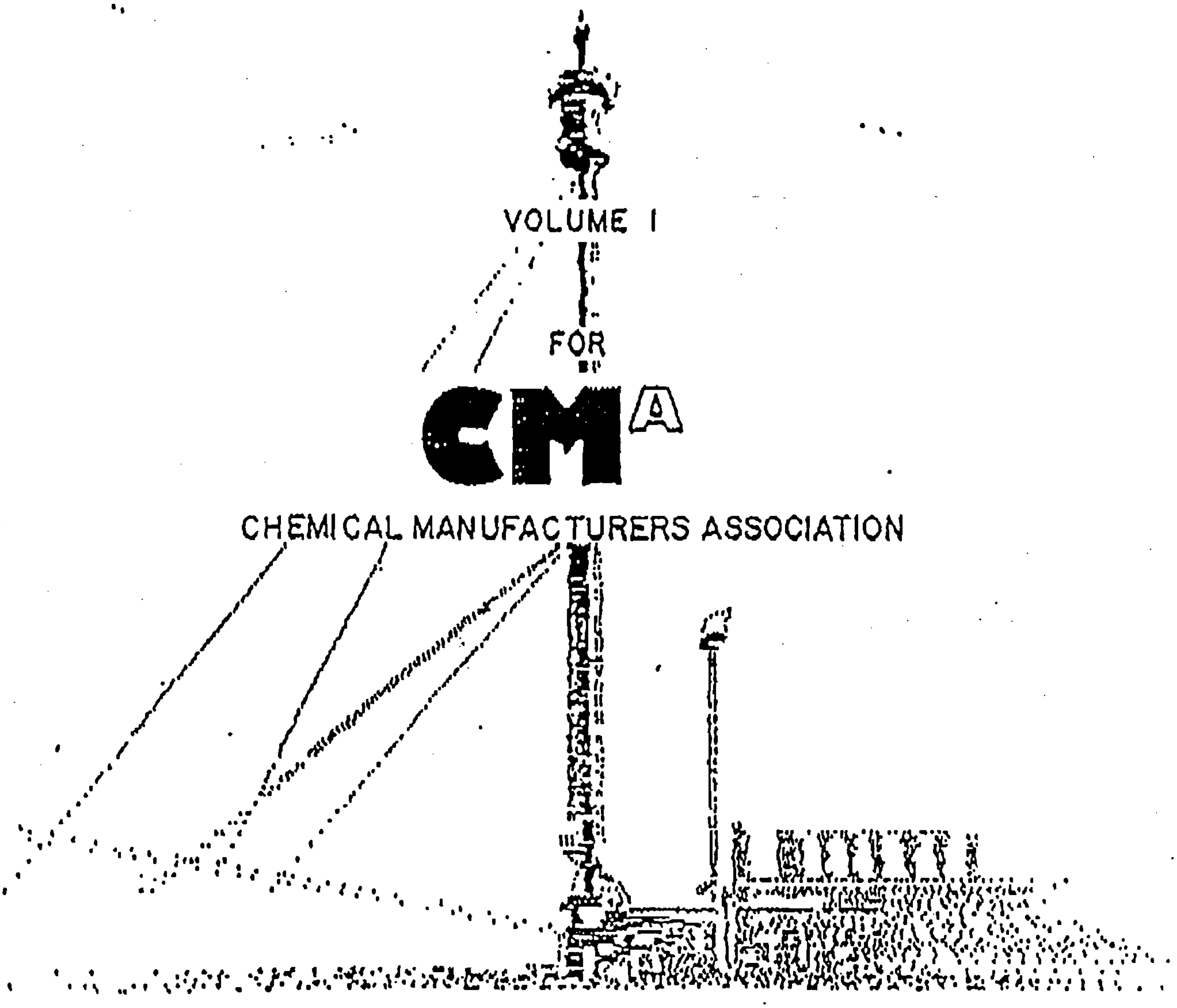
Sincerely,

S. M. Fury

A REPORT ON

A

# FLARE EFFICIENCY STUDY



VOLUME I

FOR

CMA

CHEMICAL MANUFACTURERS ASSOCIATION

PREPARED BY

**ENGINEERING-SCIENCE**
DESIGN • RESEARCH • PLANNING
*3109 NORTH INTERREGIONAL, AUSTIN, TEXAS 78722 • 512/477-9901*
*OFFICES IN PRINCIPAL CITIES*

BEST AVAILABLE COPY

Extract from Test Results of a flare efficiency study commissioned by the Chemical Manufacturers Association (CMA) and conducted by Engineering-Science during 1982 at the test facilities of John Zink Company.

STEAM ASSISTED FLARES

| Test Run # | (1) Combustion Efficiency (%) | (2) Hydrocarbon Destruction Efficiency (%) | (3) NOx Produced lb/MMbtu | (3) CO Produced lb/MMbtu |
|---|---|---|---|---|
| 2 | 99.82 | 99.999 | 0.06 | 0.13 |
| 3 | 99.82 | 99.998 | 0.08 | 0.16 |
| 1 | 99.96 | 100.000 | 0.07 | 0.05 |
| 5 | 99.94 | 100.000 | 0.04 | 0.05 |
| 7 | 99.84 | 99.998 | 0.06 | 0.18 |
| 17 | 99.84 | 100.000 | 0.05 | 0.20 |
| 50 | 98.45 | 99.981 | 0.02 | 0.41 |
| 51 | 99.66 | 99.959 | 0.02 | 0.72 |
| 23 | 100.00. | 100.000 | 0.10 | 0.06 |
| 54 | 99.90 | 100.000 | 0.12 | 0.10 |
| 4 | 99.80 | 99.981 | 0.07 | 1.59 |
| 8 | 98.81 | 99.982 | 0.07 | 1.74 |
| 56 | 99.70 | 99.994 | 0.06 | 0.47 |
| #11 | 99.82 | 99.996 | 0.16 | 0.17 |
| 57 | 99.90 | 99.997 | 0.12 | 0.10 |
| #16 | 99.75 | 99.993 | 0.12 | 0.30 |
| 59b | 98.64 | 99.614 | 0.03 | 0.90 |
| 60 | 99.82 | 99.962 | 0.07 | 0.53 |
| average | 99.64 | 99.965 | 0.07 | 0.44 |

AIR ASSISTED FLARES

| Test Run # | Combustion Efficiency (%) | Hydrocarbon Destruction Efficiency (%) | NOx Produced lb/MMbtu | CO Produced lb/MMbtu |
|---|---|---|---|---|
| 28 | 99.94 | 99.999 | 0.20 | 0.06 |
| 31 | 99.17 | 99.974 | 0.11 | 0.48 |
| 25b | 99.97 | 100.000 | 0.13 | 0.08 |
| 32a | 98.94 | 99.951 | 0.12 | 0.98 |
| 64 | 99.74 | 100.000 | 0.09 | 0.37 |
| 63 | 99.37 | 99.982 | 0.07 | 0.55 |
| 65 | 99.57 | 99.998 | 0.12 | 0.60 |
| average | 99.53 | 99.986 | 0.12 | 0.44 |

Notes:

- The derived results reported are from the test runs where the equipment was operated to the design criteria of EPA's 40 CFR 60.18 and in accordance with good practice.

\# Average of multiple runs

1. Direct from Executive Summary of CMA report
2. From Tables 2.39 and 2.40 of CMA report (n.b. efficiencies calculated to be greater than 100% are here reported as 100.000%)
3. Derived (by John Zink Co.) from measured data in report

**BEST AVAILABLE COPY**

Post-it™ brand fax transmittal memo 7671 | # of pages ▸

To SANDY FURY

Co. CHEVRON USA

Dept. ENG.

Fax # 592 6223

From KEN VAUGHN

Co. JOHN ZINK

Phone # 275-5123

Fax #

NSPS

16 to 18

## § 60.18 General control device requirements.

(a) *Introduction.* This section contains requirements for control devices used to comply with applicable subparts of parts 60 and 61. The requirements are placed here for administrative convenience and only apply to facilities covered by subparts referring to this section.

(b) *Flares.* Paragraphs (c) through (f) apply to flares.

(c)(1) Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(2) Flares shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f).

(3) Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted or air-assisted; or with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater if the flare is non-

NSPS Applies to Sweeting units LLC

assisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (f).

(4)(i) Steam-assisted and nonassisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than 18.3 m/sec (60 ft/sec), except as provided in paragraphs (b)(4) (ii) and (iii).

(ii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than the velocity, $V_{max}$, as determined by the method specified in paragraph (f)(5), and less than 122 m/sec (400 ft/sec) are allowed.

(5) Air-assisted flares shall be designed and operated with an exit velocity less than the velocity, $V_{max}$, as determined by the method specified in paragraph (f)(6).

(6) Flares used to comply with this section shall be steam-assisted, air-assisted, or nonassisted.

(d) Owners or operators of flares used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators of flares shall monitor these control devices.

(e) Flares used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

(f)(1) Reference Method 22 shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

(3) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \sum_{i=1}^{n} C_i H_i$$

where:

$H_T$=Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

K = Constant, 1,740 x $10^{-7}$ $\left(\frac{1}{ppm}\right)$ $\left(\frac{g\ mole}{scm}\right)$ $\left(\frac{MJ}{kcal}\right)$

where the standard temperature for $\left(\frac{g\ mole}{scm}\right)$ is 20°C;

$C_i$=Concentration of sample component i in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-77 (incorporated by reference as specified in § 60.17); and

$H_i$=Net heat of combustion of sample component i, kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382-76 (incorporated by reference as specified in § 60.17) if published values are not available or cannot be calculated.

(4) The actual exit velocity of a flare shall be determined by dividing the

volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip.

(5) The maximum permitted velocity, $V_{max}$, for flares complying with paragraph (c)(4)(iii) shall be determined by the following equation.

$$\text{Log}_{10}(V_{max}) = (H_T + 28.8)/31.7$$

$V_{max}$ = Maximum permitted velocity, M/sec
28.8 = Constant
31.7 = Constant
$H_T$ = The net heating value as determined in paragraph (f)(3).

(6) The maximum permitted velocity, $V_{max}$, for air-assisted flares shall be determined by the following equation.

$$V_{max} = 8.706 + 0.7084\ (H_T)$$

$V_{max}$ = Maximum permitted velocity, m/sec
8.706 = Constant
0.7084 = Constant
$H_T$ = The net heating value as determined in paragraph (f)(3).

[51 FR 2701, Jan. 21, 1986]

## Subpart B—Adoption and Submittal of State Plans for Designated Facilities

SOURCE: 40 FR 53346, Nov. 17, 1975, unless otherwise noted.

### § 60.20 Applicability.

The provisions of this subpart apply to States upon publication of a final guideline document under § 60.22(a).

### § 60.21 Definitions.

Terms used but not defined in this subpart shall have the meaning given them in the Act and in subpart A:

(a) *Designated pollutant* means any air pollutant, emissions of which are subject to a standard of performance for new stationary sources but for which air quality criteria have not been issued, and which is not included on a list published under section 108(a) or section 112(b)(1)(A) of the Act.

(b) *Designated facility* means any existing facility (see § 60.2(aa)) which emits a designated pollutant and which would be subject to a standard of performance for that pollutant if the existing facility were an affected facility (see § 60.2(e)).

(c) *Plan* means a plan under section 111(d) of the Act which establishes emission standards for designated pollutants from designated facilities and provides for the implementation and enforcement of such emission standards.

(d) *Applicable plan* means the plan, or most recent revision thereof, which has been approved under § 60.27(b) or promulgated under § 60.27(d).

(e) *Emission guideline* means a guideline set forth in Subpart C of this part, or in a final guideline document published under § 60.22(a), which reflects the degree of emission reduction achievable through the application of the best system of emission reduction which (taking into account the cost of such reduction) the Administrator has determined has been adequately demonstrated for designated facilities.

(f) *Emission standard* means a legally enforceable regulation setting forth an allowable rate of emissions into the atmosphere, or prescribing equipment specifications for control of air pollution emissions.

(g) *Compliance schedule* means a legally enforceable schedule specifying a date or dates by which a source or category of sources must comply with specific emission standards contained in a plan or with any increments of progress to achieve such compliance.

(h) *Increments of progress* means steps to achieve compliance which must be taken by an owner or operator of a designated facility, including:

(1) Submittal of a final control plan for the designated facility to the appropriate air pollution control agency;

(2) Awarding of contracts for emission control systems or for process modifications, or issuance of orders for the purchase of component parts to accomplish emission control or process modification;

(3) Initiation of on-site construction or installation of emission control equipment or process change;

(4) Completion of on-site construction or installation of emission control equipment or process change; and

(5) Final compliance.

# C-4 ATTACHMENT EU-2 FUEL ANALYSIS

John Hempie

Midstream Fuel

For Fuel Received on Tide 3-6-94 3-10-94 by Chev

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 28-FEB-1994 13:00:00
Source: 361 TANK Lot No.: CHDN02-94-0065-36822
ME-737

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 31.5 |
| COLOR, ASTM D-1500 | ASTM D-1500 | 0.8681 |
| APPEARANCE | ASTM D-4176 | L2.0 |
| CLOUD POINT (DEG F) | ASTM D-2500 | B&C |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | +14 |
| SULFUR (WT%) | ASTM D-4294 | 154 |
| CORROSION COPPER STRIP | ASTM D-130 | 0.48 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | 1 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.0 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | <0.05 |
| VISCOSITY @40C (CS) | ASTM D-445 | 41.5 |
| D-86 DISTILLATION | | 2.95 |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 330 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 422 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 527 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 626 |
| END POINT (DEG F) | ASTM D-86 | 688 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.03 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 3.0 |
| GALLONS OF BLUE DYE (GALLONS) | | 47.0 |

J. E. Platt
Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

BEST AVAILABLE COPY

22/94 10:08 ☎205 432 8350 MIDSTREAM FUEL → MIDSTREAM THEO. 001

Midstream Fuel

03/21/94 08:08 ☎2054328350 MIDSTREAM FUELS →→→ BLAKELEY 002/002

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

FOR FUEL
RECEIVED by Che
3-22-94
3-24-94
3-30-94

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 361 TANK

Date Finaled: 13-MAR-1994 01:28:00
Lot No.: CHDNO2-94-0083-36978

| Test Name | Method | Result |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 32.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8639 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L1.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +17 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 158 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.91 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 340 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 426 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 530 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 689 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.08 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 2.4 |
| GALLONS OF BLUE DYE (GALLONS) | | 38.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

BEST AVAILABLE COPY

Loaded 2/22

For fuel load by Chevron up to 3/10

Fuel Services

USA/ACCTG.PASS REFIN TEL:601-938-4314 Feb 24,94 14:28 No.012 P.01

ANDY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

oduct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 20-FEB-1994 23:48:00
rce: 361 TANK Lot No.: CHDNO2-94-0060-36723

FS-30

| Test Name | Method | Results |
|---|---|---|
| RAVITY, API (API) | ASTM D-4052 | 33.7 |
| RAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8565 |
| OR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| EARANCE | ASTM D-4176 | B&C |
| LOUD POINT (DEG F) | ASTM D-2500 | +14 |
| SH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 151 |
| FUR (WT%) | ASTM D-4294 | 0.47 |
| ROSION COPPER STRIP | ASTM D-130 | 1 |
| ERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| IMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| ANE INDEX D-4737 (INDEX) | ASTM D-4737 | 45.0 |
| SCOSITY @40C (CS) | ASTM D-445 | 2.83 |
| 6 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 321 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 419 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 522 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 616 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| LOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| ROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| D NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| RBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| H CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | +5 |
| D DIESEL COLOR | PRM 16.16 | PASS |
| E BLUE (LBS/1000 BBLS) | | 2.1 |
| LONS OF BLUE DYE (GALLONS) | | 23.0 |

J. E. Platt
Company Representative

pical data - Obtained and confirmed at regular intervals
y standard statistical procedures for quality control.

YED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
ABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
UIPMENT NOT DESIGNED FOR HIGHWAY USE

**BEST AVAILABLE COPY**

For fuel loaded out by Chevron for 3/10 - 3/22

LOADED 3/10 COVERS UP TO 3/22

Fuel Services

To SANDY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

duct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 28-FEB-1994 13:00:00
urce: 361 TANK Lot No.: CHDNO2-94-0065-36822
FS-30

| Test Name | Method | Results |
|---|---|---|
| VITY, API (API) | ASTM D-4052 | 31.5 |
| VITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8681 |
| OR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| PEARANCE | ASTM D-4176 | B&C |
| UD POINT (DEG F) | ASTM D-2500 | +14 |
| SH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 154 |
| FUR (WT%) | ASTM D-4294 | 0.48 |
| ROSION COPPER STRIP | ASTM D-130 | 1 |
| ERFACE RATING, ML CUFF (MILLILITERS) | | 0.0 |
| DIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| TANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.5 |
| COSITY @40C (CS) | ASTM D-445 | 2.95 |
| DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 330 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 422 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 527 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 626 |
| END POINT (DEG F) | ASTM D-86 | 688 |
| R STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| OGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.03 |
| ON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | +5 |
| D DIESEL COLOR | PRM 16.16 | PASS |
| BLUE (LBS/1000 BBLS) | | 3.0 |
| ONS OF BLUE DYE (GALLONS) | | 47.0 |

J E Platt
Company Representative

ypical data - Obtained and confirmed at regular intervals
standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR

For fuel loaded by Chevron from 3/22 - 3/31

CUSA/ACCTG.PASS REFIN TEL:601-938-4314 Mar 23,94 14:06 No.016 P.01

LOADED 3/22 Covers to END OF MONTH

Fuel Services

TO SANDY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

roduct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 19-MAR-1994 20:14:00
urce: 361 TANK Lot No.: CHDNO2-94-0096-37044
FS-30

| Test Name | Method | Result |
|---|---|---|
| AVITY, API (API) | ASTM D-4052 | 31.5 |
| RAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8681 |
| LOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| PEARANCE | ASTM D-4176 | B&C |
| LOUD POINT (DEG F) | ASTM D-2500 | +14 |
| LASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| LFUR (WT%) | ASTM D-4294 | 0.48 |
| RROSION COPPER STRIP | ASTM D-130 | 1 |
| NTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| DIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| ANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.2 |
| SCOSITY @40C (CS) | ASTM D-445 | 2.92 |
| 86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 337 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 423 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 532 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 639 |
| END POINT (DEG F) | ASTM D-86 | 696 |
| LOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| DROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| D NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.08 |
| BON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| H CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | +5 |
| D DIESEL COLOR | PRM 16.16 | PASS |
| BLUE (LBS/1000 BBLS) | | 4.9 |
| LONS OF BLUE DYE (GALLONS) | | 93.2 |

Company Representative

ypical data - Obtained and confirmed at regular intervals
standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
ABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
PMENT NOT DESIGNED FOR HIGHWAY USE. )

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

oduct: CHEVRON DIESEL/HEATING NO. 2
ource: 373 TANK
TTY-102

Date Finaled: 28-MAR-1994 04:47:00
Lot No.: CHDNO2-94-0104-37113

| Test Name | Method | Results |
|---|---|---|
| RAVITY, API (API) | ASTM D-4052 | 31.5 |
| RAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8681 |
| OLOR, ASTM D-1500 | ASTM D-1500 | L2.5 |
| PPEARANCE | ASTM D-4176 | B&C |
| LOUD POINT (DEG F) | ASTM D-2500 | +13 |
| LASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 161 |
| ULFUR (WT%) | ASTM D-4294 | 0.50 ✓ |
| ORROSION COPPER STRIP | ASTM D-130 | 1 |
| NTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| EDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| ETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.9 |
| ISCOSITY @40C (CS) | ASTM D-445 | 2.97 |
| -86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 411 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 423 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 529 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 689 |
| OLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| DROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| RBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| SH CONTENT (WT%) | ASTM D-482 | *<.001 |
| OUR POINT (DEG F) | ASTM D-97 | +5 |
| YED DIESEL COLOR | PRM 16.16 | PASS |
| YE BLUE (LBS/1000 BBLS) | | 4.9 |
| ALLONS OF BLUE DYE (GALLONS) | | 235.0 |

Company Representative

*Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR AXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN QUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Covers fuel sold on
4-3, 4-9

Fuel received for MidStream Fuel on 4/3, 4/9

BEST AVAILABLE COPY

05/16/94 15:05 ☎ 205 439 7245 MIDSTREAM THEO. P.03

05/17/94 09:47 ☎2054328380 MIDSTREAM FUELS →→→ BLAKELEY ☎002/002

## CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 371 TANK
TTT-V01

Date Finaled: 11-APR-1994 11:46:00
Lot No.: CXDNO2-94-0122-37344

| Test Name | Method | Result: |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| ☆ SULFUR (WT%) | ASTM D-4294 | 0.48 — |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.0 |
| VISCOSITY 40DC (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 339 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 426 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 524 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 693 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | FRM 18.5 | 88 |
| HYDROGEN SULFIDE (PPM) | FRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | BM-30-63 | 0.02 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | FRM 18.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.9 |
| GALLONS OF BLUE DYE (GALLONS) | | 55.9 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Covers fuel sold on 4-11, 4-14

Fuel received for Midstream Fuels on 4/11 4/14

LL&E PETROLEUM MARKETING, INC.
P.O. DRAWER 308
SARALAND, ALABAMA 36571
205-675-3176 FAX
205-675-7040

**Sample:** TANK 212 HIGH SULFUR DIESEL **DATE:** 04/18/94

**Sample ID:** AA00357

| TESTS | METHOD | RESULTS |
|---|---|---|
| API @ 60 DEG.F. | ASTM D-287 | 38.4 |
| FLASH POINT, DEG.F. | ASTM D-56 | 144 |
| IBP | ASTM D-86 | 315 |
| 10% | | 432 |
| 50% | | 524 |
| 90% | | 639 |
| FBP | | 700 |
| VISCOSITY, CST | ASTM D-445 | 3.10 |
| POUR POINT, DEG.F. | ASTM D-97 | +20 |
| CLOUD POINT, DEG.F. | ASTM D-2500 | +38 |
| CORROSION | ASTM D-130 | *1A |
| ☆ SULFUR, TOTAL, WT.% | ASTM D- 4294 | 0.405 — |
| CETANE INDEX | ASTM D-976 | 54 |
| ASH, WT.% | ASTM D-482 | *<0.01 |
| CARBON RESIDUE, 10% BTMS, WT.% | ASTM D-402 | *0.01 |
| BS & W | ASTM D-1797 | *0.01 |
| COLOR | ASTM D-1500 | *2.0 |

Covers fuel sold
ON 4-19, 4-29, 5-5,
5-10 AND 5-16,
And 4-27

NOTE: DYED DIESEL FUEL, NON-TAXABLE USE ONLY, PENALTY FOR TAXABLE USE

**Technician:** MDC/PH

For fuel received from Midstream Fuel
4/19 4/27 4/29 5/5 5/10 and 5/16

LL&E PETROLEUM MARKETING, INC.
P.O. DRAWER 308
SARALAND, ALABAMA 36571
205-675-3176 FAX
205-675-7060

Sample: TANK 212 HIGH SULFUR DIESEL
Sample ID: AA00412

DATE: 05/17/94

| | METHOD | RESULT |
|---|---|---|
| API @ 60 DEG.F. | ASTM D-287 | 38.4 |
| FLASH POINT, DEG.F. | ASTM D-56 | 168 |
| IBP | ASTM D-86 | 371 |
| 10% | | 454 |
| 50% | | 538 |
| 90% | | 639 |
| FBP | | 693 |
| VISCOSITY, CST | ASTM D-445 | 3.3 |
| POUR POINT, DEG.F. | ASTM D-97 | +20 |
| CLOUD POINT, DEG.F. | ASTM D-2500 | +30 |
| CORROSION | ASTM D-130 | *1A |
| SULFUR, TOTAL, WT.% | ASTM D- 4294 | .187 |
| CETANE INDEX | ASTM D-976 | 52.0 |
| ASH, WT.% | ASTM D-482 | *0.0 |
| CARBON RESIDUE, 10% BTMS, WT.% | ASTM D-402 | *0.0 |
| BS & W | ASTM D-1797 | *0.0 |
| COLOR | ASTM D-1500 | BLUE |

Covers fuel sold on
5-20, 5-27

NOTE: DYED DIESEL FUEL, NON-TAXABLE USE ONLY, PENALTY FOR TAXABLE USE

Technician: RT

For fuel received from Midstream Fuel on 5/20 and
5/27

[illegible] PETROLEUM MARKETING, INC. [redacted]
P.O. DRAWER 308
SARALAND, ALABAMA 36571
205-675-3176 FAX
205-675-7060

**Sample:** TANK 212 HIGH SULFUR DIESEL **DATE:** 05/30/94

**Sample ID:** AA00436

| TESTS | METHOD | RESULTS |
|---|---|---|
| API @ 60 DEG.F. | ASTM D-287 | 38.3 |
| FLASH POINT, DEG.F. | ASTM D-56 | 160 |
| IBP | ASTM D-86 | 341 |
| 10% | | 447 |
| 50% | | 529 |
| 90% | | 634 |
| FBP | | 684 |
| VISCOSITY, CST | ASTM D-445 | 3.14 |
| POUR POINT, DEG.F. | ASTM D-97 | 20 |
| CLOUD POINT, DEG.F. | ASTM D-2500 | 26 |
| CORROSION | ASTM D-130 | 1A |
| SULFUR, TOTAL, WT.% | ASTM D- 4294 | 0.281 |
| CETANE INDEX | ASTM D-976 | 54 |
| ASH, WT.% | ASTM D-482 | *<0.01 |
| CARBON RESIDUE, 10% BTMS, WT.% | ASTM D-402 | *0.01 |
| BS & W | ASTM D-1797 | *0.01 |
| COLOR | ASTM D-1500 | BLUE |

Covers fuel sold on
6-2

NOTE: DYED DIESEL FUEL, NON-TAXABLE USE ONLY, PENALTY FOR TAXABLE USE

Technician: MDC

For fuel received from Midstream fuel
on 6/2

BEST AVAILABLE COPY

TT 104

MFS - THEO.

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 04-JUN-1994 21:12:00
Source: 373 TANK Lot No.: CBDNO2-94-0116-38113

TT-104

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 35.1 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8493 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 176 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 49.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.00 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 371 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 446 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 529 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 613 |
| END POINT (DEG F) | ASTM D-86 | 668 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.08 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 5.1 |
| GALLONS OF BLUE DYE (GALLONS) | | 120.1 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

For fuel received from Midstream Fuel.
on 6/5, 6/8, 6/10, 6/11
and 6/13

COVERS fuel sold ON
6-5, 6-8, 6-10, 6-11
AND 6-13

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 371 TANK

Date Finaled: 14-JUN-1994 16:27:00
Lot No.: CHDNO2-94-0197-38275

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 35.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8473 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L1.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +8 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 169 |
| SULFUR (WT%) | ASTM D-4294 | 0.22 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING; ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 49.9 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.88 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 360 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 445 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 523 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 611 |
| END POINT (DEG F) | ASTM D-86 | 669 |
| OLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.8 | 87 |
| YDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| CID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| ARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| OUR POINT (DEG F) | ASTM D-97 | 0 |
| YED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.6 |
| ALLONS OF BLUE DYE (GALLONS) | | 55.0 |

Company Representative

Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR ABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN IPMENT NOT DESIGNED FOR HIGHWAY USE. )

Covers fuel sold
6-16, 6-17, 6-18, 6-
6-24, 6-27, 6-29, AND
6-30

Atth

For fuel received fra
Midstream Fuel a 6/16. 17 18. 21 24 27 29 30

**BEST AVAILABLE COPY**

Loaded 4-1

Pass Base

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

uct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 24-MAR-1994 12:51:00
rce: 361 TANK Lot No.: CHDNO2-94-0101-37090
FS-30 4-1-94

| Test Name | Method | Results |
|---|---|---|
| ITY, API (API) | ASTM D-4052 | 32.1 |
| ITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8649 |
| OR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| ARANCE | ASTM D-4176 | B&C |
| D POINT (DEG F) | ASTM D-2500 | +12 |
| H, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| FUR (WT%) | ASTM D-4294 | 0.50 |
| OSION COPPER STRIP | ASTM D-130 | 1 |
| RFACE RATING, ML CUFF (MILLILITERS) |  | <0.5 |
| IMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| NE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.8 |
| OSITY @40C (CS) | ASTM D-445 | 3.31 |
| 6 DISTILLATION |  |  |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 335 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 418 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 531 |
| 0% (DEG F) RECOVERED | ASTM D-86 | 634 |
| END POINT (DEG F) | ASTM D-86 | 695 |
| R STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| ROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.08 |
| ON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | +5 |
| DIESEL COLOR | PRM 16.16 | PASS |
| BLUE (LBS/1000 BBLS) |  | 4.9 |
| ONS OF BLUE DYE (GALLONS) |  | 85.0 |

Company Representative

pical data - Obtained and confirmed at regular intervals
standard statistical procedures for quality control.

ED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
BLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
MENT NOT DESIGNED FOR HIGHWAY USE. )

Fuel received 4/6, 4/13 - Fuel Services

BEST AVAILABLE COPY

[illegible] BASE TEL NO.601-[illegible]-1674 #059 P02

rUSA/ACCTG.PASS REFIN TEL:601-938-4314 Apr 15,94 13:48 No.023 P.01

Posted 4-15

Pass Base

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 11-APR-1994 11:46:00
ource: 371 TANK Lot No.: CHDNO2-94-0122-37344

FS-20 4-15-94

| Test Name | Method | Result |
|---|---|---|
| AVITY, API (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| LOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| PEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| LASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| LFUR (WT%) | ASTM D-4294 | 0.48 |
| RROSION COPPER STRIP | ASTM D-130 | 1 |
| NTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| DIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| TANE INDEX D-4737 (INDEX) | ASTM D-4737 | 45.0 |
| ISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| -86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 339 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 426 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 524 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 693 |
| LOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| DROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| D NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| RBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| SH CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | 0 |
| D DIESEL COLOR | PRM 16.16 | PASS |
| E BLUE (LBS/1000 BBLS) | | 4.9 |
| LONS OF BLUE DYE (GALLONS) | | 55.9 |

Company Representative

Typical data - Obtained and confirmed at regular intervals
y standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
ABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
PMENT NOT DESIGNED FOR HIGHWAY USE. )

For fuel purchased on 4/18 @ Fuel Services

**BEST AVAILABLE COPY**

Jubbel 4-26

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 373 TANK
FS-30 4-26-94

Date Finaled: 15-APR-1994 23:54:00
Lot No.: CHDNO2-94-0127-37438

| Test Name | Method | Result |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 32.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8612 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L3.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 158 |
| SULFUR (WT%) | ASTM D-4294 | 0.49✓ |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.87 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 347 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 426 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 524 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 693 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 89 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.8 |
| GALLONS OF BLUE DYE (GALLONS) | | 126.0 |

Company Representative

T/C FB

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

For fuel purchased on 4/26, 5/2 - Fuel Services

4/26, 29

For fuel received 5/7/94 - Fuel Services

Pass Base

FOAMD 5-5

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

(To SANDY)

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 373 TANK
FS- 40

Date Finaled: 03-MAY-1994 00:46:00
Lot No.: CHDNO2-94-0151-37704

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 31.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8676 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L3.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 168 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.20 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 365 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 429 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 533 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 695 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.8 |
| GALLONS OF BLUE DYE (GALLONS) | | 26.0 |

T/c
F/s

L. H. Lott / J. E. Platt
Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

FS 5/7

BEST AVAILABLE COPY

For fuel received 5/11, 5/14 - Fuel Services

[illegible], MISSISSIPPI

Pasc. Base

LOADED 5/8

TO SANDY

# LABORATORY TEST RESULTS

Product; CHEVRON DIESEL/HEATING NO. 2  Date Finaled: 07-MAY-1994 17:27:00
Source: 373 TANK  Lot No.: CHDNO2-94-0157-37778
FS-30 (5/8/94)

| Test Name | Method | Result |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 31.9 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8660 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.0 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 343 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 419 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 521 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 695 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 87 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.3 |
| GALLONS OF BLUE DYE (GALLONS) | | 42.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

TK
P/S

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location FUEL SERVICES
Fax No. 769-5963  Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4214  Phone No. 938-4224

Comments
LAB TEST RESULTS

FS - 5/11/9

8??

BEST AVAILABLE COPY

For fuel received 5/19 . . . - Fuel Services

18th

# CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 371 TANK
FS-30

Date Finaled: 15-MAY-1994 01:42:00
Lot No.: CHDNO2-94-0171-37873

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 36.2 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8438 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L1.5 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 182 |
| SULFUR (WT%) | ASTM D-4294 | 0.40 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 51.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.08 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 438 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 528 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 618 |
| END POINT (DEG F) | ASTM D-86 | 670 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.07 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +10 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 4.9 |
| GALLONS OF BLUE DYE (GALLONS) | | 53.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ) .

---

Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date

Time T/C FS

No. of Pages

To: JOHN JOYCE

From: JACKIE SHOTTS

FS 5/19, 22

**BEST AVAILABLE COPY**

Fuel Received 5/26 - Fuel Services
6/2 16/5

CUSA/ACCTG.PASS REFIN TEL:601-938-4314 May 26.94 13:44 No.014 P.01

Attn: SANDI

5/25

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 23-MAY-1994 03:57:00
Source: 361 TANK Lot No.: CHDNO2-94-0177-37975
FS-30

| Test Name | Method | Result |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 35.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8463 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.08 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 48.7 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.82 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 359 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 427 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 513 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 623 |
| END POINT (DEG F) | ASTM D-86 | 686 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 89 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 5.2 |
| GALLONS OF BLUE DYE (GALLONS) | | 97.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Fax Transmission T/C FS

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages
To: JOHN JOYCE
From: JACKIE SHOTTS

FS - 5/26

BEST AVAILABLE COPY

TO:CUSA GRAVIER

JUN-09-'94 THU 10:01M ID:CUSA PASC DRLG BASE TEL NO:601-769-1674 #156 P01

6/8 Fuel received 6/7 - Fuel Services

6/10, 6/11

/ACCTG.PASS REFIN TEL:601-938-4314 Jun 08,94 13:26 No.020 P.01

ATTN: SANDY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

ct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 04-JUN-1994 21:12:00
ce: 373 TANK Lot No.: CHDNO2-94-0186-38113

FS-30

| Test Name | Method | Results |
|---|---|---|
| ITY, API (API) | ASTM D-4052 | 35.1 |
| TY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8493 |
| , ASTM D-1500 | ASTM D-1500 | L2.0 |
| ARANCE | ASTM D-4176 | B&C |
| POINT (DEG F) | ASTM D-2500 | +9 |
| , PENSKY-MARTENS (DEG F) | ASTM D-93 | 176 |
| UR (WT%) | ASTM D-4294 | 0.46 |
| OSION COPPER STRIP | ASTM D-130 | 1 |
| FACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| ENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| . INDEX D-4737 (INDEX) | ASTM D-4737 | 49.6 |
| SITY @40C (CS) | ASTM D-445 | 3.00 |
| DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 371 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 446 |
| 0% (DEG F) RECOVERED | ASTM D-86 | 529 |
| 0% (DEG F) RECOVERED | ASTM D-86 | 613 |
| END POINT (DEG F) | ASTM D-86 | 668 |
| STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| GEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.08 |
| ON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ONTENT (WT%) | ASTM D-482 | *<.001 |
| POINT (DEG F) | ASTM D-97 | +5 |
| DIESEL COLOR | PRM 16.16 | PASS |
| BLUE (LBS/1000 BBLS) | | 5.1 |
| NS OF BLUE DYE (GALLONS) | | 120.1 |

Company Representative

ical data - Obtained and confirmed at regular intervals
standard statistical procedures for quality control.

ED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
E USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
MENT NOT DESIGNED FOR HIGHWAY USE. )

Transmission Chevron

Attn: Sandi Fury

6/14/94

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

oduct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 12-JUN-1994 16:49:00
ource: 361 TANK Lot No.: CHDNO2-94-0196-38251

| Test Name | Method | Results |
|---|---|---|
| AVITY, API (API) | ASTM D-4052 | 35.2 |
| AVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8488 |
| OLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| PEARANCE | ASTM D-4176 | B&C |
| OUD POINT (DEG F) | ASTM D-2500 | +8 |
| LASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 180 |
| ULFUR (WT%) | ASTM D-4294 | 0.40 |
| RROSION COPPER STRIP | ASTM D-130 | 1 |
| NTERFACE RATING, ML CUFF (MILLILITERS) | | 0.0 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| ETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 49.4 |
| ISCOSITY @40C (CS) | ASTM D-445 | 3.00 |
| -86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 377 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 443 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 527 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 609 |
| END POINT (DEG F) | ASTM D-86 | 663 |
| OLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.01 |
| ARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| SH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 5.0 |
| GALLONS OF BLUE DYE (GALLONS) | | 73.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Fuel received 6/15 - Fuel Services

6/16

BEST AVAILABLE COPY

Fuel received 6/18, 22, 25, 29 - Fuel Service
6/21, 6/30

CUSA/ACCTG.PASS REFIN TEL:( -938-4314 Jun 20 '1 15:49 No.025 P.01

06-17-94

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 16-JUN-1994 03:15:00
Source: 373 TANK Lot No.: CHDNO2-94-0199-38304
FS-30

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 35.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | L0.8483 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 177 |
| SULFUR (WT%) | ASTM D-4294 | 0.36 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | 0.0 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 49.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 371 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 446 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 523 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 607 |
| END POINT (DEG F) | ASTM D-86 | 670 |
| LOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 89 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 5.0 |
| GALLONS OF BLUE DYE (GALLONS) | | 51.1 |

Tk
F/S

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR AXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN QUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

ax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

y's te

Time

No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

FS 6/18,22,2

ID:CHEVRON THEODORE TEL NO:205-443-8714 #380 P09

BEST AVAILABLE COPY

NOV-14-'94 MON 09:59 ID:CUSA PASC BASE TEL NO:601-769-1674 #500 P02

JSA/ACCTG.PASS REFIN TEL:601-938-4314 Jun 30.94 7:40 No.002 P.01

JAD FS-30
-27-94

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

duct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 20-JUN-1994 09:32:00
ce: 371 TANK Lot No.: CHDNO2-94-0203-38353
FS-30

| Test Name | Method | Results |
|---|---|---|
| VITY, API (API) | ASTM D-4052 | 35.8 |
| VITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8458 |
| R, ASTM D-1500 | ASTM D-1500 | L2.5 |
| ARANCE | ASTM D-4176 | B&C |
| UD POINT (DEG F) | ASTM D-2500 | +8 |
| SH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 186 |
| UR (WT%) | ASTM D-4294 | 0.48 |
| OSION COPPER STRIP | ASTM D-130 | 1 |
| ERFACE RATING, ML CUFF (MILLILITERS) | | 0.0 |
| MENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| NE INDEX D-4737 (INDEX) | ASTM D-4737 | 50.9 |
| COSITY @40C (CS) | ASTM D-445 | 2.94 |
| 6 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 385 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 452 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 524 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 607 |
| END POINT (DEG F) | ASTM D-86 | 665 |
| OR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| DROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.02 |
| ON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| H CONTENT (WT%) | ASTM D-482 | *<.001 |
| R POINT (DEG F) | ASTM D-97 | +5 |
| D DIESEL COLOR | PRM 16.16 | PASS |
| BLUE (LBS/1000 BBLS) | | 5.0 |
| LLONS OF BLUE DYE (GALLONS) | | 59.0 |

Company Representative

Typical data - Obtained and confirmed at regular intervals
y standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR
XABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN
IPMENT NOT DESIGNED FOR HIGHWAY USE. )

Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

oday's Date

Time

No. of Pages

To: JOHN JOYCE

From: JACKIE SHOTTS

Fuel load out Chev 7

LL&E PETROLEUM MARKETING, INC.
P.O. DRAWER 308
SARALAND, ALABAMA 36571
205-675-3176 FAX
205-675-7040

LOADED

**Sample:** TANK 212 HIGH SULFUR DIESEL **DATE:** 06/15/94

**Sample ID:** AA00477

Rec'd 6/30/94

| TESTS | METHOD | RESULTS |
|---|---|---|
| API @ 60 DEG.F. | ASTM D-287 | 38.1 |
| FLASH POINT, DEG.F. | ASTM D-56 | 150 |
| IBP | ASTM D-86 | 310 |
| 10% | ASTM D-86 | 434 |
| 50% | ASTM D-86 | 528 |
| 90% | ASTM D-86 | 637 |
| FBP | ASTM D-86 | 701 |
| VISCOSITY @ 104 DEG.F., CST | ASTM D-445 | 3.18 |
| POUR POINT, DEG.F. | ASTM D-97 | 20 |
| CLOUD POINT, DEG.F. | ASTM D-2500 | 30 |
| CORROSION | ASTM D-130 | *1A |
| SULFUR, TOTAL, WT.% | ASTM D-3227 | 0.494 |
| CETANE INDEX | ASTM D-976 | 54 |
| ASH, WT.% | ASTM D-482 | *<0.01 |
| CARBON RESIDUE, 10% BTMS, WT.% | ASTM D-402 | *0.01 |
| BS & W, VOL.% | ASTM D-1797 | *0.01 |
| COLOR | ASTM D-156 | BLUE |

NOTE: DYED DIESEL FUEL, NON-TAXABLE ONLY, PENALTY FOR TAXABLE USE

Technician: MDC

7/8, 7/10

Fuel load out Chev

Rec'd
7/11/94

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

oduct: CHEVRON DIESEL/HEATING NO. 2 Date Finaled: 09-JUL-1994 14:51:00
ource: 371 TANK Lot No.: CBDN02-94-9222-38626
ME-731, ME732

| Test Name | Method | Result |
|---|---|---|
| AVITY, API (API) | ASTM D-4052 | 31.5 |
| AVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8681 |
| OLOR, ASTM D-1500 | ASTM D-1500 | L3.0 |
| PEARANCE | ASTM D-4176 | B&C |
| OUD POINT (DEG F) | ASTM D-2500 | +5 |
| LASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 178 |
| ULFUR (WT%) | ASTM D-4294 | 0.24 |
| RROSION COPPER STRIP | ASTM D-130 | 1 |
| NTERFACE RATING, ML CUFF (MILLILITERS) | | 0.0 |
| EDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| TANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.2 |
| SCOSITY @40C (CS) | ASTM D-445 | 2.92 |
| -86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 356 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 526 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 629 |
| END POINT (DEG F) | ASTM D-86 | 679 |
| OR STABILITY FILTER REFLECT (PERCENT) | PRM 16.6 | 85 |
| DROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| RBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| SH CONTENT (WT%) | ASTM D-482 | *<.001 |
| OUR POINT (DEG F) | ASTM D-97 | +0 |
| ED DIESEL COLOR | PRM 16.16 | PASS |
| E BLUE (LBS/1000 BBLS) | | 4.6 |
| ALLONS OF BLUE DYE (GALLONS) | | 51.0 |

Company Representative

Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR AXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN QUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Fuel load out Chev 7/12, 7/14

BEST AVAILABLE COPY

Rec'd 7/17

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

roduct: CHEVRON DIESEL/HEATING NO. 2
ource: 361 TANK
MF-73L

Date Finaled: 17-JUL-1996 04:14:30
Lot No.: CHDNO2-94-0226-38722

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 30.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8718 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +10 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 176 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.27 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 453 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 13.14 | 0.5 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 5.3 |
| GALLONS OF BLUE DYE (GALLONS) | | 105.0 |

Company Representative

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Chevron loadout 7/18, 7/23, 7/31 and 8/13 no TANK → 8/18/94

**BEST AVAILABLE COPY**

Rec'd 7/30 –

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Source: 371 TANK

Date Finaled: 29-JUL-1994 15:41:00
Lot No.: CHDN02-94-0241-38908

| Test Name | Method | Results |
|---|---|---|
| GRAVITY, API (API) | ASTM D-4052 | 32.2 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8644 |
| COLOR, ASTM D-1500 | ASTM D-1500 | L2.0 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.40 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CORR (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.9 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.81 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 346 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 523 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 626 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULPIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.13 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| DYE BLUE (LBS/1000 BBLS) | | 58.0 |
| GALLONS OF BLUE DYE (GALLONS) | | 5.0 |

Company Representative

* Typical data – Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

1994 - Midstream Fuel 71

# C-5 ATTACHMENT EU-3 FUEL ANALYSIS

Chevron

**Chevron U.S.A. Production Co.**
Special Projects Group
935 Gravier Street
New Orleans, LA 70112

February 12, 1996

Report of Activity
4th ~~3rd~~ Quarter 1995
Permit: OCS - FL - 002

U.S. Environmental Protection Agency Region IV
Chief, Air Enforcement Branch
Air, Pesticides and Toxics Management Division
345 Courtland Street, NE
Atlanta, Georgia 30365

Attention: Mr. R. Scott Davis
Source Evaluation and Southern Compliance Unit

Gentlemen:

In accordance with the requirements of the subject permit, the following information is provided detailing the activity from initial start-up through the end of the third calendar quarter of 1995 for the subject operation:

| | |
|---|---|
| Appendix "A": | Fuel Sulfur Content Summary |
| Appendix "B": | Daily Fuel Consumption / Run Time - Main Rig Engines |
| Appendix "C": | Daily Fuel Consumption - Marine Vessels |
| Appendix "D": | Daily Trip Summary - Marine Vessels |

We are currently nearing the commencement of well testing operations proposed under the permit. I will advise you prior to commencement of subject operation.

Should you have any questions concerning the attached, please call me at (504) 592-6095.

Sincerely,

S. M. Fury

cc: Conoco Inc.
Murphy Exploration and Production Company

Minerals Management Service
Florida Department of Environmental Protection

# APPENDIX "A"
# Third Quarter 1995 Report
# Permit OCS-FL-002
# Fuel Sulfur Content

| Date<br>Fuel Taken | Fuel<br>Supplier | Chip "D"/Rig<br>Sulfur Content, weight % |
|---|---|---|
| 11/03/95 | Midstream Fuel Services | 0.39 |
| 11/10/95 | Midstream Fuel Services | 0.47 |
| 11/17/95 | Midstream Fuel Services | 0.47 |
| 11/24/95 | Midstream Fuel Services | 0.47 |
| 11/30/95 | Midstream Fuel Services | 0.47 |
| 12/08/95 | Midstream Fuel Services | 0.44 |
| 12/16/95 | Midstream Fuel Services | 0.49 |
| 12/18/95 | Midstream Fuel Services | 0.49 |
| 12/23/95 | Midstream Fuel Services | 0.49 |
| 12/29/95 | Midstream Fuel Services | 0.42 |

| Date<br>Fuel Taken | Fuel<br>Supplier | Nancy Tide<br>Sulfur Content, weight % |
|---|---|---|
| 11/03/95 | Midstream Fuel Services | 0.39 |
| 11/15/95 | Midstream Fuel Services | 0.47 |
| 11/19/95 | Midstream Fuel Services | 0.47 |
| 11/25/95 | Midstream Fuel Services | 0.47 |
| 12/07/95 | Midstream Fuel Services | 0.44 |
| 12/13/95 | Midstream Fuel Services | 0.49 |
| 12/16/95 | Midstream Fuel Services | 0.49 |
| 12/28/95 | Midstream Fuel Services | 0.49 |

# APPENDIX "D"

## Daily Trip Summary - Marine Vessels

| Date | Crew Boat (trips completed) | Supply Boat (trips completed) | UtilityBoat (trips completed) |
|---|---|---|---|
| 11/7 | 2 | 0 | 0 |
| 11/8 | 0 | 0.5 | 0 |
| 11/9 | 0 | 0 | 0 |
| 11/10 | 0 | 1 | 0 |
| 11/11 | 0 | 0 | 0 |
| 11/12 | 0 | 1 | 0 |
| 11/13 | 0 | 0 | 0 |
| 11/14 | 1 | 0 | 0 |
| 11/15 | 0 | 1 | 0 |
| 11/16 | 1 | 0 | 0 |
| 11/17 | 0 | 1 | 0 |
| 11/18 | 0 | 0 | 0 |
| 11/19 | 0 | 1 | 0 |
| 11/20 | 0 | 0 | 0 |
| 11/21 | 0 | 1 | 0 |
| 11/22 | 1 | 0 | 0 |
| 11/23 | 0 | 1 | 0 |
| 11/24 | 0 | 0 | 0 |
| 11/25 | 0 | 1 | 0 |
| 11/26 | 1 | 0 | 0 |
| 11/27 | 0 | 1 | 0 |
| 11/28 | 1 | 0 | 0 |
| 11/29 | 1 | 0 | 0 |
| 11/30 | 0 | 1 | 0 |
|  | 8 | 10.5 | 0 |

# APPENDIX "D"

## Daily Trip Summary - Marine Vessels

| Date | Crew Boat | Supply Boat | Utility |
|---|---|---|---|
| 12/1 | 0 | 0 | 0 |
| 12/2 | 0 | 1 | 0 |
| 12/3 | 0 | 0 | 0 |
| 12/4 | 0 | 0 | 0 |
| 12/5 | 1 | 0 | 0 |
| 12/6 | 1 | 0 | 0 |
| 12/7 | 0 | 1 | 0 |
| 12/8 | 1 | 0 | 0 |
| 12/9 | 1 | 1 | 0 |
| 12/10 | 0 | 0 | 0 |
| 12/11 | 0 | 0 | 0 |
| 12/12 | 1 | 0 | 0 |
| 12/13 | 0 | 0 | 0 |
| 12/14 | 0 | 0 | 0 |
| 12/15 | 1 | 0 | 0 |
| 12/16 | 1 | 0 | 0 |
| 12/17 | 0 | 1 | 0 |
| 12/18 | 0 | 0 | 0 |
| 12/19 | 0 | 0 | 0 |
| 12/20 | 0 | 0 | 0 |
| 12/21 | 0 | 1 | 0 |
| 12/22 | 0 | 1 | 0 |
| 12/23 | 0 | 0 | 0 |
| 12/24 | 0 | 1 | 0 |
| 12/25 | 0 | 1 | 0 |
| 12/26 | 1 | 0 | 0 |
| 12/27 | 0 | 1 | 0 |
| 12/28 | 0 | 0 | 0 |
| 12/29 | 1 | 0 | 0 |
| 12/30 | 0 | 0 | 0 |
| 12/31 | 1 | 0.5 | 0 |
|  | 10 | 9.5 | 0 |

# APPENDIX "C"

## Daily Fuel Consumption - Marine Vessels

| Date | Crew Boat | Supply Boat | Utility |
|---|---|---|---|
| 11/7 | 290 | 320 | 0 |
| 11/8 | 0 | 200 | 0 |
| 11/9 | 0 | 520 | 0 |
| 11/10 | 0 | 230 | 0 |
| 11/11 | 0 | 195 | 0 |
| 11/12 | 0 | 541 | 0 |
| 11/13 | 0 | 0 | 0 |
| 11/14 | 160 | 0 | 630* |
| 11/15 | 0 | 669 | 250 |
| 11/16 | 140 | | 70 |
| 11/17 | 0 | 750 | 90 |
| 11/18 | 0 | 200 | 110 |
| 11/19 | 0 | 680 | 135 |
| 11/20 | 0 | 0 | 180 |
| 11/21 | 70 | 797 | 110 |
| 11/22 | 75 | 300 | 157 |
| 11/23 | 0 | 528 | 90 |
| 11/24 | 0 | 0 | 132 |
| 11/25 | 0 | 600 | 110 |
| 11/26 | 130 | 0 | 80 |
| 11/27 | 0 | 415 | 80 |
| 11/28 | 130 | 455 | 40 |
| 11/29 | 185 | 120 | 65 |
| 11/30 | 0 | 450 | 89 |
| | 1,180 | 7,970 | 2,418 |

# APPENDIX "C"

## Daily Fuel Consumption - Marine Vessels

| Date | Crew Boat | Supply Boat | Utility |
|---|---|---|---|
| 12/1 | 0 | 0 | 0 |
| 12/2 | 0 | 0 | 0 |
| 12/3 | 0 | 0 | 0 |
| 12/4 | 0 | 0 | 104* |
| 12/5 | 160 | 135 | 41 |
| 12/6 | 175 | 362 | 58 |
| 12/7 | 0 | 220 | 54 |
| 12/8 | 110 | 0 | 60 |
| 12/9 | 180 | 525 | 100 |
| 12/10 | 0 | 0 | 49 |
| 12/11 | 0 | 0 | 48 |
| 12/12 | 150 | 0 | 55 |
| 12/13 | 0 | 0 | 202 |
| 12/14 | 0 | 0 | 231 |
| 12/15 | 0 | 0 | 140 |
| 12/16 | 170 | 0 | 67 |
| 12/17 | 130 | 640 | 65 |
| 12/18 | 0 | 0 | 72 |
| 12/19 | 0 | 0 | 70 |
| 12/20 | 0 | 900 | 60 |
| 12/21 | 0 | 240 | 60 |
| 12/22 | 0 | 500 | 60 |
| 12/23 | 0 | 250 | 60 |
| 12/24 | 0 | 715 | 60 |
| 12/25 | 0 | 474 | 60 |
| 12/26 | 120 | 0 | 90 |
| 12/27 | 0 | 554 | 60 |
| 12/28 | 0 | 0 | 60 |
| 12/29 | 150 | 0 | 90 |
| 12/30 | 0 | 0 | 60 |
| 12/31 | 0 | 0 | 116 |
|  | 1,345 | 5,515 | 2,252 |

## APPENDIX "B"

## Third Quarter 1995 Report
## Permit OCS-FL-002
## Daily Fuel consumption/Run Time
## Main Rig Engines

| | Engine #1 | | Engine #2 | | Engine #3 | |
|---|---|---|---|---|---|---|
| Date | fuel usage (gallons) | run time (hours) | fuel usage (gallons) | run time (hours) | fuel usage (gallons) | run time (hours) |
| 11/7 | 0 | 0 | 692 | 24 | 680 | 24 |
| 11/8 | 0 | 0 | 1254 | 24 | 1179 | 24 |
| 11/9 | 9.6 | 0 | 1283 | 24 | 341 | 8 |
| 11/10 | 317 | 7 | 1284 | 24 | 0 | 0 |
| 11/11 | 1396 | 24 | 1311 | 24 | 0 | 0 |
| 11/12 | 1987 | 24 | 1922 | 24 | 0 | 0 |
| 11/13 | 2077 | 24 | 1985 | 24 | 0 | 0 |
| 11/14 | 1688 | 24 | 1587 | 24 | 0 | 0 |
| 11/15 | 2146 | 24 | 2100 | 24 | 0 | 0 |
| 11/16 | 2138 | 24 | 2136 | 24 | 0 | 0 |
| 11/17 | 2167 | 24 | 2220 | 24 | 0 | 0 |
| 11/18 | 1416 | 24 | 1412 | 24 | 0 | 0 |
| 11/19 | 2211 | 24 | 2218 | 24 | 0 | 0 |
| 11/20 | 2171 | 24 | 2237 | 24 | 0 | 0 |
| 11/21 | 2055 | 24 | 2037 | 24 | 0 | 0 |
| 11/22 | 2219 | 24 | 2183 | 24 | 0 | 0 |
| 11/23 | 2151 | 24 | 2154 | 24 | 0 | 0 |
| 11/24 | 2366 | 24 | 2363 | 24 | 0 | 0 |
| 11/25 | 1413 | 24 | 1411 | 24 | 0 | 0 |
| 11/26 | 2360 | 24 | 2340 | 24 | 0 | 0 |
| 11/27 | 1843 | 24 | 1843 | 24 | 0 | 0 |
| 11/28 | 976 | 24 | 1176 | 24 | 0 | 0 |
| 11/29 | 1072 | 24 | 915 | 24 | 0 | 0 |
| 11/30 | 1128 | 24 | 966 | 24 | 0 | 0 |
| *Totals* | 37,303.6 | | 41,029 | | 2,200 | |

# APPENDIX "B"

## Third Quarter 1995 Report
## Permit OCS-FL-002
## Daily Fuel consumption/Run Time
## Main Rig Engines

| | Engine #1 | | Engine #2 | | Engine #3 | |
|---|---|---|---|---|---|---|
| Date | fuel usage (gallons) | run time (hours) | fuel usage (gallons) | run time (hours) | fuel usage (gallons) | run time (hours) |
| 12/1 | 293 | 16 | 1206 | 24 | 0 | 0 |
| 12/2 | 743 | 24 | 1047 | 24 | 0 | 0 |
| 12/3 | 1710 | 24 | 1551 | 24 | 0 | 0 |
| 12/4 | 2073 | 24 | 2056 | 24 | 7 | 0 |
| 12/5 | 1842 | 24 | 1811 | 24 | 0 | 0 |
| 12/6 | 1211 | 24 | 1200 | 24 | 0 | 0 |
| 12/7 | 1853 | 24 | 1850 | 24 | 0 | 0 |
| 12/8 | 1498 | 24 | 477 | 24 | 0 | 0 |
| 12/9 | 762 | 24 | 394 | 12 | 386 | 12 |
| 12/10 | 798 | 24 | 0 | 0 | 853 | 24 |
| 12/11 | 1275 | 24 | 0 | 0 | 1289 | 24 |
| 12/12 | 1268 | 24 | 0 | 0 | 1308 | 24 |
| 12/13 | 925 | 24 | 0 | 0 | 942 | 24 |
| 12/14 | 1256 | 24 | 0 | 0 | 1305 | 24 |
| 12/15 | 682 | 24 | 0 | 0 | 701 | 24 |
| 12/16 | 1080 | 24 | 0 | 0 | 1117 | 24 |
| 12/17 | 1338 | 24 | 0 | 0 | 1321 | 24 |
| 12/18 | 1223 | 24 | 0 | 0 | 1190 | 24 |
| 12/19 | 1042 | 24 | 0 | 0 | 1003 | 24 |
| 12/20 | 992 | 24 | 0 | 0 | 957 | 24 |
| 12/21 | 1317 | 24 | 0 | 0 | 1295 | 24 |
| 12/22 | 1311 | 24 | 0 | 0 | 1274 | 24 |
| 12/23 | 1108 | 24 | 0 | 0 | 1089 | 24 |
| 12/24 | 486 | 24 | 232 | 24 | 745 | 24 |
| 12/25 | 0 | 0 | 1216 | 24 | 1315 | 24 |
| 12/26 | 0 | 0 | 1156 | 24 | 1221 | 24 |
| 12/27 | 0 | 0 | 1229 | 24 | 1233 | 24 |
| 12/28 | 702 | 24 | 714 | 24 | 0 | 0 |
| 12/29 | 1214 | 24 | 1218 | 24 | 0 | 0 |
| 12/30 | 1311 | 24 | 1269 | 24 | 0 | 0 |
| 12/31 | 1273 | 24 | 1276 | 24 | 0 | 0 |
| *Totals* | 32,586 | | 19,902 | | 20,551 | |

Chevron

Chevron U.S.A. Production Co.
Special Projects Group
935 Gravier Street
New Orleans, LA 70112

May 15, 1996

**Report of Activity**
**1st Quarter 1996**
**Permit: OCS-FL-002**

U. S. Environmental Protection Agency, Region IV
Chief, Air Enforcement Branch
Air, Pesticides and Toxics Management Division
345 Courtland St., NE
Atlanta, GA 30365

Attention: Mr. R. Scott Davis
Source Evaluation and Southern Compliance Unit

Ladies and Gentlemen:

The following information is hereby submitted in accordance with the Specific Conditions of the subject permit:

| | |
|---|---|
| Appendix "A": | Fuel Sulfur Certification |
| Appendix "B": | Daily Fuel Consumption / Run Time - Main Rig Engines |
| Appendix "C": | Daily Fuel Consumption - Marine Vessels (gallons) |
| Appendix "D": | Daily Trip Summary - Marine Vessels (trips completed) |

No well testing occurred during this period; therefore, there are no $SO_2$ emissions to report. The final report for operations under the subject permit will be forwarded to you shortly as drilling operations were completed in late April. Should you have any questions concerning this report or need additional information, please contact me at (504) 592-6095.

Sincerely,

S. M. Fury

c.c.: Florida Department of Environmental Protection
U.S. Department of the Interior, Minerals Management Service
Murphy Exploration & Production Company
Conoco Inc.

# APPENDIX "A"

## First Quarter 1996 Report: Permit OCS-FL-002
## *Fuel Sulfur Certification*

| Date | Fuel Supplier | Supply Boat / Rig / Utility Boat Sulfur Content, wt% |
|---|---|---|
| 1/3/96 | Midstream Fuel Service, Inc. | 0.42 |
| 1/10/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/16/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/21/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/29/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/11/96 | Midstream Fuel Service, Inc. | 0.43 |
| 2/22/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/27/96 | Midstream Fuel Service, Inc. | 0.42 |
| 3/11/96 | Midstream Fuel Service, Inc. | 0.42 |
| 3/20/96 | Midstream Fuel Service, Inc. | 0.48 |
| 3/27/96 | Midstream Fuel Service, Inc. | 0.42 |

| Date | Fuel Supplier | Crew Boat Sulfur Content, wt% |
|---|---|---|
| 1/2/96 | Midstream Fuel Service, Inc. | 0.42 |
| 1/5/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/7/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/13/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/17/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/23/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/27/96 | Midstream Fuel Service, Inc. | 0.48 |
| 1/30/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/2/96 | Midstream Fuel Service, Inc. | 0.43 |
| 2/9/96 | Midstream Fuel Service, Inc. | 0.43 |
| 2/12/96 | Midstream Fuel Service, Inc. | 0.43 |
| 2/16/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/19/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/23/96 | Midstream Fuel Service, Inc. | 0.49 |
| 2/27/96 | Midstream Fuel Service, Inc. | 0.42 |
| 3/2/96 | Midstream Fuel Service, Inc. | 0.42 |
| 3/7/96 | Midstream Fuel Service, Inc. | 0.48 |
| 3/15/96 | Midstream Fuel Service, Inc. | 0.42 |
| 3/23/96 | Midstream Fuel Service, Inc. | 0.48 |
| 3/27/96 | Midstream Fuel Service, Inc. | 0.42 |

*Note:*
*Supply Boat - "Chip D"*
*Crew Boat - "Nancy Tide"*

# APPENDIX "B"

## First Quarter 1996 Report: OCS-FL-002

## *Daily Fuel Consumption / Run Time - Main Rig Engines*

| | Engine 1 | | Engine 2 | | Engine 3 | |
|---|---|---|---|---|---|---|
| ***Date*** | **Fuel Usage *(gallons)*** | **Run Time *(hours)*** | **Fuel Usage *(gallons)*** | **Run Time *(hours)*** | **Fuel Usage *(gallons)*** | **Run Time *(hours)*** |
| 1/1/96 | 1008.7 | 24 | 1018.2 | 24 | 0 | 0 |
| 1/2/96 | 615.6 | 24 | 640.1 | 24 | 0 | 0 |
| 1/3/96 | 76.9 | 24 | 1342.1 | 24 | 0 | 0 |
| 1/4/96 * | 1367 | 24 | 1367 | 24 | 0 | 0 |
| 1/5/96 * | 1267.5 | 24 | 1267.5 | 24 | 0 | 0 |
| 1/6/96 * | 1281 | 24 | 1281 | 24 | 0 | 0 |
| 1/7/96 * | 1305.3 | 24 | 1305.3 | 24 | 0 | 0 |
| 1/8/96 | 976.6 | 24 | 1282.6 | 24 | 0 | 0 |
| 1/9/96 | 1177.1 | 24 | 1129.8 | 24 | 38 | 0 |
| 1/10/96 | 858.4 | 24 | 829.2 | 24 | 0 | 0 |
| 1/11/96 | 653.3 | 24 | 638.7 | 24 | 0 | 0 |
| 1/12/96 | 1131.1 | 24 | 1084.2 | 24 | 0 | 0 |
| 1/13/96 | 347.3 | 24 | 1222.8 | 24 | 867.8 | 24 |
| 1/14/96 | 528.1 | 24 | 720.1 | 24 | 1147.5 | 24 |
| 1/15/96 | 1319.1 | 24 | 0 | 0 | 1221.4 | 24 |
| 1/16/96 | 1294.2 | 24 | 816.8 | 18 | 226.3 | 6 |
| 1/17/96 | 1149.9 | 24 | 845.5 | 24 | 0 | 0 |
| 1/18/96 | 1218.4 | 24 | 914.6 | 24 | 0 | 0 |
| 1/19/96 | 748.9 | 24 | 727.1 | 24 | 0 | 0 |
| 1/20/96 | 645.4 | 24 | 648.3 | 24 | 0 | 0 |
| 1/21/96 | 1085.9 | 24 | 1042.3 | 24 | 0 | 0 |
| 1/22/96 | 1300.3 | 24 | 1302.6 | 24 | 0 | 0 |
| 1/23/96 | 1219.3 | 24 | 1267.3 | 24 | 0 | 0 |
| 1/24/96 | 823.6 | 24 | 846.8 | 24 | 0 | 0 |
| 1/25/96 | 1242.6 | 24 | 1259.8 | 24 | 0 | 0 |
| 1/26/96 | 897.5 | 24 | 999.7 | 23 | 11.7 | 1 |
| 1/27/96 ** | 790.4 | 24 | 738.3 | 24 | 109.8 | 0 |
| 1/28/96 | 974.2 | 24 | 1009.1 | 24 | 0 | 0 |
| 1/29/96 | 912.7 | 24 | 937.6 | 24 | 0 | 0 |
| 1/30/96 | 965.7 | 24 | 1001 | 24 | 0 | 0 |
| 1/31/96 | 1069.2 | 24 | 1113.3 | 24 | 0 | 0 |
| Total | 30251.2 | | 30598.7 | | 3622.5 | |

* *Fuel consumed by engine #1 not available, estimated using consumption by engine #2*

** *Fuel usage by engine #3 suspect given no hours run*

# APPENDIX "B"

## First Quarter 1996 Report: OCS-FL-002

### *Daily Fuel Consumption / Run Time - Main Rig Engines*

| | Engine 1 | | Engine 2 | | Engine 3 | |
|---|---|---|---|---|---|---|
| *Date* | Fuel Usage *(gallons)* | Run Time *(hours)* | Fuel Usage *(gallons)* | Run Time *(hours)* | Fuel Usage *(gallons)* | Run Time *(hours)* |
| 2/1/96 | 1053.4 | 24 | 1091.4 | 24 | 0 | 0 |
| 2/2/96 | 737.5 | 24 | 790 | 24 | 0 | 0 |
| 2/3/96 | 979.6 | 24 | 1017.9 | 24 | 0 | 0 |
| 2/4/96 | 848.7 | 24 | 891.7 | 24 | 0 | 0 |
| 2/5/96 | 1016.7 | 23 | 1065.7 | 24 | 1.8 | 0 |
| 2/6/96 | 820.3 | 24 | 16.2 | 0 | 801.7 | 24 |
| 2/7/96 | 977.9 | 24 | 0 | 0 | 1014.2 | 24 |
| 2/8/96 | 754.8 | 24 | 96 | 0 | 644.1 | 24 |
| 2/9/96 | 1028.1 | 24 | 0 | 0 | 1027.4 | 24 |
| 2/10/96 | 1089.4 | 24 | 0 | 0 | 1065.7 | 24 |
| 2/11/96 | 1126 | 19 | 0 | 0 | 380.6 | 24 |
| 2/12/96 | 791.1 | 24 | 0 | 0 | 765.6 | 24 |
| 2/13/96 | 848.4 | 24 | 0 | 0 | 871.9 | 24 |
| 2/14/96 | 843 | 24 | 0 | 0 | 837.7 | 24 |
| 2/15/96 | 702.6 | 24 | 429.5 | 24 | 290.4 | 10 |
| 2/16/96 | 830.6 | 24 | 856.7 | 24 | 0 | 0 |
| 2/17/96 | 675.7 | 24 | 706.4 | 24 | 0 | 0 |
| 2/18/96 * | 675.7 | 24 | 706.4 | 24 | 0 | 0 |
| 2/19/96 | 681.8 | 24 | 719.9 | 24 | 0 | 0 |
| 2/20/96 | 558.9 | 24 | 607.4 | 24 | 0 | 0 |
| 2/21/96 | 566 | 24 | 615.9 | 24 | 0 | 0 |
| 2/22/96 | 492.5 | 24 | 552 | 24 | 0 | 0 |
| 2/23/96 | 772.9 | 24 | 807.5 | 24 | 0 | 0 |
| 2/24/96 | 766 | 24 | 803.8 | 24 | 0 | 0 |
| 2/25/96 | 901.4 | 24 | 933.7 | 24 | 0 | 0 |
| 2/26/96 | 751.1 | 24 | 787.9 | 24 | 0 | 0 |
| 2/27/96 | 626.2 | 24 | 676.7 | 24 | 0 | 0 |
| 2/28/96 | 855.5 | 24 | 892.8 | 24 | 0 | 0 |
| 2/29/96 | 541.9 | 24 | 591.9 | 24 | 0 | 0 |
| Total | 23313.7 | | 15657.4 | | 7701.1 | |

* *Fuel consumption data not available, used average consumption of 2/17 and 2/19 as estimate*

# APPENDIX "B"

## First Quarter 1996 Report: OCS-FL-002

## *Daily Fuel Consumption / Run Time - Main Rig Engines*

| | Engine 1 | | Engine 2 | | Engine 3 | |
|---|---|---|---|---|---|---|
| *Date* | Fuel Usage *(gallons)* | Run Time *(hours)* | Fuel Usage *(gallons)* | Run Time *(hours)* | Fuel Usage *(gallons)* | Run Time *(hours)* |
| 3/1/96 | 443.3 | 24 | 690.3 | 24 | 0 | 0 |
| 3/2/96 | 756.2 | 24 | 816.4 | 24 | 0 | 0 |
| 3/3/96 | 875.9 | 24 | 926.4 | 24 | 0 | 0 |
| 3/4/96 | 861.7 | 24 | 928.2 | 24 | 0 | 0 |
| 3/5/96 | 888.9 | 24 | 940.5 | 24 | 0 | 0 |
| 3/6/96 | 899.4 | 24 | 954.3 | 24 | 0 | 0 |
| 3/7/96 | 723.6 | 24 | 788.8 | 24 | 0 | 0 |
| 3/8/96 | 604.9 | 24 | 369.6 | 24 | 2.8 | 0 |
| 3/9/96 | 564.4 | 24 | 0 | 0 | 299.7 | 24 |
| 3/10/96 | 659.7 | 24 | 0 | 0 | 641.3 | 24 |
| 3/11/96 | 448.7 | 24 | 0 | 0 | 410.6 | 24 |
| 3/12/96 | 440 | 24 | 16.6 | 0 | 861.7 | 24 |
| 3/13/96 | 543.1 | 24 | 16.5 | 0 | 436.9 | 24 |
| 3/14/96 | 484.5 | 24 | 100.2 | 4 | 346.3 | 20 |
| 3/15/96 * | 511.55 | 24 | 356.5 | 24 | 0 | 0 |
| 3/16/96 | 538.6 | 24 | 612.8 | 24 | 0 | 0 |
| 3/17/96 | 465.8 | 24 | 553.5 | 24 | 0 | 0 |
| 3/18/96 ** | 439.35 | 24 | 339.45 | 24 | 0 | 0 |
| 3/19/96 | 412.9 | 24 | 125.4 | 24 | 481.7 | 24 |
| 3/20/96 | 0 | 0 | 621.6 | 24 | 308 | 24 |
| 3/21/96 | 3 | 0 | 653.3 | 24 | 665.1 | 24 |
| 3/22/96 | 0 | 0 | 733.3 | 24 | 751.6 | 24 |
| 3/23/96 | 0 | 0 | 761.7 | 24 | 790.6 | 24 |
| 3/24/96 | 0 | 0 | 363 | 24 | 779.5 | 24 |
| 3/25/96 | 0 | 0 | 719.3 | 24 | 785.4 | 24 |
| 3/26/96 | 0 | 0 | 725.5 | 24 | 345.3 | 13 |
| 3/27/96 | 0 | 0 | 850.4 | 24 | 96.8 | 3 |
| 3/28/96 | 0 | 0 | 614.7 | 24 | 829.9 | 24 |
| 3/29/96 | 0 | 0 | 0 | 0 | 885.4 | 24 |
| 3/30/96 | 0 | 0 | 437.1 | 16 | 750.7 | 24 |
| 3/31/96 | 0 | 0 | 697.9 | 24 | 729.4 | 24 |
| Total | | | | | | |

* *Fuel consumed by engines #1 and #2 estimated based on average of fuel consumed on 3/14 and 3/16*

** *Fuel consumed by engines #1 and #2 estimated based on average of fuel consumed on 3/17 and 3/19*

# APPENDIX "C"

## First Quarter 1996 Report: Permit OCS-FL-002

## *Daily Fuel Consumption - Marine Vessels (gallons)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 1/1/96 | 130 | 515 | 90 |
| 1/2/96 | 0 | 0 | 60 |
| 1/3/96 | 150 | 0 | 60 |
| 1/4/96 | 170 | 0 | 60 |
| 1/5/96 | 0 | 0 | 83 |
| 1/6/96 | 0 | 275 | 83 |
| 1/7/96 | 0 | 76 | 60 |
| 1/8/96 | 0 | 318 | 80 |
| 1/9/96 | 150 | 0 | 194 |
| 1/10/96 | 150 | 840 | 80 |
| 1/11/96 | 0 | 0 | 60 |
| 1/12/96 | 0 | 0 | 40 |
| 1/13/96 | 0 | 1045 | 40 |
| 1/14/96 | 130 | 515 | 40 |
| 1/15/96 | 325 | 470 | 120 |
| 1/16/96 | 0 | 30 | 50 |
| 1/17/96 | 65 | 300 | 40 |
| 1/18/96 | 0 | 450 | 50 |
| 1/19/96 | 0 | 470 | 50 |
| 1/20/96 | 0 | 395 | 50 |
| 1/21/96 | 0 | 0 | 40 |
| 1/22/96 | 170 | 250 | 80 |
| 1/23/96 | 140 | 205 | 80 |
| 1/24/96 | 150 | 200 | 40 |
| 1/25/96 | 0 | 0 | 50 |
| 1/26/96 | 0 | 535 | 40 |
| 1/27/96 | 0 | 215 | 60 |
| 1/28/96 | 0 | 223 | 40 |
| 1/29/96 | 300 | 210 | 50 |
| 1/30/96 | 130 | 284 | 50 |
| 1/31/96 | 120 | 414 | 60 |
| Total | 2280 | 8235 | 1980 |

# APPENDIX "C"

## First Quarter 1996 Report: Permit OCS-FL-002

## *Daily Fuel Consumption - Marine Vessels (gallons)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 2/1/96 | 160 | 308 | 40 |
| 2/2/96 | 140 | 195 | 90 |
| 2/3/96 | 0 | 305 | 95 |
| 2/4/96 | 80 | 0 | 100 |
| 2/5/96 | 80 | 0 | 65 |
| 2/6/96 | 135 | 0 | 40 |
| 2/7/96 | 0 | 895 | 50 |
| 2/8/96 | 90 | 0 | 40 |
| 2/9/96 | 100 | 395 | 40 |
| 2/10/96 | 100 | 42 | 50 |
| 2/11/96 | 100 | 0 | 40 |
| 2/12/96 | 0 | 250 | 50 |
| 2/13/96 | 80 | 460 | 60 |
| 2/14/96 | 80 | 250 | 40 |
| 2/15/96 | 180 | 695 | 50 |
| 2/16/96 | 180 | 215 | 50 |
| 2/17/96 | 0 | 0 | 50 |
| 2/18/96 | 0 | 230 | 40 |
| 2/19/96 | 0 | 475 | 60 |
| 2/20/96 | 140 | 205 | 40 |
| 2/21/96 | 140 | 355 | 60 |
| 2/22/96 | 190 | 0 | 40 |
| 2/23/96 | 0 | 0 | 50 |
| 2/24/96 | 0 | 0 | 50 |
| 2/25/96 | 145 | 485 | 40 |
| 2/26/96 | 150 | 0 | 50 |
| 2/27/96 | 140 | 0 | 40 |
| 2/28/96 | 120 | 440 | 40 |
| 2/29/96 | 0 | 215 | 40 |
| Total | 2530 | 6415 | 1110 |

# APPENDIX "C"

## First Quarter 1996 Report: Permit OCS-FL-002

### *Daily Fuel Consumption - Marine Vessels (gallons)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 3/1/96 | 150 | 310 | 65 |
| 3/2/96 | 150 | 0 | 50 |
| 3/3/96 | 0 | 410 | 45 |
| 3/4/96 | 0 | 0 | 60 |
| 3/5/96 | 0 | 285 | 50 |
| 3/6/96 | 310 | 0 | 40 |
| 3/7/96 | 0 | 410 | 40 |
| 3/8/96 | 0 | 0 | 40 |
| 3/9/96 | 0 | 0 | 45 |
| 3/10/96 | 495 | 450 | 50 |
| 3/11/96 | 0 | 300 | 50 |
| 3/12/96 | 160 | 412 | 60 |
| 3/13/96 | 0 | 234 | 40 |
| 3/14/96 | 100 | 480 | 50 |
| 3/15/96 | 150 | 585 | 40 |
| 3/16/96 | 180 | 0 | 40 |
| 3/17/96 | 190 | 235 | 40 |
| 3/18/96 | 0 | 525 | 60 |
| 3/19/96 | 0 | 95 | 40 |
| 3/20/96 | 0 | 210 | 40 |
| 3/21/96 | 0 | 510 | 60 |
| 3/22/96 | 0 | 235 | 55 |
| 3/23/96 | 160 | 385 | 40 |
| 3/24/96 | 0 | 0 | 50 |
| 3/25/96 | 110 | 385 | 40 |
| 3/26/96 | 110 | 520 | 40 |
| 3/27/96 | 0 | 0 | 40 |
| 3/28/96 | 140 | 257 | 55 |
| 3/29/96 | 0 | 256 | 50 |
| 3/30/96 | 140 | 240 | 40 |
| 3/31/96 | 0 | 260 | 40 |
| Total | 2545 | 7989 | 1455 |

# APPENDIX "D"

## First Quarter 1996: Permit OCS-FL-002

## *Daily Trip Summary - Marine Vessels (trips completed)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 1/1/96 | 1 | 1 | 0 |
| 1/2/96 | 0 | 0 | 0 |
| 1/3/96 | 1 | 0 | 0 |
| 1/4/96 | 1 | 0 | 0 |
| 1/5/96 | 0 | 0 | 0 |
| 1/6/96 | 0 | 0 | 0 |
| 1/7/96 | 0 | 0 | 0 |
| 1/8/96 | 0 | 1 | 0 |
| 1/9/96 | 1 | 0 | 0 |
| 1/10/96 | 1 | 1 | 0 |
| 1/11/96 | 0 | 0 | 0 |
| 1/12/96 | 0 | 1 | 0 |
| 1/13/96 | 0 | 0 | 0 |
| 1/14/96 | 1 | 0 | 0 |
| 1/15/96 | 1 | 1 | 0 |
| 1/16/96 | 1 | 0 | 0 |
| 1/17/96 | 0 | 0 | 0 |
| 1/18/96 | 1 | 1 | 0 |
| 1/19/96 | 0 | 0 | 0 |
| 1/20/96 | 0 | 1 | 0 |
| 1/21/96 | 0 | 0 | 0 |
| 1/22/96 | 0 | 0 | 0 |
| 1/23/96 | 1 | 0 | 0 |
| 1/24/96 | 1 | 1 | 0 |
| 1/25/96 | 1 | 0 | 0 |
| 1/26/96 | 0 | 1 | 0 |
| 1/27/96 | 0 | 0 | 0 |
| 1/28/96 | 0 | 0 | 0 |
| 1/29/96 | 2 | 1 | 0 |
| 1/30/96 | 1 | 0 | 0 |
| 1/31/96 | 1 | 0 | 0 |
| Total | 16 | 10 | 0 |

# APPENDIX "D"

## First Quarter 1996: Permit OCS-FL-002
## *Daily Trip Summary - Marine Vessels (trips completed)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 2/1/96 | 1 | 1 | 0 |
| 2/2/96 | 1 | 0 | 0 |
| 2/3/96 | 0 | 1 | 0 |
| 2/4/96 | 0 | 0 | 0 |
| 2/5/96 | 1 | 0 | 1 |
| 2/6/96 | 1 | 0 | 0 |
| 2/7/96 | 0 | 1 | 0 |
| 2/8/96 | 1 | 0 | 0 |
| 2/9/96 | 1 | 0 | 0 |
| 2/10/96 | 1 | 1 | 0 |
| 2/11/96 | 1 | 0 | 0 |
| 2/12/96 | 0 | 0 | 0 |
| 2/13/96 | 0 | 1 | 0 |
| 2/14/96 | 1 | 0 | 0 |
| 2/15/96 | 1 | 1 | 0 |
| 2/16/96 | 1 | 1 | 0 |
| 2/17/96 | 0 | 0 | 0 |
| 2/18/96 | 0 | 0 | 0 |
| 2/19/96 | 0 | 1 | 0 |
| 2/20/96 | 1 | 0 | 0 |
| 2/21/96 | 1 | 1 | 0 |
| 2/22/96 | 1 | 0 | 0 |
| 2/23/96 | 0 | 0 | 0 |
| 2/24/96 | 0 | 0 | 0 |
| 2/25/96 | 1 | 1 | 0 |
| 2/26/96 | 1 | 0 | 0 |
| 2/27/96 | 1 | 0 | 0 |
| 2/28/96 | 1 | 1 | 0 |
| 2/29/96 | 0 | 0 | 0 |
| Total | 18 | 11 | 1 |

*Note:*
*Utility vessel "White Pony" replaced by sister ship "David McCall". Vessel swapout required due to need for shipyard work and USCG required inspection of "White Pony".*

# APPENDIX "D"

## First Quarter 1996: Permit OCS-FL-002

### *Daily Trip Summary - Marine Vessels (trips completed)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 3/1/96 | 1 | 1 | 0 |
| 3/2/96 | 1 | 0 | 0 |
| 3/3/96 | 0 | 1 | 0 |
| 3/4/96 | 0 | 0 | 0 |
| 3/5/96 | 0 | 0 | 0 |
| 3/6/96 | 1 | 1 | 0 |
| 3/7/96 | 1 | 1 | 0 |
| 3/8/96 | 0 | 0 | 0 |
| 3/9/96 | 0 | 0 | 0 |
| 3/10/96 | 0 | 1 | 0 |
| 3/11/96 | 0 | 0 | 0 |
| 3/12/96 | 1 | 0 | 0 |
| 3/13/96 | 0 | 1 | 0 |
| 3/14/96 | 1 | 0 | 0 |
| 3/15/96 | 1 | 1 | 0 |
| 3/16/96 | 1 | 0 | 0 |
| 3/17/96 | 1 | 0 | 0 |
| 3/18/96 | 0 | 1 | 0 |
| 3/19/96 | 0 | 0 | 0 |
| 3/20/96 | 0 | 0 | 0 |
| 3/21/96 | 0 | 1 | 0 |
| 3/22/96 | 0 | 0 | 0 |
| 3/23/96 | 1 | 1 | 0 |
| 3/24/96 | 0 | 0 | 0 |
| 3/25/96 | 1 | 0 | 0 |
| 3/26/96 | 1 | 1 | 0 |
| 3/27/96 | 0 | 0 | 0 |
| 3/28/96 | 1 | 0 | 0 |
| 3/29/96 | 1 | 0 | 0 |
| 3/30/96 | 1 | 1 | 0 |
| 3/31/96 | 0 | 0 | 0 |
| Total | 15 | 12 | 0 |

Chevron

**Chevron U.S.A. Production Co.**
Special Projects Group
935 Gravier Street
New Orleans, LA 70112

August 14, 1996

**Final Report of Activity**
**2nd Quarter 1996**
**Permit OCS-FL-002**

U. S. Environmental Protection Agency, Region IV
Chief, Air Enforcement Branch
Air, Pesticides and Toxics Management Division
345 Courtland St., NE
Atlanta, Georgia 30365

Attention: Mr. R. Scott Davis
Source Evaluation and Southern Compliance Unit

Ladies and Gentlemen:

The attached Second Quarter 1996 Report is submitted in accordance with the specific conditions of permit OCS-FL-002. The permitted drilling activity was completed on April 27, 1996 at which time the ENSCO 87 drilling rig was jacked down and moved off of the Destin Dome 57 #1 well location. A Performance Recap has also been provided summarizing the total performance under the subject permit.

Should you have any questions concerning this report or need additional information, please contact me at (504) 592 - 6095.

Sincerely,

Sarah M Fury

S. M. Fury

c.c.: Florida Department of Environmental Protection
U. S. Department of the Interior, Minerals Management Service
Murphy Exploration & Production Company
Conoco Inc.

# APPENDIX "A"

## Second Quarter 1996 Report: Permit OCS-FL-002
## *Fuel Sulfur Certification*

| Date | Fuel Supplier | Supply Boat / Rig / Utility Boat Sulfur Content, wt% |
|---|---|---|
| 4/6/96 | Midstream Fuel Service, Inc. | 0.50 |
| 4/17/96 | Midstream Fuel Service, Inc. | 0.46 |

| Date | Fuel Supplier | Crew Boat Sulfur Content, wt% |
|---|---|---|
| 4/4/96 | Midstream Fuel Service, Inc. | 0.50 |
| 4/6/96 | Midstream Fuel Service, Inc. | 0.50 |
| 4/9/96 | Midstream Fuel Service, Inc. | 0.48 |
| 4/13/96 | Midstream Fuel Service, Inc. | 0.46 |
| 4/16/96 | Midstream Fuel Service, Inc. | 0.46 |
| 4/20/96 | Midstream Fuel Service, Inc. | 0.46 |
| 4/24/96 | Midstream Fuel Service, Inc. | 0.49 |
| 4/25/96 | Midstream Fuel Service, Inc. | 0.46 |

*Note:*
*Supply Boat - "Chip D"*
*Crew Boat - "Nancy Tide"*

# APPENDIX "B"

## Second Quarter 1996 Report: Permit OCS-FL-002

### *Daily Fuel Consumption / Run Time - Main Rig Engines*

| | Engine 1 | | Engine 2 | | Engine 3 | |
|---|---|---|---|---|---|---|
| Date | Fuel Usage (gal) | Run Time (hrs) | Fuel Usage (gal) | Run Time (hrs) | Fuel Usage (gal) | Run Time (hrs) |
| 4/1/96 | 0 | 0 | 588.4 | 24 | 605.2 | 24 |
| 4/2/96 | 0 | 0 | 575.3 | 24 | 592.0 | 24 |
| 4/3/96 | 0 | 0 | 563.7 | 24 * | 1146.9 | 24 |
| 4/4/96 | 0 | 0 | 645.0 | 24 * | 405.8 | 24 |
| 4/5/96 | 0 | 0 | 760.8 | 24 | 0 | 0 |
| 4/6/96 | 0 | 0 | 746.7 | 24 | 0 | 0 |
| 4/7/96 | 0 | 0 | 737.6 | 24 | 0 | 0 |
| 4/8/96 | 0 | 0 | 710.2 | 24 | 0 | 0 |
| 4/9/96 | 0 | 0 | 775.3 | 24 | 0 | 0 |
| 4/10/96 | 0 | 0 | 746.8 | 24 | 0 | 0 |
| 4/11/96 | 0 | 0 | 562.9 | 18 | 182.0 | 6 |
| 4/12/96 | 214.7 | 24 * | 0 | 0 | 645.1 | 24 * |
| 4/13/96 | 880.0 | 24 * | 0 | 0 | 600.1 | 24 * |
| 4/14/96 | 846.4 | 24 * | 0 | 0 | 569.0 | 24 * |
| 4/15/96 | 860.8 | 24 * | 0 | 0 | 560.5 | 24 * |
| 4/16/96 | 690.6 | 24 * | 0 | 0 | 582.6 | 24 * |
| 4/17/96 | 564.7 | 24 * | 143.7 | 6 * | 162.5 | 6 * |
| 4/18/96 | 109.0 | 4 | 382.8 | 24 | 445.5 | 20 |
| 4/19/96 | 0 | 0 | 431.9 | 24 | 549.5 | 24 |
| 4/20/96 | 0 | 0 | 372.0 | 24 | 489.0 | 24 |
| 4/21/96 | 550.8 | 21 | 2.6 | 0 | 479.5 | 24 |
| 4/22/96 | 692.1 | 24 | 0 | 0 | 349.5 | 18 |
| 4/23/96 | 578.0 | 24 | 0 | 0 | 478.6 | 24 |
| 4/24/96 | 557.8 | 24 | 0 | 0 | 453.1 | 24 |
| 4/25/96 | 655.3 | 24 | 0 | 0 | 372.8 | 18 |
| 4/26/96 | 635.3 | 24 | 0 | 0 | 387.8 | 20 |
| 4/27/96 | 724.7 | 24 | 29.8 | 1 * | 93.3 | 3 * |
| Total: | 8560.2 | | 8775.5 | | 10150.3 | |
| Total Fuel Main Rig Engines: | | | | | 27486 | |

*Note:*

* *Engine run time not available - engine hrs run estimated based on actual fuel consumption*

# APPENDIX “C”

## Second Quarter 1996 Report: Permit OCS-FL-002

*Daily Fuel Consumption - Marine Vessels (gallons)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 4/1/96 | 0 | 80 | 60 |
| 4/2/96 | 140 | 330 | 50 |
| 4/3/96 | 140 | 200 | 90 |
| 4/4/96 | 150 | 360 | 40 |
| 4/5/96 | 140 | 0 | 45 |
| 4/6/96 | 85 | 0 | 55 |
| 4/7/96 | 85 | 0 | 45 |
| 4/8/96 | 140 | 0 | 50 |
| 4/9/96 | 0 | 0 | 60 |
| 4/10/96 | 140 | 0 | 40 |
| 4/11/96 | 80 | 470 | 50 |
| 4/12/96 | 210 | 390 | 70 |
| 4/13/96 | 140 | 0 | 40 |
| 4/14/96 | 140 | 0 | 40 |
| 4/15/96 | 0 | 90 | 50 |
| 4/16/96 | 140 | 425 | 80 |
| 4/17/96 | 0 | 454 | 120 |
| 4/18/96 | 140 | 237 | 80 |
| 4/19/96 | 140 | 295 | 50 |
| 4/20/96 | 140 | 40 | 40 |
| 4/21/96 | 0 | 540 | 40 |
| 4/22/96 | 0 | 495 | 60 |
| 4/23/96 | 280 | 0 | 60 |
| 4/24/96 | 310 | 305 | 40 |
| 4/25/96 | 140 | 445 | 60 |
| 4/26/96 | 220 | 240 | 60 |
| 4/27/96 | 70 | 295 | 80 |
| Total | 3170 | 5691 | 1555 |
| Total Marine Vessels: | | | 10416 |

# APPENDIX "D"

## Second Quarter 1996 Report: Permit OCS-FL-002

*Daily Trip Summary - Marine Vessels (trips completed)*

| Date | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 4/1/96 | 0 | 0 | 0 |
| 4/2/96 | 1 | 0 | 0 |
| 4/3/96 | 1 | 0 | 0 |
| 4/4/96 | 1 | 1 | 0 |
| 4/5/96 | 1 | 0 | 0 |
| 4/6/96 | 1 | 0 | 0 |
| 4/7/96 | 1 | 0 | 0 |
| 4/8/96 | 1 | 0 | 0 |
| 4/9/96 | 0 | 0 | 0 |
| 4/10/96 | 1 | 0 | 0 |
| 4/11/96 | 1 | 0 | 0 |
| 4/12/96 | 1 | 1 | 0 |
| 4/13/96 | 1 | 0 | 0 |
| 4/14/96 | 1 | 0 | 0 |
| 4/15/96 | 0 | 0 | 0 |
| 4/16/96 | 2 | 1 | 0 |
| 4/17/96 | 0 | 0 | 0 |
| 4/18/96 | 1 | 0 | 0 |
| 4/19/96 | 1 | 1 | 0 |
| 4/20/96 | 1 | 0 | 0 |
| 4/21/96 | 0 | 1 | 0 |
| 4/22/96 | 0 | 1 | 0 |
| 4/23/96 | 2 | 0 | 0 |
| 4/24/96 | 2 | 0 | 0 |
| 4/25/96 | 1 | 1 | 0 |
| 4/26/96 | 0 | 0 | 0 |
| 4/27/96 | 1 | 1 | 1 |
| Total Trips Completed: | 23 | 8 | 1 |

# APPENDIX "E"

## Second Quarter 1996 Report: Permit OCS-FL-002
### *Well Test Summary - Information on Gas Flared*

| | | H2S Draegger Tube Readings | | | | |
|---|---|---|---|---|---|---|
| Date | Time | Sample 1 (ppm) | Sample 2 (ppm) | Sample 3 (ppm) | Average Flow Rate (MMSCF/D) | Total Gas Flared (MSCF) |
| 4/7/96 | 06:00 | 10 | 50 | 35 | 17 | 0 |
| | 07:00 | 35 | 35 | 35 | 18 | 645.28 |
| | 08:00 | 35 | 35 | 35 | 17.7 | 1357.94 |
| | 09:00 | 30 | 35 | 30 | 18 | 2097.64 |
| | 10:00 | 50 | 50 | 50 | 18.2 | 2856.81 |
| | 11:00 | 30 | 35 | 35 | 18.1 | 3589.59 |
| | 12:00 | 25 | 30 | 30 | 18.3 | 4349.59 |
| | 13:00 | 30 | 30 | 28 | 17.9 | 5069.74 |
| | 14:00 | 35 | 35 | 35 | 17.2 | 5795.23 |
| | 15:00 | 35 | 32 | 35 | 17.4 | 6518.19 |
| | 16:00 | 45 | 40 | 40 | 17.5 | 7254.38 |
| | 17:00 | 30 | 28 | 30 | 17.4 | 7980.04 |
| | 18:00 | 50 | 50 | 48 | 17.4 | 8705.83 |
| Shut well in at 18:00 hrs on 4/7/96 for pressure build-up | | | | | | |
| Re-opened well at 22:30 hrs on 4/8/96 | | | | | | |
| 4/8/96 | 23:00 | 30 | 32 | 32 | 18 | 9066.96 |
| | 24:00 | 10 | 50 | 52 | 19.2 | 9814.75 |
| 4/9/96 | 01:00 | 30 | 50 | 50 | 19.6 | 10631.3 |
| | 02:00 | 50 | 52 | 50 | 19.6 | 11440.3 |
| | 03:00 | 50 | 52 | 52 | 19.5 | 12256.0 |
| | 04:00 | 50 | 45 | 50 | 19.6 | 13075.2 |
| | 05:00 | 70 | 70 | 70 | 26.6 | 14027.4 |
| | 06:00 | 70 | 70 | 75 | 27.6 | 15143.0 |
| | 07:00 | 72 | 70 | 75 | 27.6 | 16279.5 |
| | 08:00 | 100 | 85 | 85 | 28.3 | 17449.0 |
| | 09:00 | 55 | 70 | 70 | 28.6 | 18638.0 |
| | 10:00 | 68 | 65 | 68 | 29 | 19844.3 |
| | 11:00 | 58 | 55 | 57 | 36.7 | 21202.3 |
| | 12:00 | 70 | 72 | 72 | 36.6 | 22728.4 |
| | 13:00 | 50 | 58 | 58 | 36.8 | 24265.9 |
| | 14:00 | 68 | 60 | 60 | 36.9 | 25795.0 |
| | 15:00 | 72 | 70 | 72 | 37 | 27335.3 |
| | 16:00 | 68 | 65 | 68 | 37.2 | 28881.3 |
| | 17:00 | 72 | 70 | 72 | 40.8 | 30550.6 |
| | 18:00 | 70 | 70 | 68 | 40.8 | 32252.0 |
| | 19:00 | 72 | 68 | 70 | 40.7 | 33952.4 |
| | 20:00 | 70 | 70 | 72 | 40.7 | 35649.2 |
| | 21:00 | 68 | 70 | 68 | 41.2 | 37348.9 |
| | 22:00 | 68 | 70 | 68 | 41 | 39057.7 |

# APPENDIX "E"

## Second Quarter 1996 Report: Permit OCS-FL-002
## *Well Test Summary - Information on Gas Flared*

| | | H2S Draegger Tube Readings | | | Average | Total |
|---|---|---|---|---|---|---|
| Date | Time | Sample 1 (ppm) | Sample 2 (ppm) | Sample 3 (ppm) | Flow Rate (MMSCF/D) | Gas Flared (MSCF) |
| 4/9/96 | 23:00 | 70 | 65 | 70 | 41.1 | 40767.1 |
| | 24:00 | 68 | 68 | 68 | 41.1 | 42479.6 |
| 4/10/96 | 01:00 | 68 | 68 | 68 | 41.1 | 44190.5 |
| | 02:00 | 72 | 70 | 72 | 41.1 | 45901.9 |
| | 03:00 | 72 | 70 | 70 | 41.2 | 47616.4 |
| | 04:00 | 70 | 72 | 72 | 41.2 | 49333.4 |
| | 04:25 | | | | | 50050.8 |

Shut well in at 04:26 - test complete
Total gas flared - well test: 50050.8 MSCF

*Note:*
*MMSCFD = 1,000,000 standard cubic feet per day*
*MSCF = 1000 standard cubic feet*

# APPENDIX "F"

## Performance Recap: Permit OCS-FL-002

### Fuel Consumption - Main Rig Engines (gallons)

| | Engine 1 | Engine 2 | Engine 3 |
|---|---|---|---|
| 4th Qtr 1995 | 69892.6 | 60931 | 22751 |
| 1st Qtr 1996 | 65127.4 | 61969.35 | 22522.3 |
| 2nd Qtr 1996 | 8560.2 | 8775.5 | 10150.3 |
| Total Fuel Consumed - Main Rig Engines: | | | 330,680 |

### Fuel Consumption - Marine Vessels (gallons)

| | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 4th Qtr 1995 | 2525 | 13485 | 4670 |
| 1st Qtr 1996 | 7355 | 22639 | 4545 |
| 2nd Qtr 1996 | 3170 | 5691 | 1555 |
| | 13050 | 41815 | 10770 |
| Total Fuel Consumed - Marine Vessels: | | | 65635 |

### Completed Trips - Marine Vessels

| | Crew Boat | Supply Boat | Utility Boat |
|---|---|---|---|
| 4th Qtr 1995 | 20 | 18 | 0 |
| 1st Qtr 1996 | 49 | 33 | 1 |
| 2nd Qtr 1996 | 23 | 8 | 1 |
| Total trips: | 92 | 59 | 2 |

### Well Test - Gas Flared

| | |
|---|---|
| Total Gas Volume Flared: | 50050.8 MSCF |
| Maximum H2S Measured: | 100 ppm |
| Range, H2S Measured: | 10 - 100 ppm |

**BEST AVAILABLE COPY**

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

Nom# 322770AR1

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-DEC-1995 03:00:00
Source: 371 TANK
ME-726

Date Completed: 08-DEC-1995 06:34:00
Lot No.: CHDNO2-95-0363-44866

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 166 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUEF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 369 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 445 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 543 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 636 |
| END POINT (DEG F) | ASTM D-86 | 686 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 91 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.1 |

L.H. Lott / J.E. Platt
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

1/3/96 Chip-D

BEST AVAILABLE COPY

VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

10H#324317A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK
Loc No.: CHDNO2-96-0001-45186
T-lek

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## ax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

day's ate Time No. of Pages

n: JOHN JOYCE
From: JACKIE SHOTTS
ocation: MIDSTREAM FUEL SERVICE
Location
ax lo. 769-5963
Phone No. 762-0636
Fax No. (801) 938-4314
Phone No. 938-4224
omments: 1-10-96 m/v Chip-D

Align With Top Of Document

**BEST AVAILABLE COPY**

LH# 324317A

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Source: 361 TANK
T-12k

Date Completed: 03-JAN-1996 20:13:00
Lot No.: CHDNO2-96-0001-45186

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## ıx Transmission

Chevron

**Chevron**

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ay's
e

Time

No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

cation MIDSTREAM FUEL SERVICE

Location

x 769-5963

Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

mments

1/16/96 Chip D

Align With Top Of Document

BEST AVAILABLE COPY

Jan 5 '96 15:17 P.01/01

CH ON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

MH# 324317A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Source: 361 TANK
T-102

Date Completed: 03-JAN-1996 20:13:00
Lot No.: CHDNO2-96-0001-45186

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | *13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | *5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

x Transmission

**Chevron**
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Time
No. of Pages

JOHN JOYCE
MIDSTREAM FUEL SERVICE
769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments
1/21/96 m/u Chip D

Align X with Top Of Document

**BEST AVAILABLE COPY**

Jan 30 '9 9:59 P.01/01

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

: 1# 335483A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 24-JAN-1996 03:15:00
Source: 371 TANK
JJI-105

Date Completed: 24-JAN-1996 06:42:00
Lot No.: CHDNO2-96-0022-45402

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8639 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.03 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 362 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 435 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.16 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 21.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

s Time No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

tion MIDSTREAM FUEL SERVICE

Location

769-5963 Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

ments

11/29/96 Chip-D

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

W/OM# 325930

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 31-JAN-1996 00:30:00
Source: 371 TANK
ME-726

Date Completed: 31-JAN-1996 03:53:00
Lot No.: CHDNO2-96-0025-45458

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8665 |
| APPEARANCE [illegible] | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.43 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.10 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 366 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 438 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.20 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/11/96 Chip-D

**BEST AVAILABLE COPY**

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

Vor't# 326851A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-FEB-1996 11:50:00
Source: 361 TANK
ME-226

Date Completed: 15-FEB-1996 12:09:00
Lot No.: CHDNO2-96-0041-45638

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8633 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +10 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.88 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 373 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 441 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 620 |
| END POINT (DEG F) | ASTM D-86 | 664 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.3 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.11 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 12.7 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

# Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/22/96 Chip-D

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

, oM,FF32742IA

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00 Date Completed: 23-FEB-1996 00:44:00
Source: 361 TANK Lot No.: CHDNO2-96-0050-45726
MF-226

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

## x Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

iv's JOHN JOYCE
Time
No. of Pages
ation MIDSTREAM FUEL SERVICE
769-5963
Phone No. 762-0636
From: JACKIE SHOTTS
Location
Fax No: (601) 938-4314
Phone No. 938-4224
nments 2/27/96 Chip-D

**BEST AVAILABLE COPY** Feb 26 '96 10:06 P.01/01

VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

, ºM,# 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00
Source: 361 TANK
MF-726

Date Completed: 23-FEB-1996 00:44:00
Lot No.: CHDNO2-96-0050-45726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

x Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ıv's Time No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

ation MIDSTREAM FUEL SERVICE

Location

769-5963 Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

ıments

3/11/96 Chip D

BEST AVAILABLE COPY Mar 11 12:42 P.01/01

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

No ## 328136ARI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-MAR-1995 12:15:00
Source: 371 TANK
MF-726, MF-603

Date Completed: 06-MAR-1996 16:26:00
Lot No.: CHDNO2-96-0069-45871

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8745 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 173 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.30 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 381 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 456 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 549 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 640 |
| END POINT (DEG F) | ASTM D-86 | 688 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.10 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.4 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages 1

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments
3/20/96 Chip-D

BEST AVAILABLE COPY Feb 26 10:06 P.01/01

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

oM,FF 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00 Date Completed: 23-FEB-1996 00:44:00
Source: 361 TANK Lot No.: CHDNO2-96-0050-45726
MF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

‹ Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

s Time No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

rion MIDSTREAM FUEL SERVICE

Location

769-5963

Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

ments

3/27/96 Chip D

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NOM # 322770AR1

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-DEC-1995 03:00:00
Source: 371 TANK
ME-726

Date Completed: 08-DEC-1995 06:34:00
Lot No.: CHDNO2-95-0363-44866

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 166 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 369 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 445 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 543 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 636 |
| END POINT (DEG F) | ASTM D-86 | 686 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 91 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.1 |

L.H. Lott / J. E. Platt
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

1/2/96 Nancy Tide

BEST AVAILABLE COPY

Jan 5 '96 15:17 P.01/01

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

10M#324317A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00 Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK Lot No.: CHDNO2-96-0001-45186
T-103

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ) .

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
From: JACKIE SHOTTS

Location: MIDSTREAM FUEL SERVICE
Location

Fax No. 769-5963
Phone No. 762-0636
Fax No. (601) 938-4314
Phone No. 938-4224

Comments: 1/5/96 Nancy Tidle

Align With Top Of Document

BEST AVAILABLE COPY

C RON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

OM# 324317A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK
Lot No.: CHDNO2-96-0001-45186
T-102

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

1/7/96 Nancy Tide

Align With Top Of Document

BEST AVAILABLE COPY

10M# 324317A

C RON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK
Lot No.: CHDNO2-96-0001-45186
T-103

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

100
DILLCIHC-
H-a 3099
E2 (A-0247
[illegible]

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location:
Fax No. (601) 938-4314
Phone No. 938-4224

Comments:
1-13-96 Nancy Tide

Align With Top Of Document

**BEST AVAILABLE COPY**

CHE  N U.S.A. PRODUCTS COMPAN
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

OH # 324317A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK
Lot No.: CHDNO2-96-0001-45186
T-163

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

ax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ay's
te
Time
No. of Pages

JOHN JOYCE
From: JACKIE SHOTTS
MIDSTREAM FUEL SERVICE
Location
769-5963
Phone No. 762-0636
Fax No. (601) 938-4314
Phone No. 938-4224

ents

1/17/96 Nancy Tede

Align With Top Of Document

BEST AVAILABLE COPY

MA# 324317A

CHE N U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00 Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK Loc No.: CHDNO2-96-0001-45186
T-103

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

x Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

V S Time No. of Pages

JOHN JOYCE
From: JACKIE SHOTTS

ation MIDSTREAM FUEL SERVICE
Location

769-5963 Phone No. 762-0636
Fax No. (601) 938-4314 Phone No. 938-4224

mments

1/23/96 Nancy Tide

Align With Top Of Document

CH JN U.S.A. PRODUCTS COMPAN
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

MT# 324317A

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 03-JAN-1996 11:15:00
Date Completed: 03-JAN-1996 20:13:00
Source: 361 TANK
Lot No.: CHDNO2-96-0001-45186
T-12k

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 33.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8586 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 46.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.96 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 88 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ) .

---

## ix Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ay's e    Time    No. of Pages

JOHN JOYCE
From: JACKIE SHOTTS

cation MIDSTREAM FUEL SERVICE
Location

x 769-5963    Phone No. 762-0636
Fax No. (601) 938-4314    Phone No. 938-4224

mments

1/27/96 Nancy [illegible]

Align X-it Top Of Document

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

#325483A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 24-JAN-1996 03:15:00 Date Completed: 24-JAN-1996 06:42:00
Source: 371 TANK Lot No.: CHDNO2-96-0022-45402
III-105

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8639 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.03 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 362 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 435 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.16 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 21.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

x Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

s Time No. of Pages

From: JACKIE SHOTTS

JOHN JOYCE

tion MIDSTREAM FUEL SERVICE

Location

F 769-5963 Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

ments

1/30/96 Nancy Tide

BEST AVAILABLE COPY Feb 2 '96 16:57 P.01/01

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

N OH# 325930

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 31-JAN-1996 00:30:00
Source: 371 TANK
ME-726

Date Completed: 31-JAN-1996 03:53:00
Lot No.: CHDNO2-96-0025-45458

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8665 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.43 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.10 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 366 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 438 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.20 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

**Chevron**

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location:
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/2/96 Nancy Tide

**BEST AVAILABLE COPY**

Feb 2 '' 16:37 P.01/01

N/OM# 325930

VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 31-JAN-1996 00:30:00
Source: 371 TANK
ME-726

Date Completed: 31-JAN-1996 03:53:00
Lot No.: CHDNO2-96-0025-45458

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8665 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.43 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.10 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG R) | ASTM D-86 | 366 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 438 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.20 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/9/96 Nancy Tide

BEST AVAILABLE COPY

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NOM# 325930

# LABORATORY TEST RESULTS*

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 31-JAN-1996 00:30:00
Source: 371 TANK
NE-726

Date Completed: 31-JAN-1996 03:53:00
Lot No.: CHDNO2-96-0025-45458

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8665 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.43 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | 0.00 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.10 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 366 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 438 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 630 |
| END POINT (DEG F) | ASTM D-86 | 680 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.20 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.2 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/12/96 Nancy Tide

**BEST AVAILABLE COPY**

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NOAA# 326851A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-FEB-1996 11:50:00 Date Completed: 15-FEB-1996 12:09:00
Source: 361 TANK Loc No.: CHDNO2-96-0041-45638
HE-226

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8633 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +10 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.88 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 373 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 441 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 620 |
| END POINT (DEG F) | ASTM D-86 | 664 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.3 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.11 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 12.7 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

Nancy Tide 2/16/96

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NOM# 326851A

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-FEB-1996 11:50:00 Date Completed: 15-FEB-1996 12:09:00
Source: 361 TANK Loc No.: CHDNO2-96-0041-45638
HE-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8633 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +10 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.88 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 373 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 441 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 620 |
| END POINT (DEG F) | ASTM D-86 | 664 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.3 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.11 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 12.7 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

Nancy Tide 2/19/96

[illegible]
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

'01 # 326851A

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-FEB-1996 11:50:00
Source: 361 TANK
MF-226

Date Completed: 15-FEB-1996 12:09:00
Lot No.: CHDNO2-96-0041-45638

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8633 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +10 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.88 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 373 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 441 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 620 |
| END POINT (DEG F) | ASTM D-86 | 664 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.3 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.11 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 12.7 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

2/23/96 Nancy Tide

BEST AVAILABLE COPY Feb 26 .6 10:06 P.01/01

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

oM,FF 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00
Date Completed: 23-FEB-1996 00:44:00
Source: 361 TANK
Lot No.: CHDNO2-96-0050-45726
MF-226

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## x Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ıv's JOHN JOYCE
Time
No. of Pages
From: JACKIE SHOTTS
ation MIDSTREAM FUEL SERVICE
Location
769-5963
Phone No. 762-0636
Fax No. (601) 938-4314
Phone No. 938-4224
ıments

2/27/96 Nancy Tide

BEST AVAILABLE COPY Feb 26 '. 10:06 P.01/01

VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

/ oM, # 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00 Date Completed: 23-FEB-1996 00:44:00
Source: 361 TANK Lot No.: CHDNO2-96-0050-45726
MF-726

| Test Name | Method | | Results |
|---|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 100 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | | 0.8686 |
| APPEARANCE | ASTM D-4176 | [illegible] | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | | 171 |
| SULFUR (WT%) | ASTM D-4294 | | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | [illegible] | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | | 3.12 |
| D-86 DISTILLATION | | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | | 625 |
| END POINT (DEG F) | ASTM D-86 | | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | | +5 |
| DYED DIESEL COLOR | PRM 16.16 | | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

x Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

y's
Time
No. of Pages

JOHN JOYCE
From: JACKIE SHOTTS
ation MIDSTREAM FUEL SERVICE
Location
769-5963
Phone No. 762-0636
Fax No. (601) 938-4314
Phone No. 938-4224
nments
3/2/96 Nancy Tede

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA MISSISSIPPI

NOH# 327557A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 28-FEB-1996 06:35:00
Source: 371 TANK
MF-603, 726

Date Completed: 28-FEB-1996 11:02:00
Lot No.: CHDNO2-96-005845792

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8740 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.0 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.15 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 385 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 454 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 543 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 678 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 94 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.07 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 12.8 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

3/7/96 Nancy Tide

BEST AVAILABLE COPY

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

OM,# 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00
Source: 361 TANK
MF-226

Date Completed: 23-FEB-1996 00:44:00
Lot No.: CHDNO2-96-0050-45726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

y's
Time
No. of Pages

JOHN JOYCE
ation MIDSTREAM FUEL SERVICE
769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

nments
3/15/96 Nancy Tide

**BEST AVAILABLE COPY**

Mar 11 12:42 P.01/01

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NoM# 328136ARI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-MAR-1996 12:15:00
Source: 371 TANK
MF-726, MF-603

Date Completed: 06-MAR-1996 16:26:00
Lot No.: CHDNO2-96-0069-45871

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8745 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +14 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 173 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.30 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 381 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 456 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 549 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 640 |
| END POINT (DEG F) | ASTM D-86 | 688 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.10 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.4 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages 1

To: JOHN JOYCE
Location MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments
3/23/96 Nancy Tide

**BEST AVAILABLE COPY** Feb 26 10:06 P.01/01

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

, oM, FF 327421A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 22-FEB-1996 19:00:00
Source: 361 TANK
MF-226

Date Completed: 23-FEB-1996 00:44:00
Lot No.: CHDNO2-96-0050-45726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 171 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 625 |
| END POINT (DEG F) | ASTM D-86 | 675 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.09 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.9 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL - FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

## x Transmission

Chevron
**Chevron**
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ıv's Time No. of Pages

JOHN JOYCE

From: JACKIE SHOTTS

ation MIDSTREAM FUEL SERVICE

Location

769-5963

Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

nments

3/27/96 Nancy Tide

**BEST AVAILABLE COPY**

1. MH# 329238A

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 25-MAR-1996 02:20:00    Date Completed: 25-MAR-1996 06:33:00
Source: 361 TANK    Lot No.: CHDNO2-96-0091-46094
ME-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8740 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.50 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.06 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 374 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 439 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 634 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 19.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Chevron

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE
TIME
NO. OF PAGES

TO: JOHN JOYCE
LOCATION MIDSTREAM FUEL SERV.
FAX NUMBER 769-5963
TELEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS
LOCATION CHEVRON
FAX NUMBER (601) 938-[redacted] 4314
TELEPHONE NUMBER (601) 938-[redacted] 4224

COMMENTS

4/6/96 Chip-D

BEST AVAILABLE COPY

C VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

VOM#330153A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 07-APR-1996 16:45:00 Date Completed: 07-APR-1996 20:24:00
Source: 361 TANK Lot No.: CHDNO2-96-0105-46249
MF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.1 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8649 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.9 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.14 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 384 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 449 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.5 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.07 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 17.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Time

No. of Pages 1

TOHN JOYCE

From: JACKIE SHOTTS

" MIDSTREAM FUEL SERVICE

Location

769-5963

Phone No. 762-0636

Fax No. (601) 938-4314

Phone No. 938-4224

ents

4/17/96 Chip D

Align With Top Of Document

BEST AVAILABLE COPY

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

1. MH 329238A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 25-MAR-1996 02:20:00 Date Completed: 25-MAR-1996 06:33:00
Source: 361 TANK Lot No.: CHDNO2-96-0091-46094
ME-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8740 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.50 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.06 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 374 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 439 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 634 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 19.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

Chevron

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE
TIME
NO OF PAGES

TO: JOHN JOYCE
LOCATION MIDSTREAM FUEL SERV.
FAX NUMBER 769-5963
TELEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS
LOCATION CHEVRON
FAX NUMBER (601) 938-[redacted] 4314
TELEPHONE NUMBER (601) 938-[redacted] 4224

COMMENTS

4/4/96 Nancy Tide

**BEST AVAILABLE COPY**

1 MH 329238A

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 25-MAR-1996 02:20:00 Date Completed: 25-MAR-1996 06:33:00
Source: 361 TANK Lot No.: CHDNO2-96-0091-46094
ME-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8740 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.50 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.06 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 374 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 439 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 538 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 634 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 93 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 19.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Chevron

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE

TIME

NO. OF PAGES

TO: JOHN JOYCE

LOCATION MIDSTREAM FUEL SERV.

FAX NUMBER 769-5963

TELEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS

LOCATION CHEVRON

FAX NUMBER (601) 938-[redacted] 4314

TELEPHONE NUMBER (601) 938-[redacted] 4224

COMMENTS

4/6/96 Nancy Tide

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NoM# 329978M

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 05-APR-1996 19:25:00
Source: 361 TANK
NF-725, NF-726

Date Completed: 05-APR-1996 23:32:00
Lot No.: CMDM02-96-0101-46203

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8729 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.48 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPS (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.2 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.12 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 379 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 447 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 541 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 639 |
| END POINT (DEG F) | ASTM D-86 | 690 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 94 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.4 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV, SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 17.6 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

4/9/96 Nancy Tidi

C. RON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

Com#330153A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 07-APR-1996 16:45:00
Source: 361 TANK
MF-726

Date Completed: 07-APR-1996 20:24:00
Lot No.: CHDNO2-96-0105-46249

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.1 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8649 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.9 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.14 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 384 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 449 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.5 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.07 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 17.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages 1

To: JOHN JOYCE
Location " MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

4/13/96 Nancy Tide

**BEST AVAILABLE COPY**

Apr 11 '[illegible] 16:07 P.01/01

CI RON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

Com#330153A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 07-APR-1996 16:45:00 Date Completed: 07-APR-1996 20:24:00
Source: 361 TANK Lot No.: CHDNO2-96-0105-46249
MF-926

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.1 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8649 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +15 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 160 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.9 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.14 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 384 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 449 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.5 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.07 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 17.0 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

a: Transmission

Chevron
**Chevron**
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Time
No. of Pages 1

To JOHN JOYCE
From: JACKIE SHOTTS

"MIDSTREAM FUEL SERVICE"
Location

Fax No. 769-5963
Phone No. 762-0636
Fax No. (601) 938-4314
Phone No. 938-4224

Comments

4/16/96 - Nancy Tide

BEST AVAILABLE COPY

EVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-APR-1996 02:30:00 Date Completed: 15-APR-1996 06:18:00
Source: 371 TANK Lot No.: CHDNO2-96-0115-46343

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8729 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.7 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.08 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 371 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 451 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 623 |
| END POINT (DEG F) | ASTM D-86 | 674 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.08 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.4 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE TIME NO. OF PAGES

O: JOHN JOYCE
OCATION MIDSTREAM FUEL SERV.
AX NUMBER 769-5963
ELEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS
LOCATION CHEVRON
FAX NUMBER (601) 938-[redacted] 4314
TELEPHONE NUMBER (601) 938-[redacted] 4224

OMMENTS

4-20-96 Nancy Tide

BEST AVAILABLE COPY

IEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

ADM# 330906A

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 21-APR-1996 18:55:00
Date Completed: 21-APR-1996 19:14:00
Source: 371 TANK
Lot No.: CHDNO2-96-0126-46430
ME-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.2 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8718 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.1 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.06 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 376 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 448 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 539 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 627 |
| END POINT (DEG F) | ASTM D-86 | 678 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.11 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 13.1 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE
TIME
NO. OF PAGES

JOHN JOYCE
CATION MIDSTREAM FUEL SERV.
NUMBER 769-5963
LEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS
LOCATION CHEVRON
FAX NUMBER (601) 938-[redacted] 4314
TELEPHONE NUMBER (601) 938-[redacted] 4224

MMENTS

4-24-96 Nancy Tide

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 15-APR-1996 02:30:00   Date Completed: 15-APR-1996 06:18:00
Source: 371 TANK   Lot No.: CHDNO2-96-0115-46343

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8729 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.46 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) |  | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.7 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.08 |
| D-86 DISTILLATION |  |  |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 371 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 451 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 537 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 623 |
| END POINT (DEG F) | ASTM D-86 | 674 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 95 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | ASTM D-974 | 0.08 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 14.4 |

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

Chevron

**Chevron U.S.A. Products Company**
Purchasing

## FAX TRANSMISSION

TODAY'S DATE   TIME   NO. OF PAGES

TO: JOHN JOYCE
LOCATION MIDSTREAM FUEL SERV.
FAX NUMBER 769-5963
TELEPHONE NUMBER 762-0636

FROM: JACKIE SHOTTS
LOCATION CHEVRON
FAX NUMBER (601) 938-[redacted] 4314
TELEPHONE NUMBER (601) 938-[redacted] 4224

COMMENTS

4/25/96 Nancy Tide

Apr 18 '96 10:32 P.01/01

BEST AVAILABLE COPY

Oct 31 12:59 P.01/01

John Joyce

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 26-OCT-1995 22:15:00
Source: 361 TANK

Date Completed: 27-OCT-1995 03:20:00
Lot No.: CHDNO2-95-0309-44322

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.6 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8623 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 166 |
| SULFUR (WT%) | ASTM D-4294 | 0.39 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPS (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.08 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 361 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 427 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 533 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 676 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 16.9 |

11-3-95
CHPD

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Best Available Copy

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00 Date Completed: 08-NOV-1995 14:41:00
Source: 371 TANK Lot No.: CHDNO2-95-0323-44487
MF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.15 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-10-95
CHPD

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

ax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ay's
e Time No. of Pages

JOHN JOYCE
From: JACKIE SHEPPS

ation: MIDSTREAM FUEL SERVICE
Location:

769-5963 Phone No. 762-[illegible]
Fax No. [illegible] Phone No. 938-4224

mments:

PASCAGOULA REFINERY
ASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00
Source: 371 TANK
AE-726

Date Completed: 08-NOV-1995 14:41:00
Lot No.: CHDNO2-95-0323-44487

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-17-95
CHIPD

H. O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

---

## ax Transmission

**Chevron**

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

oday's Date: [illegible]
Time: [illegible]
No. of Pages: [illegible]

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHAFTS
Location: [illegible]
Fax No. 601 938-4214
Phone No. 938-4224

Comments: [illegible]

[illegible]
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00 - Date Completed: 08-NOV-1995 14:41:00
Source: 371 TANK Lot No.: CHDNO2-95-0323-44487
MF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-28-95
CHPD

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## ax Transmission

Chevron

Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

day's ate [illegible] Time [illegible] No. of Pages [illegible]

o: JOHN JOYCE
From: JACKIE SHEFFS
ocation: MIDSTREAM FUEL SERVICE
Location: [illegible]
ax No. 769-5963
Phone No. 762-2636
Fax No. (601) 938-4114
Phone No. 938-4224
omments: [illegible]

Best Available Copy

PASCAGOULA REFINERY
PASCAGOULA - MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00
Source: 371 TANK
AF-726

Date Completed: 08-NOV-1995 14:41:00
Lot No.: CHDNO2-95-0323-44487

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-20-95
CH&D

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

x Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

ly's
Time
No. of Pages

JOHN JOYCE
ation MIDSTREAM FUEL SERVICE
769-5963
Phone No. 762-[illegible]

From JACKIE SHOTTS
Location
Fax No. [illegible]
Phone No. 938-4224

ments

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

H.# 3223734

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 29-NOV-1995 09:31:00 Date Completed: 29-NOV-1995 10:50:00
Source: 361 TANK. Lot No.: CHDNO2-95-9353-44765
HF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8676 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| SULFUR (WT%) | ASTM D-4294 | 0.44 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CURP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.7 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.73 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 357 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 431 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 536 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 682 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 94 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -10 |
| DYED DIESEL COLOR | PRM 16.15 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.15 | 17.3 |

12-8-95
CHPO

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

Best Available Copy

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NORTH J22 MOAK)

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK
MF-725

Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDNO2-95-0361-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

12-16-95
CHIPD

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date: [illegible]
Time: [illegible]
No. of Pages: [illegible]

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No.: 769-5963
Phone No.: 762-[illegible]

From: JACKIE SHOTTS
Location: [illegible]
Fax No.: (601) 938-[illegible]
Phone No.: 938-4224

Comments: [illegible]

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NORTH 322 MOAK)

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK.
MF-725

Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDNO2-95-0361-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

12-18-95
CHPD

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date:
Time:
No. of Pages:
To: JOHN JOYCE
From: JACKIE SHOTTS
Location: MIDSTREAM FUEL SERVICE
Location:
Fax No.: 769-5963
Phone No.: 762-0656
Fax No.: (601) 938-4114
Phone No.: 938-4224
Comments:

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NORTH 322 MOARL)

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK.
MF-725

Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDN02-95-0361-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

12-23-95
CHPD

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date:
Time:
No. of Pages:

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location:
Fax No. (601) [illegible]
Phone No. 938-4224

Comments:

VRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

N041# 322770AK1

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-DEC-1995 03:00:00
Source: 371 TANK
ME-726

Date Completed: 08-DEC-1995 06:34:00
Lot No.: CHDNO2-95-0363-44866

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.4 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8686 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 166 |
| SULFUR (WT%) | ASTM D-4294 | 0.42 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPP (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 43.5 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 369 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 445 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 543 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 636 |
| END POINT (DEG F) | ASTM D-86 | 686 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 91 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SN-30,-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | 0 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.1 |

L.H. Lott / J.E. Platt
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

12-29-95
CHPD

John Joyce

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 26-OCT-1995 22:15:00
Date Completed: 27-OCT-1995 03:20:00
Source: 361 TANK
Lot No.: CHDNO2-95-6305-49322

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.8 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8623 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +13 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 166 |
| SULFUR (WT%) | ASTM D-4294 | 0.39 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFE (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.08 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 361 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 427 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 533 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 632 |
| END POINT (DEG F) | ASTM D-86 | 676 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 92 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.04 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 16.9 |

11-8-95
NANCY TIDE

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00
Source: 371 TANK
ME-726

Date Completed: 08-NOV-1995 14:41:00
Lot No.: CHDNO2-95-0323-44487

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-15-95
NANCY TROE

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

ax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

day's
ite

Time

No. of
Pages

o: JOHN JOYCE

From: JACKIE SHOTTS

ncation: MIDSTREAM FUEL SERVICE

Location:

ax
o: 769-5963

Phone
No. 762-0636

Fax
No. (601) 938-4314

Phone
No. 938-4224

omments

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00 Date Completed: 08-NOV-1995 14:41:00
Source: 371 TANK Lot No.: CHDNO2-95-0123-44487
MF-721

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-1052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-1007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | [illegible] |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-19-95
NANCY T. OE

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting, Pascagoula Facility

Today's Date Time No. of Pages

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963 Phone No. 762-8636

From: JACKIE SHEFFS
Location:
Fax No. [illegible] Phone No. 938-4224

Comments

**BEST AVAILABLE COPY**

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 08-NOV-1995 06:30:00 Date Completed: 08-NOV-1995 14:41:00
Source: 371 TANK Lot No.: CHDNO2-95-0323-44487
MF-726

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 32.5 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8628 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +12 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 164 |
| SULFUR (WT%) | ASTM D-4294 | 0.47 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 44.3 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.86 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 364 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 428 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 534 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 635 |
| END POINT (DEG F) | ASTM D-86 | 684 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 86 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SH-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | +5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 15.6 |

11-25-95
NANCY TICE

H.O. Holland
Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. )

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages
To: JOHN JOYCE
From: JACKIE SHEETS
Location: MIDSTREAM FUEL SERVICE
Location:
Fax No. 769-5963
Phone No. 762-6636
Fax No. (601) 938-4314
Phone No. 938-4224
Comments:

BEST AVAILABLE COPY

PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

# LABORATORY TEST RESULTS

VOM. # 322373A

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 29-NOV-1995 09:31:00 Date Completed: 29-NOV-1995 10:50:00
Source: 361 TANK Lot No.: CHDN02-95-9353-44765
HE-722

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 31.3 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8676 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +9 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 156 |
| SULFUR (WT%) | ASTM D-4294 | 0.44 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUFF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 42.7 |
| VISCOSITY @40C (CS) | ASTM D-445 | 2.73 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 357 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 431 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 536 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 631 |
| END POINT (DEG F) | ASTM D-86 | 682 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 94 |
| HYDROGEN SULFIDE (PPM) | PRM 16.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.05 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -10 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 17.3 |

12-7-95
NANCY TIDE

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. (THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE.)

**BEST AVAILABLE COPY**

Dec 13 '95 10:47 P.01/02

NOM# 322 MOAR)

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK
MF-725

Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDN02-95-0361-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPS (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

1278-95
NANCY T.DE

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

ax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

oday's ate
Time
No. of Pages

To: JOHN JOYCE
From: JACKIE SHOTTS
ocation: MIDSTREAM FUEL SERVICE
Location:
ax No.: 769-5963
Phone No.: 762-0656
Fax No.:
Phone No. 938-9224
omments:

BEST AVAILABLE COPY

Dec 13 10:47 P.01/02

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NORTH 322 MOAR)

# LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK
MF-725

Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDN02-95-0361-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | +11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.4 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SH-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

12-16-95
NANCY TIDE

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date:
Time:
No. of Pages

To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636

From: JACKIE SHOTTS
Location:
Fax No. (601) 938-[illegible]
Phone No. 938-4224

Comments:

BEST AVAILABLE COPY

CHEVRON U.S.A. PRODUCTS COMPANY
PASCAGOULA REFINERY
PASCAGOULA, MISSISSIPPI

NOMH 3227MoAR)

## LABORATORY TEST RESULTS

Product: CHEVRON DIESEL/HEATING NO. 2
Date Sampled: 06-DEC-1995 21:00:00
Source: 361 TANK
ML-725
Date Completed: 07-DEC-1995 02:15:00
Lot No.: CHDNO2-95-0351-44847

| Test Name | Method | Results |
|---|---|---|
| API AVERAGE (API) | ASTM D-4052 | 30.7 |
| GRAVITY, SPECIFIC, CALCULATED | ASTM D-4052 | 0.8724 |
| APPEARANCE | ASTM D-4176 | B&C |
| CLOUD POINT (DEG F) | ASTM D-2500 | 11 |
| FLASH, PENSKY-MARTENS (DEG F) | ASTM D-93 | 162 |
| SULFUR (WT%) | ASTM D-4294 | 0.49 |
| CORROSION COPPER STRIP | ASTM D-130 | 1 |
| INTERFACE RATING, ML CUPF (MILLILITERS) | | <0.5 |
| SEDIMENT AND WATER (VOL. %) | ASTM D-4007 | <0.05 |
| CETANE INDEX D-4737 (INDEX) | ASTM D-4737 | 41.6 |
| VISCOSITY @40C (CS) | ASTM D-445 | 3.13 |
| D-86 DISTILLATION | | |
| INITIAL BOILING POINT (DEG F) | ASTM D-86 | 368 |
| 10% (DEG F) RECOVERED | ASTM D-86 | 434 |
| 50% (DEG F) RECOVERED | ASTM D-86 | 540 |
| 90% (DEG F) RECOVERED | ASTM D-86 | 633 |
| END POINT (DEG F) | ASTM D-86 | 681 |
| COLOR STABILITY FILTER REFLECT (PERCENT) | PRM 16.5 | 90 |
| HYDROGEN SULFIDE (PPM) | PRM 18.14 | 0.0 |
| ACID NEUT NUMBER (MG KOH/GRAM) | SM-30-63 | 0.06 |
| CARBON RESIDUE, RAMSBOTTOM (WT%) | ASTM D-524 | *0.18 |
| ASH CONTENT (WT%) | ASTM D-482 | *<.001 |
| POUR POINT (DEG F) | ASTM D-97 | -5 |
| DYED DIESEL COLOR | PRM 16.16 | PASS |
| EQUIV. SOLVENT RED 26 (MG/LITER) | PRM 16.16 | 20.8 |

12-28-95
NANCY TIDE

Company Representative

The data set forth in this Laboratory Test Report is an accurate statement of product qualities of the batch tendered to the receiving carrier. It is not and cannot be considered a Laboratory Test Report as being representative of the quality of the product downstream of the point where it would be commingled with other product or with part of another shipment in another connecting carrier.

* Typical data - Obtained and confirmed at regular intervals by standard statistical procedures for quality control.

DYED DIESEL FUEL. FOR NON-TAXABLE USE ONLY. PENALTY FOR TAXABLE USE. ( THIS DIESEL IS PRODUCED AND SOLD FOR USE IN EQUIPMENT NOT DESIGNED FOR HIGHWAY USE. ).

---

## Fax Transmission

Chevron
Chevron U.S.A. Production Company
Accounting/Pascagoula Refinery

Today's Date
Time
No. of Pages
To: JOHN JOYCE
Location: MIDSTREAM FUEL SERVICE
Fax No. 769-5963
Phone No. 762-0636
From: JACKIE SHAFFS
Location
Fax No. (601) 938-4316
Telephone No. 938-4224
Comments

Align With Top Of Document

```
ENGINE MODEL :  SATURN T-1500  FROMCS-26409  (31-MAR-87)
ENGINE TYPE  :  GSC
ENGINE RATING:  STANDARD
FUEL CLASS   :  GAS FUEL

POWER        :  1082.  KW
HEAT RATE    :  14.78  KBTU/KW-HR
EXH. FLOW    :  860.15  LB/MIN
PCD          :  83.1 P.S.I.G.
EXH. TEMP.   :  931. DEG. F

      NOX        CO        UHC
  (PRELIMINARY EXPECTED NOMINAL PERFORMANCE)

      6.88      5.99      0.23       g/(kg -FUEL)
     83.90    119.88      7.93       PPMv at 15% O2, DRY BASIS
      5.34      4.65      0.18       LBm/Hr
     23.40     20.35      0.77       TON/YR
      0.58      0.50      0.02       micro g/(Joule -GT. SHAFT)
      1.55      1.35      0.05       g/(BHP-HR -GT. SHAFT)
    174.45    151.75      5.74       mg/Nm3 15% O2, DRY BASIS
      0.33      0.29      0.01       LBm/(MMBTU -FUEL LHV)
    143.61    124.92      4.72       g/(GJ -FUEL LHV)
```