# PALMETTO POWER L.L.C.

1000 Louisiana, Suite 5800
Houston, Texas 77002-5050
(713) 507-6400

RECEIVED

OCT 15 1999

BUREAU OF AIR REGULATION

October 13, 1999

Administrator, New Source Review Section
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

0970073-001-AC
PSD-FL-277

Attention: Mr. A.A. Linero, P.E.

RE: DYNEGY, INC.
AIR PERMIT APPLICATION AND PREVENTION OF SIGNIFCANT DETERIORATION ANALYSIS
PALMETTO POWER PROJECT, OSCEOLA COUNTY, FLORIDA

Dear Mr. Linero:

Palmetto Power L.L.C. is pleased to submit this application for a permit to license, construct, and operate an independent power production facility in Osceola County, Florida. The enclosed application includes supportive information that the project is required to provide under the regulations for Prevention of Significant Deterioration (PSD) of air quality. As you may know, the associated fee of $7,500 for processing the application was previously forwarded to the DEP ahead of this application.

We appreciate your timely review of this application and look forward toward working with you. If you have any questions, please contact me at (713) 767-8961.

Sincerely,

Robert C. McLean
for
Starla Lacy
Environmental Specialist

cc: J. Koerner, BAR
Central District
EPA
NPS
C. Carlson, BAR

| Florida Dept of Environmental Protection | 18884 | 504172 | 09/14/99 |
|---|---|---|---|

| VOUCHER | VENDOR INVOICE # | INVOICE DATE | TOTAL AMOUNT | PRIOR PAYMENTS | NET AMOUNT |
|---|---|---|---|---|---|
| 00006233 | 081099 | 19990810 | | | $ 7,500.00 |



DYN-6005 (8/98)

Dynegy Inc.
1000 Louisiana Street, Suite 5800
Houston, Texas 77002

32399-6316 01

# Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

October 20, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Bunyak, Chief
Policy, Planning & Permit Review Branch
NPS – Air Qulaity Division
P.O. Box 25287
Denver, CO 80225

Re: Palmetto Power LLC
New Facility, Three Westinghouse Frame 501F Combustion Turbines
PSD-FL-277 (File No. 0970073-001-AC)
Facility ID No. 0970073

Dear Mr. Bunyak:

Enclosed for your review and comment is an application for the above referenced project. The applicant proposes to construct a new electrical power generating facility consisting of three new Westinghouse Frame 501F Combustion Turbines. Each gas turbine is fired only with natural gas and will produce a nominal 180 MW per hour of peaking power for up to 3750 hours per year. The applicant has proposed the following BACT limits:

- NOx: 15.0 ppmvd @ 15% oxygen with natural gas only firing and dry low-NOx combustion controls, and
- CO: 25.0 ppmvd @ 15% oxygen with natural gas only firing, combustor design, and good combustion practices.

Your comments may be forwarded to my attention at the letterhead address or faxed to the Bureau of Air Regulation at 850/922-6979. If you have any questions, please contact the project engineer, Jeff Koerner, at 850/414-7268.

Sincerely,

[signature] 10/20

Al Linero, P.E.
Administrator
New Source Review Section

AAL/jfk/kt

Enclosures

# Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary


October 20, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Gregg Worley, Chief
Air, Radiation Technology Branch
Preconstruction/HAP Section
U.S. EPA – Region 4
61 Forsyth Street
Atlanta, GA 30303

Re: Palmetto Power LLC
New Facility, Three Westinghouse Frame 501F Combustion Turbines
PSD-FL-277 (File No. 0970073-001-AC)
Facility ID No. 0970073

Dear Mr. Worley:

Enclosed for your review and comment is an application for the above referenced project. The applicant proposes to construct a new electrical power generating facility consisting of three new Westinghouse Frame 501F Combustion Turbines. Each gas turbine is fired only with natural gas and will produce a nominal 180 MW per hour of peaking power for up to 3750 hours per year. The applicant has proposed the following BACT limits:

- NOx: 15.0 ppmvd @ 15% oxygen with natural gas only firing and dry low-NOx combustion controls, and
- CO: 25.0 ppmvd @ 15% oxygen with natural gas only firing, combustor design, and good combustion practices.

Your comments may be forwarded to my attention at the letterhead address or faxed to the Bureau of Air Regulation at 850/922-6979. If you have any questions, please contact the project engineer, Jeff Koerner, at 850/414-7268.

Sincerely,

[signature] 10/20

Al Linero, P.E.
Administrator
New Source Review Section

AAL/jfk/kt

Enclosures

RECEIVED
OCT 15 1999
BUREAU OF AIR REGULATION

# AIR PERMIT APPLICATION AND PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS FOR THE PALMETTO POWER L.L.C. FACILITY

Submitted by:

Palmetto Power L.L.C.
1000 Louisiana, Suite 5800
Houston, Texas 77002-5050

Prepared By:

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

October 1999
9937575Y/F1

DISTRIBUTION:
4 Copies - FDEP
3 Copies - Palmetto Power L.L.C.
3 Copies - Golder Associates

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# AIR PERMIT APPLICATION

# Department of Environmental Protection

## Division of Air Resources Management

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BUREAU OF AIR REGULATION

## APPLICATION FOR AIR PERMIT - TITLE V SOURCE

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

## I. APPLICATION INFORMATION

### Identification of Facility

| | |
|---|---|
| 1. Facility Owner/Company Name: **Palmetto Power LLC Project** | |
| 2. Site Name: **Palmetto Power LLC Project (PPP)** | |
| 3. Facility Identification Number: [ **X** ] Unknown | |
| 4. Facility Location: Street Address or Other Locator: **State Road 532** City: County: **Osceola** Zip Code: | |
| 5. Relocatable Facility? [ ] Yes [ **X** ] No | 6. Existing Permitted Facility? [ ] Yes [ **X** ] No |

### Application Contact

| |
|---|
| 1. Name and Title of Application Contact: **Starla Lacy** |
| 2. Application Contact Mailing Address: Organization/Firm: **Palmetto Power, L. L. C.** Street Address: **1000 Louisiana St., Suite 5800** City: **Houston** State: **TX** Zip Code: **77002** |
| 3. Application Contact Telephone Numbers: Telephone: ( **713** ) **767 - 8961** Fax: ( **713** ) **767 - 8764** |

### Application Processing Information (DEP Use)

| | |
|---|---|
| 1. Date of Receipt of Application: | October 15, 1999 |
| 2. Permit Number: | 0970073-001-AC |
| 3. PSD Number (if applicable): | PSD-FL-277 |
| 4. Siting Number (if applicable): | |

## Purpose of Application

### Air Operation Permit Application

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

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

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

Current construction permit number:____________________

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

Current construction permit number:____________________

Operation permit number to be revised:____________________

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

Operation permit number to be revised/corrected:____________________

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

Operation permit number to be revised:____________________

Reason for revision:____________________

### Air Construction Permit Application

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

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

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

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

## Owner/Authorized Representative or Responsible Official

| | |
|---|---|
| 1. | Name and Title of Owner/Authorized Representative or Responsible Official:<br>**Rick A. Bowen, Executive Vice President** |
| 2. | Owner/Authorized Representative or Responsible Official Mailing Address:<br>Organization/Firm: **Palmetto Power, L. L. C.**<br>Street Address: **1000 Louisiana St., Suite 5800**<br>City: **Houston** State: **TX** Zip Code: **77002** |
| 3. | Owner/Authorized Representative or Responsible Official Telephone Numbers:<br>Telephone: **( 713 ) 767 - 8532** Fax: **( 713 ) 767 - 8511** |
| 4. | Owner/Authorized Representative or Responsible Official Statement:<br>*I, the undersigned, am the owner or authorized representative*(check here [ ], if so) or the responsible official (check here [ ], if so) of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*<br><br>Signature Date |

* Attach letter of authorization if not currently on file.

## Professional Engineer Certification

| | |
|---|---|
| 1. | Professional Engineer Name: **Kennard F. Kosky**<br>Registration Number: **14996** |
| 2. | Professional Engineer Mailing Address:<br>Organization/Firm: **Golder Associates Inc.**<br>Street Address: **6241 NW 23rd Street, Suite 500**<br>City: **Gainesville** State: **FL** Zip Code: **32653-1500** |
| 3. | Professional Engineer Telephone Numbers:<br>Telephone: **( 352 ) 336 - 5600** Fax: **( 352 ) 336 - 6603** |

4. Professional Engineer Statement:

*I, the undersigned, hereby certify, except as particularly noted herein*, that:*

*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ], 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] 10/14/99

Signature Date

(seal)

* Attach any exception to certification statement.

## Scope of Application

| Emissions Unit ID | Description of Emissions Unit | Permit Type | Processing Fee |
|---|---|---|---|
| 1R | S/W Frame 501F Combustion Turbine | AC1A | |
| 2R | S/W Frame 501F Combustion Turbine | AC1A | |
| 3R | S/W Frame 501F Combustion Turbine | AC1A | |
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## Application Processing Fee

Check one: [ X ] Attached - Amount: $: 7,500 [ ] Not Applicable

## Construction/Modification Information

| |
|---|
| 1. Description of Proposed Project or Alterations:<br><br>**Construction of 3 170-MW 'F' Class combustion turbines. See Attachment PSD-PPP.** |
| 2. Projected or Actual Date of Commencement of Construction: **1 Jul 2000** |
| 3. Projected Date of Completion of Construction: **1 Mar 2002** |

## Application Comment

| |
|---|
| **See Attachment PSD-PPP** |

# II. FACILITY INFORMATION

## A. GENERAL FACILITY INFORMATION

**Facility Location and Type**

| | | | |
|---|---|---|---|
| 1. Facility UTM Coordinates:<br>Zone: **17** | East (km): **508.3** | North (km): **3135.2** | |
| 2. Facility Latitude/Longitude:<br>Latitude (DD/MM/SS): / / | | Longitude (DD/MM/SS): / / | |
| 3. Governmental Facility Code:<br>**0** | 4. Facility Status Code:<br>**C** | 5. Facility Major Group SIC Code:<br>**49** | 6. Facility SIC(s):<br>**4911** |
| 7. Facility Comment (limit to 500 characters):<br>**Project consists of three 170-MW Siemens/Westinghouse (S/W) Frame 501F combustion turbines that will use dry low-nitrogen oxide combustion technology when firing natural gas. Each CT will operate up to 3,750 hours per year.** | | | |

**Facility Contact**

| | | | |
|---|---|---|---|
| 1. Name and Title of Facility Contact:<br>**Ms. Starla Lacy** | | | |
| 2. Facility Contact Mailing Address:<br>Organization/Firm: **Palmetto Power, L. L. C.**<br>Street Address: **1000 Louisiana St., Suite 5800** | | | |
| City: **Houston** | State: **TX** | Zip Code: **77002** | |
| 3. Facility Contact Telephone Numbers:<br>Telephone: ( **713** ) **767 - 8961** | | Fax: ( **713** ) **767 - 8764** | |

## Facility Regulatory Classifications

**Check all that apply:**

| | |
|---|---|
| 1. [ ] Small Business Stationary Source? | [ ] Unknown |
| 2. [ X ] Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)? | |
| 3. [ ] Synthetic Minor Source of Pollutants Other than HAPs? | |
| 4. [ ] Major Source of Hazardous Air Pollutants (HAPs)? | |
| 5. [ ] Synthetic Minor Source of HAPs? | |
| 6. [ X ] One or More Emissions Units Subject to NSPS? | |
| 7. [ ] One or More Emission Units Subject to NESHAP? | |
| 8. [ ] Title V Source by EPA Designation? | |
| 9. Facility Regulatory Classifications Comment (limit to 200 characters): **CT is subject to NSPS Subpart GG.** | |

## List of Applicable Regulations

| | |
|---|---|
| **Not Applicable** | |
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## B. FACILITY POLLUTANTS

**List of Pollutants Emitted**

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

**Supplemental Requirements**

| | |
|---|---|
| 1. Area Map Showing Facility Location: [ X ] Attached, Document ID: PSD-PPP [ ] Not Applicable [ ] Waiver Requested | |
| 2. Facility Plot Plan: [ X ] Attached, Document ID: PSD-PPP [ ] Not Applicable [ ] Waiver Requested | |
| 3. Process Flow Diagram(s): [ X ] Attached, Document ID: PSD-PPP [ ] 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: [ ] Attached, Document ID: ______ [ X ] Not Applicable [ ] Waiver Requested | |
| 6. Supplemental Information for Construction Permit Application: [ X ] Attached, Document ID: PSD-PPP [ ] Not Applicable | |
| 7. Supplemental Requirements Comment: | |

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

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

# III. EMISSIONS UNIT INFORMATION

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

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

**Emissions Unit Description and Status**

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

[ X ] 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).

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

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

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

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

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

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Siemens/Westinghouse Frame 501F Simple Cycle**

4. Emissions Unit Identification Number:
ID:

[ ] No ID
[ X ] ID Unknown

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

9. Emissions Unit Comment: (Limit to 500 Characters)
**This emission unit is a S/W Frame 501F combustion turbine operating in simple cycle mode. See Attachment PSD-PPP.**

## Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

**Dry Low $NO_x$ combustion - Natural gas firing**

2. Control Device or Method Code(s): **25**

## Emissions Unit Details

1. Package Unit:
   Manufacturer: **Siemens/Westinghouse** Model Number: **W501FD**
2. Generator Nameplate Rating: **182.5** MW
3. Incinerator Information:
   Dwell Temperature: °F
   Dwell Time: seconds
   Incinerator Afterburner Temperature: °F

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

**Emissions Unit Operating Capacity and Schedule**

| | | | |
|---|---|---|---|
| 1. Maximum Heat Input Rate: | | **1,681** | mmBtu/hr |
| 2. Maximum Incineration Rate: | lb/hr | | tons/day |
| 3. Maximum Process or Throughput Rate: | | | |
| 4. Maximum Production Rate: | | | |
| 5. Requested Maximum Operating Schedule: | | | |
| | hours/day | | days/week |
| | weeks/year | **3,750** | hours/year |
| 6. Operating Capacity/Schedule Comment (limit to 200 characters): **Maximum heat input at ISO conditions and natural gas firing (LHV) and 182.5 MW with evaporative coolers off.** | | | |

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

List of Applicable Regulations

| | |
|---|---|
| See Attachment IPS-EU1-D for operational requirements | |
| See Attachment PSD-PPP for permitting requirements | |
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**ATTACHMENT PPP-EU1-D**

Applicable Requirements Listing

EMISSION UNIT ID: EU1

FDEP Rules:

Air Pollution Control-General Provisions:

| | |
|---|---|
| 62-204.800(7)(b)37. (State Only) | - NSPS Subpart GG |
| 62-204.800(7)(c) (State Only) | - NSPS authority |
| 62-204.800(7)(d)(State Only) | - NSPS General Provisions |
| 62-204.800(12) (State Only) | - Acid Rain Program |
| 62-204.800(13) (State Only) | - Allowances |
| 62-204.800(14) (State Only) | - Acid Rain Program Monitoring |
| 62-204.800(16) (State Only) | - Excess Emissions (Potentially applicable over term of permit) |

Stationary Sources-General:

| | |
|---|---|
| 62-210.650 | - Circumvention; EUs with control device |
| 62-210.700(1) | - Excess Emissions; |
| 62-210.700(4) | - Excess Emissions; poor maintenance |
| 62-210.700(6) | - Excess Emissions; notification |

Acid Rain:

| | |
|---|---|
| 62-214.300 | - All Acid Rain Units (Applicability) |
| 62-214.320(1)(a),(2) | - All Acid Rain Units (Application Shield) |
| 62-214.330(1)(a)1. | - Compliance Options (if 214.430) |
| 62-214.340 | - Exemptions (new units, retired units) |
| 62-214.350(2);(3);(6) | - All Acid Rain Units (Certification) |
| 62-214.370 | - All Acid Rain Units (Revisions; correction; potentially applicable if a need arises) |
| 62-214.430 | - All Acid Rain Units (Compliance Options-if required) |

Stationary Sources-Emission Standards:

| | |
|---|---|
| 62-296.320(4)(b)(State Only) | - CTs/Diesel Units |

Stationary Sources-Emission Monitoring (where stack test is required):

| | |
|---|---|
| 62-297.310(1) | - All Units (Test Runs-Mass Emission) |
| 62-297.310(2)(b) | - All Units (Operating Rate; other than CTs;no CT) |
| 62-297.310(3) | - All Units (Calculation of Emission) |
| 62-297.310(4)(a) | - All Units (Applicable Test Procedures;Sampling time) |
| 62-297.310(4)(b) | - All Units (Sample Volume) |
| 62-297.310(4)(c) | - All Units (Required Flow Rate Range-PM/H2SO4/F) |
| 62-297.310(4)(d) | - All Units (Calibration) |
| 62-297.310(4)(e) | - All Units (EPA Method 5-only) |

| | |
|---|---|
| 62-297.310(5) | - All Units (Determination of Process Variables) |
| 62-297.310(6)(a) | - All Units (Permanent Test Facilities-general) |
| 62-297.310(6)(c) | - All Units (Sampling Ports) |
| 62-297.310(6)(d) | - All Units (Work Platforms) |
| 62-297.310(6)(e) | - All Units (Access) |
| 62-297.310(6)(f) | - All Units (Electrical Power) |
| 62-297.310(6)(g) | - All Units (Equipment Support) |
| 62-297.310(7)(a)1. | - Applies mainly to CTs/Diesels |
| 62-297.310(7)(a)2. | - FFSG excess emissions |
| 62-297.310(7)(a)3. | - Permit Renewal Test Required |
| 62-297.310(7)(a)4.a | - Annual Test |
| 62-297.310(7)(a)5. | - PM exemption if <400 hrs/yr |
| 62-297.310(7)(a)6. | - PM FFSG semi annual test required if >200 hrs/yr |
| 62-297.310(7)(a)7. | - PM quarterly monitoring if >100 hrs/yr |
| 62-297.310(7)(a)9. | - FDEP Notification - 15 days |
| 62-297.310(7)(c) | - Waiver of Compliance Tests (Fuel Sampling) |
| 62-297.310(8) | - Test Reports |

**Federal Rules:**

NSPS Subpart GG:

| | |
|---|---|
| 40 CFR 60.332(a)(1) | - NOx for Electric Utility CTs |
| 40 CFR 60.332(a)(3) | - NOx for Electric Utility CTs |
| 40 CFR 60.333 | - SO2 limits |
| 40 CFR 60.334 | - Monitoring of Operations (Custom Monitoring for Gas) |
| 40 CFR 60.335 | - Test Methods |

NSPS General Requirements:

| | |
|---|---|
| 40 CFR 60.7(a)(1) | - Notification of Construction |
| 40 CFR 60.7(a)(2) | - Notification of Initial Start-Up |
| 40 CFR 60.7(a)(3) | - Notification of Actual Start-Up |
| 40 CFR 60.7(a)(4) Cycle) | - Notification and Recordkeeping (Physical/Operational |
| 40 CFR 60.7(a)(5) | - Notification of CEM Demonstration |
| 40 CFR 60.7(b) (startup/shutdown/malfunction) | - Notification and Recordkeeping |
| 40 CFR 60.7(c) (startup/shutdown/malfunction) | - Notification and Recordkeeping |
| 40 CFR 60.7(d) (startup/shutdown/malfunction) | - Notification and Recordkeeping |
| 40 CFR 60.7(f) | - Notification and Recordkeeping (maintain records-2 yrs) |
| 40 CFR 60.8(a) | - Performance Test Requirements |
| 40 CFR 60.8(b) | - Performance Test Notification |
| 40 CFR 60.8(c) | - Performance Tests (representative conditions) |
| 40 CFR 60.8(e) | - Provide Stack Sampling Facilities |
| 40 CFR 60.8(f) | - Test Runs |

| | |
|---|---|
| 40 CFR 60.11(a) | - Compliance (ref. S. 60.8 or Subpart; other than opacity) |
| 40 CFR 60.11(b) | - Compliance (opacity determined EPA Method 9) |
| 40 CFR 60.11(c) | - Compliance (opacity; excludes startup/shutdown/malfunction) |
| 40 CFR 60.11(d) | - Compliance (maintain air pollution control equip.) |
| 40 CFR 60.11(e)(2) | - Compliance (opacity; ref. S. 60.8) |
| 40 CFR 60.12 | - Circumvention |
| 40 CFR 60.13(a) | - Monitoring (Appendix B; Appendix F) |
| 40 CFR 60.13(c) | - Monitoring (Opacity COMS) |
| 40 CFR 60.13(d)(1) | - Monitoring (CEMS; span, drift, etc.) |
| 40 CFR 60.13(d)(2) | - Monitoring (COMS; span, system check) |
| 40 CFR 60.13(e) | - Monitoring (frequency of operation) |
| 40 CFR 60.13(f) | - Monitoring (frequency of operation) |
| 40 CFR 60.13(h) | - Monitoring (COMS; data requirements) |

Acid Rain-Permits:

| | |
|---|---|
| 40 CFR 72.9(a) | - Permit Requirements |
| 40 CFR 72.9(b) | - Monitoring Requirements |
| 40 CFR 72.9(c)(1) | - SO2 Allowances-hold allowances |
| 40 CFR 72.9(c)(2) | - SO2 Allowances-violation |
| 40 CFR 72.9(c)(3)(iii) | - SO2 Allowances-Phase II Units (listed) |
| 40 CFR 72.9(c)(4) | - SO2 Allowances-allowances held in ATS |
| 40 CFR 72.9(c)(5) | - SO2 Allowances-no deduction for 72.9(c)(1)(i) |
| 40 CFR 72.9(d) | - NOx Requirements |
| 40 CFR 72.9(e) | - Excess Emission Requirements |
| 40 CFR 72.9(f) | - Recordkeeping and Reporting |
| 40 CFR 72.9(g) | - Liability |
| 40 CFR 72.20(a) | - Designated Representative; required |
| 40 CFR 72.20(b) | - Designated Representative; legally binding |
| 40 CFR 72.20(c) | - Designated Representative; certification requirements |
| 40 CFR 72.21 | - Submissions |
| 40 CFR 72.22 | - Alternate Designated Representative |
| 40 CFR 72.23 | - Changing representatives; owners |
| 40 CFR 72.24 | - Certificate of representation |
| 40 CFR 72.30(a) | - Requirements to Apply (operate) |
| 40 CFR 72.30(b)(2) | - Requirements to Apply (Phase II-Complete) |
| 40 CFR 72.30(c) | - Requirements to Apply (reapply before expiration) |
| 40 CFR 72.30(d) | - Requirements to Apply (submittal requirements) |
| 40 CFR 72.31 | - Information Requirements; Acid Rain Applications |
| 40 CFR 72.32 | - Permit Application Shield |
| 40 CFR 72.33(b) | - Dispatch System ID;unit/system ID |
| 40 CFR 72.33(c) | - Dispatch System ID;ID requirements |
| 40 CFR 72.33(d) | - Dispatch System ID;ID change |
| 40 CFR 72.40(a) | - General; compliance plan |
| 40 CFR 72.40(b) | - General; multi-unit compliance options |
| 40 CFR 72.40(c) | - General; conditional approval |

| | |
|---|---|
| 40 CFR 72.40(d) | - General; termination of compliance options |
| 40 CFR 72.51 | - Permit Shield |
| 40 CFR 72.90 | - Annual Compliance Certification |

Allowances:

| | |
|---|---|
| 40 CFR 73.33(a),(c) | - Authorized account representative |
| 40 CFR 73.35(c)(1) | - Compliance: ID of allowances by serial number |

Monitoring Part 75:

| | |
|---|---|
| 40 CFR 75.4 | - Compliance Dates; |
| 40 CFR 75.5 | - Prohibitions |
| 40 CFR 75.10(a)(1) | - Primary Measurement; SO2; |
| 40 CFR 75.10(a)(2) | - Primary Measurement; NOx; |
| 40 CFR 75.10(a)(3)(iii) | - Primary Measurement; CO2; O2 monitor |
| 40 CFR 75.10(b) | - Primary Measurement; Performance Requirements |
| 40 CFR 75.10(c) | - Primary Measurement; Heat Input; Appendix F |
| 40 CFR 75.10(e) | - Primary Measurement; Optional Backup Monitor |
| 40 CFR 75.10(f) | - Primary Measurement; Minimum Measurement |
| 40 CFR 75.10(g) | - Primary Measurement; Minimum Recording |
| 40 CFR 75.11(d) | - SO2 Monitoring; Gas- and Oil-fired units |
| 40 CFR 75.11(e) | - SO2 Monitoring; Gaseous firing |
| 40 CFR 75.12(a) | - NOx Monitoring; Coal; Non-peaking oil/gas units |
| 40 CFR 75.12(b) | - NOx Monitoring; Determination of NOx emission rate; Appendix F |
| 40 CFR 75.13(b) | - CO2 Monitoring; Appendix G |
| 40 CFR 75.13(c) | - CO2 Monitoring; Appendix F |
| 40 CFR 75.14(c) | - Opacity Monitoring; Gas units; exemption |
| 40 CFR 75.20(a) | - Initial Certification Approval Process; Loss of Certification |
| 40 CFR 75.20(b) | - Recertification Procedures (if recertification necessary) |
| 40 CFR 75.20(c) | - Certification Procedures (if recertification necessary) |
| 40 CFR 75.20(d) | - Recertification Backup/portable monitor |
| 40 CFR 75.20(f) | - Alternate Monitoring system |
| 40 CFR 75.21(a) | - QA/QC; CEMS; Appendix B (Suspended 7/17/95-12/31/96) |
| 40 CFR 75.21(c) | - QA/QC; Calibration Gases |
| 40 CFR 75.21(d) | - QA/QC; Notification of RATA |
| 40 CFR 75.21(e) | - QA/QC; Audits |
| 40 CFR 75.21(f) | - QA/QC; CEMS (Effective 7/17/96-12/31/96) |
| 40 CFR 75.22 | - Reference Methods |
| 40 CFR 75.24 | - Out-of-Control Periods; CEMS |
| 40 CFR 75.30(a)(3) | - General Missing Data Procedures; NOx |
| 40 CFR 75.30(a)(4) | - General Missing Data Procedures; SO2 |
| 40 CFR 75.30(b) | - General Missing Data Procedures; certified backup monitor |
| 40 CFR 75.30(c) | - General Missing Data Procedures; certified backup monitor |

| | |
|---|---|
| 40 CFR 75.30(d) | - General Missing Data Procedures; SO2 (optional before 1/1/97) |
| 40 CFR 75.30(e) stacks | - General Missing Data Procedures; bypass/multiple |
| 40 CFR 75.31 | - Initial Missing Data Procedures (new/re-certified CMS) |
| 40 CFR 75.32 | - Monitoring Data Availability for Missing Data |
| 40 CFR 75.33 | - Standard Missing Data Procedures |
| 40 CFR 75.36 | - Missing Data for Heat Input |
| 40 CFR 75.40 | - Alternate Monitoring Systems-General |
| 40 CFR 75.41 | - Alternate Monitoring Systems-Precision Criteria |
| 40 CFR 75.42 | - Alternate Monitoring Systems-Reliability Criteria |
| 40 CFR 75.43 | - Alternate Monitoring Systems-Accessability Criteria |
| 40 CFR 75.44 | - Alternate Monitoring Systems-Timeliness Criteria |
| 40 CFR 75.45 | - Alternate Monitoring Systems-Daily QA |
| 40 CFR 75.46 | - Alternate Monitoring Systems-Missing data |
| 40 CFR 75.47 | - Alternate Monitoring Systems-Criteria for Class |
| 40 CFR 75.48 | - Alternate Monitoring Systems-Petition |
| 40 CFR 75.53 | - Monitoring Plan ; revisions |
| 40 CFR 75.54(a) | - Recordkeeping-general |
| 40 CFR 75.54(b) | - Recordkeeping-operating parameter |
| 40 CFR 75.54(c) | - Recordkeeping-SO2 |
| 40 CFR 75.54(d) | - Recordkeeping-NOx |
| 40 CFR 75.54(e) | - Recordkeeping-CO2 |
| 40 CFR 75.54(f) | - Recordkeeping-Opacity |
| 40 CFR 75.55(c) | - General Recordkeeping (Specific Situations) |
| 40 CFR 75.55(e) | - General Recordkeeping (Specific Situations) |
| 40 CFR 75.56 | - Certification; QA/QC Provisions |
| 40 CFR 75.60 | - Reporting Requirements-General |
| 40 CFR 75.61 | - Reporting Requirements-Notification cert/recertification |
| 40 CFR 75.62 | - Reporting Requirements-Monitoring Plan |
| 40 CFR 75.63 | - Reporting Requirements-Certification/Recertification |
| 40 CFR 75.64(a) | - Reporting Requirements-Quarterly reports; submission |
| 40 CFR 75.64(b) statement | - Reporting Requirements-Quarterly reports; DR |
| 40 CFR 75.64(c) | - Rep. Req.; Quarterly reports; Compliance Certification |
| 40 CFR 75.64(d) | - Rep. Req.; Quarterly reports; Electronic format |
| 40 CFR 75.66 | - Petitions to the Administrator (if required) |
| Appendix A-1 | - Installation and Measurement Locations |
| Appendix A-2. | - Equipment Specifications |
| Appendix A-3. | - Performance Specifications |
| Appendix A-4. | - Data Handling and Acquisition Systems |
| Appendix A-5. | - Calibration Gases |
| Appendix A-6. | - Certification Tests and Procedures |
| Appendix A-7. | - Calculations |
| Appendix B | - QA/QC Procedures |
| Appendix C-1. | - Missing Data; SO2/NOx for controlled sources |
| Appendix C-2. | - Missing Data; Load-Based Procedure; NOx & flow |

| | |
|---|---|
| Appendix D | - Optional SO2; Oil-/gas-fired units |
| Appendix F | - Conversion Procedures |
| Appendix H | - Traceability Protocol |

Acid Rain Program-Excess Emissions (these are future requirements):

| | |
|---|---|
| 40 CFR 77.3 | - Offset Plans (future) |
| 40 CFR 77.5(b) | - Deductions of Allowances (future) |
| 40 CFR 77.6 | - Excess Emissions Penalties (SO2 and NOx;future) |

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

**Emission Point Description and Type**

| | |
|---|---|
| 1. Identification of Point on Plot Plan or Flow Diagram? **See Att. PSD-PPP** | 2. Emission Point Type Code: **1** |

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):

**Exhausts through a single stack.**

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

| | | |
|---|---|---|
| 5. Discharge Type Code: **V** | 6. Stack Height: **50** feet | 7. Exit Diameter: **19** feet |
| 8. Exit Temperature: **1,099** °F | 9. Actual Volumetric Flow Rate: **2,429,695** acfm | 10. Water Vapor: **8.5** % |

| | |
|---|---|
| 11. Maximum Dry Standard Flow Rate: **750,000** dscfm | 12. Nonstack Emission Point Height: feet |

13. Emission Point UTM Coordinates:

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

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

**Stack parameters for ISO operating condition firing natural gas with evaporative coolers off.**

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

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

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type) (limit to 500 characters):<br>**Natural Gas** | | |
| 2. Source Classification Code (SCC):<br>**20100201** | 3. SCC Units:<br>**Million Cubic Feet** | |
| 4. Maximum Hourly Rate:<br>**1.83** | 5. Maximum Annual Rate:<br>**6,853** | 6. Estimated Annual Activity Factor: |
| 7. Maximum % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit:<br>**920** |
| 10. Segment Comment (limit to 200 characters):<br>**Based on 920 Btu/cf(LHV); ISO conditions and 3,750 hrs/yr operation with evaporative coolers off.** | | |

**Segment Description and Rate:** Segment ____ of ____

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type ) (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 % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: |
| 10. Segment Comment (limit to 200 characters): | | |

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

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | EL |
| $SO_2$ | | | EL |
| $NO_x$ | 026 | | EL |
| CO | | | EL |
| VOC | | | EL |
| $PM_{10}$ | | | EL |
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## G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
### (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **PM** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **8.6** lb/hour **15.3** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **<10% opacity** | 4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Annual VE test; EPA Method 9** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr based on 32°F; Tons/year at ISO and 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$SO_2$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **5.5** lb/hour **9.8** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Emission Factor: 1 grain S per 100 CF gas; Lb/hr at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **Pipeline Natural Gas** | 4. Equivalent Allowable Emissions: **5.5** lb/hour **9.8** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Fuel Sampling** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr at 32°F and 100% load; Tons/year at 3,750 hrs/yr ISO conditions. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

1. Pollutant Emitted: **$NO_x$**
2. Total Percent Efficiency of Control:
3. Potential Emissions: **111.2** lb/hour **196.5** tons/year
4. Synthetically Limited? [ X ]
5. Range of Estimated Fugitive Emissions:
   [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year
6. Emission Factor:
   Reference: **S/W, 1999; Golder**
7. Emissions Method Code: **2**
8. Calculation of Emissions (limit to 600 characters):

   **See Attachment PSD-PPP; Section 2.0; Appendix A.**
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):

   **Lb/hr based on gas firing at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions.**

**Allowable Emissions** Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**
2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **15 ppmvd**
4. Equivalent Allowable Emissions: **111.2** lb/hour **196.5** tons/year
5. Method of Compliance (limit to 60 characters):

   **CEM - 30 Day Rolling Average**
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):

   **Requested Allowable Emissions is at 15% $O_2$-100% load. Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **CO** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **113.0** lb/hour **200.6** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **25 ppmvd @ 15% $O_2$** | 4. Equivalent Allowable Emissions: **113.0** lb/hour **200.6** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 10; high and low load** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **VOC** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **3.7** lb/hour **6.6** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **1.8 ppmvd** | 4. Equivalent Allowable Emissions: **3.7** lb/hour **6.6** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 25A; high and low load** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$PM_{10}$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **8.6** lb/hour **15.3** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |

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

**See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions**

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **8.6 lb/hr** | 4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year |

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

**Annual VE test; EPA Method 9**

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

**Dry Filterable PM - excludes $H_2SO_4$. See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE10** | 2. Basis for Allowable Opacity: [ ] Rule [ X ] Other |
| 3. Requested Allowable Opacity:<br>Normal Conditions: **10** % Exceptional Conditions: %<br>Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance:<br>**Annual VE Test EPA Method 9** | |
| 5. Visible Emissions Comment (limit to 200 characters):<br>**Maximum for gas firing.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: **EM** | 2. Pollutant(s): **$NO_x$** |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined**<br>Manufacturer:<br>Model Number: | Serial Number: |
| 5. Installation Date: **01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters):<br>**$NO_x$ CEM proposed to meet requirements of 40 CFR Part 75.** | |

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE99** | 2. Basis for Allowable Opacity: [ X ] Rule [ ] Other |
| 3. Requested Allowable Opacity: Normal Conditions: % Exceptional Conditions: **100** % Maximum Period of Excess Opacity Allowed: **6** min/hour | |
| 4. Method of Compliance: **None** | |
| 5. Visible Emissions Comment (limit to 200 characters): **FDEP Rule 62-201.700(1), Allowed for 2 hours (120 minutes) per 24 hours for start up, shutdown and malfunction.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: **$O_2$** | 2. Pollutant(s): **Oxygen** |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined** Manufacturer: Model Number: Serial Number: | |
| 5. Installation Date: **01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): **Dilution monitor required by 40 CFR Part 75; may be $CO_2$ in lieu of $O_2$ monitor.** | |

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

**Supplemental Requirements**

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

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

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

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

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

14. Compliance Assurance Monitoring Plan
   [ ] Attached, Document ID:________ [ ] Not Applicable

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

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

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

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

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

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

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

   [ ] Not Applicable

# III. EMISSIONS UNIT INFORMATION

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

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

**Emissions Unit Description and Status**

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

[ X ] 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).

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

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

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

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

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

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Siemens/Westinghouse Frame 501F Simple Cycle**

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

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

9. Emissions Unit Comment: (Limit to 500 Characters)
**This emission unit is a S/W Frame 501F combustion turbine operating in simple cycle mode. See Attachment PSD-PPP.**

## Emissions Unit Control Equipment

| |
|---|
| 1. Control Equipment/Method Description (Limit to 200 characters per device or method):<br><br>**Dry Low $NO_x$ combustion - Natural gas firing** |
| 2. Control Device or Method Code(s): **25** |

## Emissions Unit Details

| | | |
|---|---|---|
| 1. Package Unit:<br>Manufacturer: **Siemens/Westinghouse** | Model Number: **W501FD** | |
| 2. Generator Nameplate Rating: | **182.5** MW | |
| 3. Incinerator Information: | | |
| Dwell Temperature: | | °F |
| Dwell Time: | | seconds |
| Incinerator Afterburner Temperature: | | °F |

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

**Emissions Unit Operating Capacity and Schedule**

| | | | |
|---|---|---|---|
| 1. Maximum Heat Input Rate: | | **1,681** | mmBtu/hr |
| 2. Maximum Incineration Rate: | lb/hr | | tons/day |
| 3. Maximum Process or Throughput Rate: | | | |
| 4. Maximum Production Rate: | | | |
| 5. Requested Maximum Operating Schedule: | | | |
| | hours/day | | days/week |
| | weeks/year | **3,750** | hours/year |
| 6. Operating Capacity/Schedule Comment (limit to 200 characters): | | | |

**Maximum heat input at ISO conditions and natural gas firing (LHV) and 182.5 MW with evaporative coolers off.**

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

List of Applicable Regulations

| | |
|---|---|
| See Attachment IPS-EU1-D for operational requirements | |
| See Attachment PSD-PPP for permitting requirements | |
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## D. EMISSION POINT (STACK/VENT) INFORMATION
### (Regulated Emissions Units Only)

**Emission Point Description and Type**

| | |
|---|---|
| 1. Identification of Point on Plot Plan or Flow Diagram? **See Att. PSD-PPP** | 2. Emission Point Type Code: **1** |

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):

**Exhausts through a single stack.**

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

| | | |
|---|---|---|
| 5. Discharge Type Code: **V** | 6. Stack Height: **50** feet | 7. Exit Diameter: **19** feet |
| 8. Exit Temperature: **1,099** °F | 9. Actual Volumetric Flow Rate: **2,429,695** acfm | 10. Water Vapor: **8.5** % |

| | |
|---|---|
| 11. Maximum Dry Standard Flow Rate: **750,000** dscfm | 12. Nonstack Emission Point Height: feet |

13. Emission Point UTM Coordinates:

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

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

**Stack parameters for ISO operating condition firing natural gas with evaporative coolers off.**

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

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

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type) (limit to 500 characters):<br>**Natural Gas** | | |
| 2. Source Classification Code (SCC):<br>**20100201** | 3. SCC Units:<br>**Million Cubic Feet** | |
| 4. Maximum Hourly Rate:<br>**1.83** | 5. Maximum Annual Rate:<br>**6,853** | 6. Estimated Annual Activity Factor: |
| 7. Maximum % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit:<br>**920** |
| 10. Segment Comment (limit to 200 characters):<br>**Based on 920 Btu/cf(LHV); ISO conditions and 3,750 hrs/yr operation with evaporative coolers off.** | | |

**Segment Description and Rate:** Segment ____ of ____

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type ) (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 % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: |
| 10. Segment Comment (limit to 200 characters): | | |

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

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | EL |
| $SO_2$ | | | EL |
| $NO_x$ | 026 | | EL |
| CO | | | EL |
| VOC | | | EL |
| $PM_{10}$ | | | EL |
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## G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
### (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **PM** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **8.6** lb/hour **15.3** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.** | |

**Allowable Emissions** Allowable Emissions **1** of **1**

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **<10% opacity** | 4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year |
| 5. Method of Compliance (limit to 60 characters): ***Annual VE test; EPA Method 9*** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr based on 32°F; Tons/year at ISO and 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$SO_2$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **5.5** lb/hour **9.8** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Emission Factor: 1 grain S per 100 CF gas; Lb/hr at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **Pipeline Natural Gas** | 4. Equivalent Allowable Emissions: **5.5** lb/hour **9.8** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Fuel Sampling** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr at 32°F and 100% load; Tons/year at 3,750 hrs/yr ISO conditions. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$NO_x$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **111.2** lb/hour **196.5** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on gas firing at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions.** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **15 ppmvd** | 4. Equivalent Allowable Emissions: **111.2** lb/hour **196.5** tons/year |
| 5. Method of Compliance (limit to 60 characters): **CEM - 30 Day Rolling Average** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions is at 15% $O_2$-100% load. Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **CO** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **113.0** lb/hour **200.6** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **25 ppmvd @ 15% $O_2$** | 4. Equivalent Allowable Emissions: **113.0** lb/hour **200.6** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 10; high and low load** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **VOC** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **3.7** lb/hour **6.6** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **1.8 ppmvd** | 4. Equivalent Allowable Emissions: **3.7** lb/hour **6.6** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 25A; high and low load** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$PM_{10}$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **8.6** lb/hour **15.3** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **8.6 lb/hr** | 4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Annual VE test; EPA Method 9** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Dry Filterable PM - excludes $H_2SO_4$. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE10** | 2. Basis for Allowable Opacity: [ ] Rule [ X ] Other |
| 3. Requested Allowable Opacity:<br>Normal Conditions: 10 % Exceptional Conditions: %<br>Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance:<br>**Annual VE Test EPA Method 9** | |
| 5. Visible Emissions Comment (limit to 200 characters):<br>**Maximum for gas firing.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: **EM** | 2. Pollutant(s): $NO_x$ |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined**<br>Manufacturer:<br>Model Number: Serial Number: | |
| 5. Installation Date:<br>**01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters):<br>**$NO_x$ CEM proposed to meet requirements of 40 CFR Part 75.** | |

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE99** | 2. Basis for Allowable Opacity: [ X ] Rule [ ] Other |
| 3. Requested Allowable Opacity: Normal Conditions: % Exceptional Conditions: **100** % Maximum Period of Excess Opacity Allowed: **6** min/hour | |
| 4. Method of Compliance: **None** | |
| 5. Visible Emissions Comment (limit to 200 characters): **FDEP Rule 62-201.700(1), Allowed for 2 hours (120 minutes) per 24 hours for start up, shutdown and malfunction.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: **$O_2$** | 2. Pollutant(s): **Oxygen** |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined** Manufacturer: Model Number: Serial Number: | |
| 5. Installation Date: **01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): **Dilution monitor required by 40 CFR Part 75; may be $CO_2$ in lieu of $O_2$ monitor.** | |

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

**Supplemental Requirements**

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

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

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

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

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

14. Compliance Assurance Monitoring Plan
    [ ] Attached, Document ID:________ [ ] Not Applicable

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

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

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

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

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

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

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

    [ ] Not Applicable

## III. EMISSIONS UNIT INFORMATION

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

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

**Emissions Unit Description and Status**

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

[ X ] 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).

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

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

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

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

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

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):
**Siemens/Westinghouse Frame 501F Simple Cycle**

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

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

9. Emissions Unit Comment: (Limit to 500 Characters)
**This emission unit is a S/W Frame 501F combustion turbine operating in simple cycle mode. See Attachment PSD-PPP.**

## Emissions Unit Control Equipment

| |
|---|
| 1. Control Equipment/Method Description (Limit to 200 characters per device or method):<br><br>Dry Low $NO_x$ combustion - Natural gas firing |
| 2. Control Device or Method Code(s): 25 |

## Emissions Unit Details

| | |
|---|---|
| 1. Package Unit:<br>Manufacturer: Siemens/Westinghouse | Model Number: W501FD |
| 2. Generator Nameplate Rating: | 182.5 MW |
| 3. Incinerator Information:<br>Dwell Temperature:<br>Dwell Time:<br>Incinerator Afterburner Temperature: | <br>°F<br>seconds<br>°F |

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

**Emissions Unit Operating Capacity and Schedule**

| | | | |
|---|---|---|---|
| 1. Maximum Heat Input Rate: | | 1,681 | mmBtu/hr |
| 2. Maximum Incineration Rate: | lb/hr | | tons/day |
| 3. Maximum Process or Throughput Rate: | | | |
| 4. Maximum Production Rate: | | | |
| 5. Requested Maximum Operating Schedule: | | | |
| | hours/day | | days/week |
| | weeks/year | 3,750 | hours/year |
| 6. Operating Capacity/Schedule Comment (limit to 200 characters): Maximum heat input at ISO conditions and natural gas firing (LHV) and 182.5 MW with evaporative coolers off. | | | |

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

List of Applicable Regulations

| | |
|---|---|
| See Attachment IPS-EU1-D for operational requirements | |
| See Attachment PSD-PPP for permitting requirements | |
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## D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

**Emission Point Description and Type**

| | |
|---|---|
| 1. Identification of Point on Plot Plan or Flow Diagram? **See Att. PSD-PPP** | 2. Emission Point Type Code: **1** |

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point):

**Exhausts through a single stack.**

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

| | | |
|---|---|---|
| 5. Discharge Type Code: **V** | 6. Stack Height: **50** feet | 7. Exit Diameter: **19** feet |
| 8. Exit Temperature: **1,099** °F | 9. Actual Volumetric Flow Rate: **2,429,695** acfm | 10. Water Vapor: **8.5** % |

| | |
|---|---|
| 11. Maximum Dry Standard Flow Rate: **750,000** dscfm | 12. Nonstack Emission Point Height: feet |

13. Emission Point UTM Coordinates:

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

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

**Stack parameters for ISO operating condition firing natural gas with evaporative coolers off.**

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

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

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type) (limit to 500 characters):<br><br>**Natural Gas** | | |
| 2. Source Classification Code (SCC):<br>**20100201** | 3. SCC Units:<br>**Million Cubic Feet** | |
| 4. Maximum Hourly Rate:<br>**1.83** | 5. Maximum Annual Rate:<br>**6,853** | 6. Estimated Annual Activity Factor: |
| 7. Maximum % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit:<br>**920** |
| 10. Segment Comment (limit to 200 characters):<br><br>**Based on 920 Btu/cf(LHV); ISO conditions and 3,750 hrs/yr operation with evaporative coolers off.** | | |

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

| | | |
|---|---|---|
| 1. Segment Description (Process/Fuel Type ) (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 % Sulfur: | 8. Maximum % Ash: | 9. Million Btu per SCC Unit: |
| 10. Segment Comment (limit to 200 characters): | | |

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

| 1. Pollutant Emitted | 2. Primary Control Device Code | 3. Secondary Control Device Code | 4. Pollutant Regulatory Code |
|---|---|---|---|
| PM | | | EL |
| $SO_2$ | | | EL |
| $NO_x$ | 026 | | EL |
| CO | | | EL |
| VOC | | | EL |
| $PM_{10}$ | | | EL |
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# G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
## (Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

## Potential/Fugitive Emissions

1. Pollutant Emitted: **PM**
2. Total Percent Efficiency of Control:
3. Potential Emissions: **8.6** lb/hour **15.3** tons/year
4. Synthetically Limited? [ **X** ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year
6. Emission Factor:
   Reference: **S/W, 1999; Golder**
7. Emissions Method Code: **2**
8. Calculation of Emissions (limit to 600 characters):

   **See Attachment PSD-PPP; Section 2.0; Appendix A.**
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):

   **Lb/hr based on 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.**

## Allowable Emissions

Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**
2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **<10% opacity**
4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year
5. Method of Compliance (limit to 60 characters):

   **Annual VE test; EPA Method 9**
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):

   **Lb/hr based on 32°F; Tons/year at ISO and 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

### Potential/Fugitive Emissions

| | |
|---|---|
| 1. Pollutant Emitted: **$SO_2$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **5.5** lb/hour **9.8** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Emission Factor: 1 grain S per 100 CF gas; Lb/hr at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing; ISO conditions.** | |

### Allowable Emissions
Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **Pipeline Natural Gas** | 4. Equivalent Allowable Emissions: **5.5** lb/hour **9.8** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Fuel Sampling** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Lb/hr at 32°F and 100% load; Tons/year at 3,750 hrs/yr ISO conditions. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

1. Pollutant Emitted: **$NO_x$**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **111.2** lb/hour **196.5** tons/year

4. Synthetically Limited? [ **X** ]

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

6. Emission Factor:
Reference: **S/W, 1999; Golder**

7. Emissions Method Code: **2**

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

**See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Lb/hr based on gas firing at 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions.**

**Allowable Emissions** Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units: **15 ppmvd**

4. Equivalent Allowable Emissions: **111.2** lb/hour **196.5** tons/year

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

**CEM - 30 Day Rolling Average**

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

**Requested Allowable Emissions is at 15% $O_2$-100% load. Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Potential/Fugitive Emissions**

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **113.0** lb/hour **200.6** tons/year

4. Synthetically Limited? [ X ]

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

6. Emission Factor:
Reference: **S/W, 1999; Golder**

7. Emissions Method Code: **2**

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

**See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Lb/hr based on 100% load and 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions**

**Allowable Emissions** Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**

2. Future Effective Date of Allowable Emissions:

3. Requested Allowable Emissions and Units: **25 ppmvd @ 15% $O_2$**

4. Equivalent Allowable Emissions: **113.0** lb/hour **200.6** tons/year

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

**EPA Method 10; high and low load**

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

**Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.**

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **VOC** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **3.7** lb/hour **6.6** tons/year | 4. Synthetically Limited? [ X ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **1.8 ppmvd** | 4. Equivalent Allowable Emissions: **3.7** lb/hour **6.6** tons/year |
| 5. Method of Compliance (limit to 60 characters): **EPA Method 25A; high and low load** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Max @ 32°F; 100% load; TPY @ 59°F, 3,750 hrs/yr. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

**Potential/Fugitive Emissions**

| | |
|---|---|
| 1. Pollutant Emitted: **$PM_{10}$** | 2. Total Percent Efficiency of Control: |
| 3. Potential Emissions: **8.6** lb/hour **15.3** tons/year | 4. Synthetically Limited? [ **X** ] |
| 5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year | |
| 6. Emission Factor: Reference: **S/W, 1999; Golder** | 7. Emissions Method Code: **2** |
| 8. Calculation of Emissions (limit to 600 characters): **See Attachment PSD-PPP; Section 2.0; Appendix A.** | |
| 9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Lb/hr based on 100% load; 32°F. Tons/yr based on 3,750 hrs/yr gas firing and ISO conditions** | |

**Allowable Emissions** Allowable Emissions 1 of 1

| | |
|---|---|
| 1. Basis for Allowable Emissions Code: **OTHER** | 2. Future Effective Date of Allowable Emissions: |
| 3. Requested Allowable Emissions and Units: **8.6 lb/hr** | 4. Equivalent Allowable Emissions: **8.6** lb/hour **15.3** tons/year |
| 5. Method of Compliance (limit to 60 characters): **Annual VE test; EPA Method 9** | |
| 6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Dry Filterable PM - excludes $H_2SO_4$. See Attachment PSD-PPP; Section 2.0; Appendix A.** | |

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE10** | 2. Basis for Allowable Opacity: [ ] Rule [ X ] Other |
| 3. Requested Allowable Opacity: Normal Conditions: **10** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour | |
| 4. Method of Compliance: **Annual VE Test EPA Method 9** | |
| 5. Visible Emissions Comment (limit to 200 characters): **Maximum for gas firing.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: **EM** | 2. Pollutant(s): **$NO_x$** |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined** Manufacturer: Model Number: | Serial Number: |
| 5. Installation Date: **01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): **$NO_x$ CEM proposed to meet requirements of 40 CFR Part 75.** | |

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

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

| | |
|---|---|
| 1. Visible Emissions Subtype: **VE99** | 2. Basis for Allowable Opacity: [ X ] Rule [ ] Other |
| 3. Requested Allowable Opacity: Normal Conditions: % Exceptional Conditions: **100** % Maximum Period of Excess Opacity Allowed: **6** min/hour | |
| 4. Method of Compliance: **None** | |
| 5. Visible Emissions Comment (limit to 200 characters): **FDEP Rule 62-201.700(1), Allowed for 2 hours (120 minutes) per 24 hours for start up, shutdown and malfunction.** | |

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

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

| | |
|---|---|
| 1. Parameter Code: $O_2$ | 2. Pollutant(s): **Oxygen** |
| 3. CMS Requirement: | [ X ] Rule [ ] Other |
| 4. Monitor Information: **Not yet determined** Manufacturer: Model Number: | Serial Number: |
| 5. Installation Date: **01 Mar 2002** | 6. Performance Specification Test Date: |
| 7. Continuous Monitor Comment (limit to 200 characters): **Dilution monitor required by 40 CFR Part 75; may be $CO_2$ in lieu of $O_2$ monitor.** | |

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

**Supplemental Requirements**

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

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

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

# ATTACHMENT PPP-EU1-D

## APPLICABLE REQUIREMENTS LISTING

EMISSION UNIT ID: EU1

FDEP Rules:

Air Pollution Control-General Provisions:

| | |
|---|---|
| 62-204.800(7)(b)37. (State Only) | NSPS Subpart GG |
| 62-204.800(7)(c) (State Only) | NSPS authority |
| 62-204.800(7)(d) (State Only) | NSPS General Provisions |
| 62-204.800(12) (State Only) | Acid Rain Program |
| 62-204.800(13)(State Only) | Allowances |
| 62-204.800(14) (State Only) | Acid Rain Program Monitoring |
| 62-204.800(16) (State Only) | Excess Emissions (Potentially applicable over term of permit) |

Stationary Sources-General:

| | |
|---|---|
| 62-210.650 | Circumvention; EUs with control device |
| 62-210.700(1) | Excess Emissions; |
| 62-210.700(4) | Excess Emissions; poor maintenance |
| 62-210.700(6) | Excess Emissions; notification |

Acid Rain:

| | |
|---|---|
| 62-214.300 | All Acid Rain Units (Applicability) |
| 62-214.320(1)(a),(2) | All Acid Rain Units (Application Shield) |
| 62.214.330(1)(a)1. | Compliance Options (if 214.430) |
| 62-214.340 | Exemptions (new units, retired units) |
| 62-214.350(2);(3);(6) | All Acid Rain Units (Certification) |
| 62-214.370 | All Acid Rain Units (Revisions; correction; potentially applicable if a need arises) |
| 62-214.430 | All Acid Rain Units (Compliance Options-if required) |

Stationary Sources-Emission Standards:

| | |
|---|---|
| 62-296.320(4)(b)(State Only) | CTs/Diesel Units |

Stationary Sources-Emission Monitoring:

| | |
|---|---|
| 62-297.310(1) | All Units (Test Runs-Mass Emission) |
| 62-297.310(2)(b) | All Units (Operating Rate; other than CTs; no CT); |
| 62-297.310(3) | All Units (Calculation of Emission) |
| 62-297.310(4)(a) | All Units (Applicable Test Procedures; Sampling time) |
| 62-297.310(4)(b) | All Units (Sample Volume) |
| 62-297.310(4)(c) | All Units (Required Flow Rate Range-PM/H2SO4/F) |
| 62-297.310(4)(d) | All Units (Calibration) |
| 62-297.310(4)(e) | All Units (EPA Method 5 only) |
| 62-297.310(5) | All Units (Determination of Process Variables) |
| 62.297.310(6)(a) | All Units (Permanent Test Facilities-general) |
| 62.297.310(6)(c) | All Units (Sampling Ports) |
| 62-297.310(6)(d) | All Units (Work Platforms) |
| 62.297.310(6)(e) | All Units (Access) |
| 62.297.310(6)(f) | All Units (Electrical Power) |
| 62-297.310(6)(g) | All Units (Equipment Support) |
| 62-297.310(7)(a)1. | Applies mainly to CTs/Diesels |
| 62-297.310(7)(a)2 | FFSG excession emissions |
| 62-297.310(7)(a)3. | Permit Renewal Test Required |

| | |
|---|---|
| 62.297-310(7)(a)4.a | Annual Test |
| 62.297.310(7)(a)5. | PM exemption if <400 hrs/yr |
| 62.297.310(7)(a)6. | PM FFSG semi annual test required if >200 hrs/yr |
| 62-297.310(7)(a)7. | PM quarterly monitoring if >100 hrs/yr |
| 62-297.310(7)(a)9. | FDEP Notification - 15 days |
| 62-297.310(7)(c) | Waiver of Compliance Tests (Fuel Samplings) |
| 62-297.310(8) | Test Reports |

Federal Rules:

| | |
|---|---|
| NSPS Subpart GG: | |
| 40 CFR 60.332(a)(1) | NOx for Electric Utility CTs |
| 40 CFR 60.332(a)(3) | NOx for Electric Utility CTs |
| 40 CFR 60.333 | SO2 limits |
| 40 CFR 60.334 | Monitoring of Operations (Custom Monitoring for Gas) |
| 40 CFR 560.335 | Test Methods |
| NSPS General Requirements | |
| 40CFR 60.7(a)(1) | Notification of Construction |
| 40 CFR 60.7(a)(2) | Notification of Initial Start-Up |
| 40 CFR 60.7(a)(3) | Notification of Actual Start-Up |
| 40 CFR 60.7(a)(4) | Notificaton and Recordkeeping (Physical/Operational Cycle) |
| 40 40 CFR 60.7(a)(5) | Notification of CEM Demonstration |
| 40 CFR 60.7(b) | Notification and Recordkeeping (startup/shutdown/malfunction) |
| 40 CFR 60.7(c) | Notification and Recordkeeping (startup/shutdown/malfunction) |
| 40 CFR 60.7(d) | Notification and Recordkeeping (startup/shutdown/malfunction) |
| 40 CFR 60.7(f) | Notification and Recordkeeping (maintain records - 2 yrs) |
| 40 CFR 60.8(a) | Performance Test Requirements |
| 40 CFR 60.8(b) | Performance Test Notification |
| 40 CFR 60.8(c) | Performance Tests (representative conditions) |
| 40 CFR 60.8(e) | Provide Stack Sampling Facilities |
| 40 CFR 60.8(f) | Test Runs |
| 40 CFR 60.11(a) | Compliance (ref S. 60.8 or Subpart; other than opacity) |
| 40 CFR 60.11(b) | Compliance (opacity determined EPA Method 9) |
| 40 CFR 60.11(c) | Compliance (opacity; excludes startup/shutdown/malfunction |
| 40 CFR 60.11(d) | Compliance (maintain air pollution control equip.) |
| 40 CFR 60.11(e)(2) | Compliance (opacity; ref.S.60.8) |
| 40 CFR 60.12 | Circumvention |
| 40 CFR 60.13(a) | Monitoring (Appendix B; Appendix F) |
| 40 CFR 60.13(c) | Monitoring (Opacity COMS) |
| 40 CFR 60.13(d)(1) | Monitoring (CEMSS; span, drift, etc.) |
| 40 CFR 60.13(d)(2) | Monitoring (COMS; span, system check) |
| 40 CFR 60.13(e) | Monitoring (frequency of operation ) |
| 40 CFR 60.13(f) | Monitoring (frequency of operation) |
| 40 CFR 60.13(h) | Monitoring (COMS; data requirements) |
| Acid Rain-Permits: | |
| 40 CFR 72.9(a) | Permit Requirements |

| | |
|---|---|
| 40 CFR 72.9(b) | Monitoring Requirements |
| 40 CFR 72.9(c)(1) | SO2 Allowances-hold allowances |
| 40 CFR 72.9(c)(2) | SO2 Allowances violation |
| 40 CFR 72.9(c)(3)(iii) | SO2 Allowances-Phase II Units (listed) |
| 40 CFR 72.9(c)(4) | SO2 Allowances-allowances held in ATS |
| 40 CFR 72.9(c)(5) | SO2 Allowances-no deduction for 72.9(c)(1)(i) |
| 40 CFR 72.9(d) | NOx Requirements |
| 40 CFR 72.9(e) | Excess Emission Requirements; |
| 40 CFR 72.9(f) | Recordkeeping and Reporting |
| 40 CFR 72.9(g) | Liability |
| 40 CFR 72.20(a) | Designated Representative required |
| 40 CFR 72.20(b) | Designated Representative; legally binding |
| 40 CFR 72.20(c) | Designated Representative; certification requirements |
| 40 CFR 72.21 | Submissions |
| 40 CFR 72.22 | Alternate Designated Representative |
| 40 CFR 72.23 | Changing representatives; owners |
| 40 CFR 72.24 | Certificate of representation |
| 40 CFR 72.30(a) | Requirements to Apply (operate) |
| 40 CFR 72.20(b)(2) | Requirements to Apply (Phase II-Complete) |
| 40 CFR 72.30(c) | Requirements to Apply (reapply before expiration) |
| 40 CFR 72.30(d) | Requirements to Apply (submittal requirements) |
| 40 CFR 72.31 | Information Requirements; Acid Rain Applications |
| 40 CFR 72.32 | Permit Application Shield |
| 40 CFR 72.33(b) | Dispatch System ID; unit/system ID |
| 40 CFR 72.33(c) | Dispatch System ID; ID requirements |
| 40 CFR 72.33(d) | Dispatch System ID; ID change |
| 40 CFR 72.40(a) | General; compliance plan |
| 40 CFR 72.40(b) | General; multi-unit compliance options |
| 40 CFR 72.40(c) | General; conditional approval |
| 40 CRF 72.40(d) | General; termination of compliance options |
| 40 CFR 72.51 | Permit Shield |
| 40 CFR 72.90 | Annual Compliance Certification |
| Allowances: | |
| 40 CFR 73.33(a),(c) | Authorized account representative |
| 40 CFR 73.35(c)(c) | Compliance: ID of allowances by serial number |
| Monitoring Part 75: | |
| 40 CFR 75.4 | Compliance Dates; |
| 40 CFR 75.5 | Prohibitions |
| 40 CFR 75.10(a)(1) | Primary Measurement; SO2; |
| 40 CFR 75.10(a)(2) | Primary Measurement; NOx; |
| 40 CFR 75.10(a)(3)(iii) | Primary Measurement; CO2, O2 monitor |
| 40 CFR 75.10(b) | Primary Measurement: Performance Requirements |
| 40 CFR 75.10(c) | Primary Measurement; Heat Input; Appendix F |
| 40 CFR 75.10(e) | Primary Measurement; Optional Backup Monitor |
| 40 CFR 75.10(f) | Primary Measurement; Minimum Measurement |
| 40 CFR 75.10(g) | Primary Measurement; Minimum Recording |
| 40 CFR 75.11(d) | SO2 Monitoring; Gas- and Oil-fired units |
| 40 CFR 75.11(e) | SO2 Monitoring; Gaseous firing |
| 40 CFR 75.12(a) | NOx Monitoring; Coal; Non-peaking oil/gas units |
| 40 CFR 75.12(b) | NOx Monitoring; Determination of NOx emission rate; Appendix F |
| 40 CFR 75.13(b) | CO2 Monitoring; Appendix G |
| 40 CFR 75.13(c) | CO2 Monitoring; Appendix F |

| | |
|---|---|
| 40 CFR 75.14(c) | Opacity Monitoring; Gas units; exemption |
| 40 CFR 75.20(a) | Initial Certification Approval Process; Loss of Certification |
| 40 CFR 75.20(b) | Recertification Procedures (if recertification necessary) |
| 40 CFR 75.20(c) | Certification Procedures (if recertification necessary) |
| 40 CFR 75.20(d) | Recertification Backup/portable monitor |
| 40 CFR 75.20(f) | Alternate Monitoring system |
| 40 CFR 75.21(a) | QA/QC; CEMS; Appendix B (Suspended 7/17/95-12/31/96) |
| 40 CFR 75.21(c) | QA/QC; Calibration Gases |
| 40 CFR 75.21(d) | QA/QC; Notification of RATA |
| 40 CFR 75.21(e) | QA/QC; Audits |
| 40 CFR 75.21(f) | QA/QC CEMS (Effective 7/17/96-12/31/96) |
| 40 CFR 75.22 | Reference Methods |
| 40 CFR 75.24 | Out-of-Control Periods; CEMS |
| 40 CFR 75.30(a)(3) | General Missing Data Procedures; NOx |
| 40 CFR 75.30(a)(4) | General Missing Data Procedures; SO2 |
| 40 CFR 75.30(b) | General Missing Data Procedures; certified backup monitor |
| 40 CFR 75.30(c) | General Missing Data Procedures; certified backup monitor |
| 40 CFR 75.30(d) | General Missing Data Procedures; SO2 (optional before 1/1/97) |
| 40 CFR 75.30(e) | General Missing Data Procedures; bypass/multiple stacks |
| 40 CFR 75.31 | Initial Missing Data Procedures (new/re-certified CMS) |
| 40 CFR 75.32 | Monitoring Data Availability for Missing Data |
| 40 CFR 75.33 | Standard Missing Data Procedures |
| 40 CFR 75.36 | Missing Data for Heat Input |
| 40 CFR 75.40 | Alternate Monitoring Systems-General |
| 40 CFR 75.41 | Alternate Monitoring Systems-Precision Criteria |
| 40 CFR 75.42 | Alternate Monitoring Systems-Reliability Criteria |
| 40 CFR 75.43 | Alternate Monitoring Systems-Accessibility Criteria |
| 40 CFR 75.44 | Alternate monitoring Systems-Timeliness Criteria |
| 40 CFR 75.45 | Alternate Monitoring Systems-Daily Qa |
| 40 CFR 75.46 | Alternate Monitoring Systems-Missing data |
| 40 CFR 75.47 | Alternate Monitoring Systems-Criteria for Class |
| 40 CFR 75.48 | Alternate Monitoring Systems-Petition |
| 40 CFR 75.53 | Monitoring Plan; revisions |
| 40 CFR 75.54(a) | Recordkeeping-general |
| 40 CFR 75.54(b) | Recordkeeping-operating parameter |
| 40 CFR 75.54(c) | Recordkeeping-SO2 |
| 40 CFR 75.54(d) | Recordkeeping-NOx |
| 40 CFR 75.54(e) | Recordkeeping-CO2 |
| 40 CFR 75.54(f) | Recordkeeping-Opacity |
| 40 CFR 75.55(c) | General Recordkeeping (Specific Situations) |
| 40 CFR 75.55(e) | General Recordkeeping (Specific Situations) |
| 40 CFR 75.56 | Certification; QA/QC Provisions |
| 40 CFR 75.60 | Reporting Requirements-General |
| 40 CFR 75.61 | Reporting Requirements-Notification cert/recertification |
| 40 CFR 75.62 | Reporting Requirements-Monitoring Plan |
| 40 CFR 75.63 | Reporting Requirements-Certification/Recertification |
| 40 CFR 75.64(a) | Reporting Requirements-Quarterly reports; submission |

| | |
|---|---|
| 40 CFR 75.64(b) | Reporting Requirements-Quarterly reports; DR statement |
| 40 CFR 75.64(c) | Rep. Req.; Quarterly reports; Compliance Certification |
| 40 CFR 75.64(d) | Rep.Req.; Quarterly reports; Electronic format |
| 40 CFR 75.66 | Petitions to the Administrator (if required) |
| Appendix A-1 | Installation and Measurement Locations |
| Appendix A-2 | Equipment Specifications |
| Appendix A-3 | Performance Specifications |
| Appendix A-4 | Data Handling and Acquisition Systems |
| Appendix A-5 | Calibration Gases |
| Appendix A-6 | Certification Tests and Procedures |
| Appendix A-7 | Calculations |
| Appendix B | QA/QC Procedures |
| Appendix C-1 | Missing Data; SO2/NOx for controlled sources |
| Appendix C-2 | Missing Data; Load-Based Procedure; NOx & flow |
| Appendix D | Optional SO2; Oil/gas-fired units |
| Appendix F | Conversion Procedures |
| Appendix H | Traceability Protocol |

Acid Rain Program-Excess Emissions (these are future requirements):

| | |
|---|---|
| 40 CFR 77.3 | Offset Plans (future) |
| 40 CFR 77.5(b) | Deductions of Allowances (future) |
| 40 CFR 77.6 | Excess Emissions Penalties (SO2 and NOx future) |

PSD ANALYSIS

# 1.0 INTRODUCTION AND EXECUTIVE SUMMARY

Palmetto Power L.L.C. proposes to construct and operate a simple cycle independent power production facility in Osceola County, Florida (Figure 1-1). The facility will be located on a 150-acre tract approximately 12 kilometers (km) west of Cocoa, Florida, and is referred to as the Palmetto Power L.L.C. Project ("the Project"). The facility will be capable of generating a nominal net electrical output of 540 megawatts (MW).

This application contains the technical information developed in accordance with Prevention of Significant Deterioration (PSD) regulations as promulgated by the U.S. Environmental Protection Agency (EPA) and implemented through delegation to the Florida Department of Environmental Protection (DEP). It presents an evaluation of regulated pollutants subject to PSD review, a demonstration of Best Available Control Technology (BACT), a demonstration that pollutant emission rates comply with New Source Performance Standards (NSPS) regulation, and an assessment of potential air quality impacts associated with the Project. Through this application, Palmetto Power L.L.C. requests that the Florida DEP issue an Air Construction Permit for the Project.

## 1.1 PROJECT APPROACH

The Project will consist of three 180-MW combustion turbines (CTs) that will operate in simple cycle mode. The total electric power capacity will be nominally 540 MW. The CTs will be Siemens-Westinghouse 501FD models or equivalent with dry low-nitrogen oxide ($NO_x$) burners fired by natural gas only. Operation of the CTs in simple cycle mode provides a fast response time to meet the high electrical demands during peak hours. Additionally, the proposed CTs provide electric energy at heat rates that are much lower and more efficient than previous turbine technology. Palmetto Power L.L.C. expects that the Project may be required to operate in simple cycle mode for up to 3,750 hours each year, responding to system peak demands and market opportunities. This corresponds to an approximate 43 percent annual capacity factor.

## 1.2 PREVENTION OF SIGNIFICANT DETERIORATION (PSD) REQUIREMENTS

The permitting of the Project in Florida requires an air construction permit and PSD review approval. The Project will be a new air emission source in Osceola County. The U.S. EPA has implemented regulations requiring a PSD review for new or modified sources that increase air emissions above certain threshold amounts. Because the threshold amounts will be exceeded by the proposed project, the project is subject to PSD review. The total predicted emissions in tons per year associated with this project are presented as Table 1-1. PSD regulations are promulgated under 40 Code of Federal Regulations (CFR) Part 52.21 and implemented through delegation to the Florida DEP. Florida's PSD regulations are codified in Rules 62-212.400, F.A.C. These regulations incorporate the EPA PSD regulations.

Based on the emissions from the proposed project, a PSD review is required for each of the following regulated pollutants:

- Particulate matter (PM) as total suspended particulate matter (TSP),
- Particulate matter with aerodynamic diameter of 10 microns or less ($PM_{10}$),
- Nitrogen dioxide ($NO_2$), and
- Carbon monoxide (CO)

Osceola County has been designated as an attainment or unclassifiable area for all criteria pollutants. The county is also classified as a PSD Class II area for $PM_{10}$, $SO_2$, and $NO_2$; therefore, the new source review will follow PSD regulations pertaining to such designations.

Table 1-1. Summary of Maximum "Annual" Pollutant Emissions for the Palmetto Power L.L.C. Project (see Section 2.0 for Details)[a]

| Pollutant | 3 CTs in SC Mode (tons per year) | EPA Significant Emission Rate Threshold (tons per year) |
|---|---|---|
| $SO_2$ | 29.9 | 40 |
| PM | 46.4 | 25 |
| $PM_{10}$ | 46.4 | 15 |
| $NO_x$ | 601 | 40 |
| CO | 613 | 100 |
| VOC | 20.2 | 40 |
| Sulfuric Acid Mist | 4.6 | 7 |
| Mercury | 0.000008 | 0.1 |

[a] Based on 3 CTs operating at 100 percent load for 3,750 hours per year.

Note: CT = combustion turbine
SC = simple cycle

Other regulated pollutants will be emitted in negligible amounts.

## 1.3 BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

A BACT analysis was conducted for each pollutant which was greater than the EPA significance threshold and, therefore, subject to BACT review. The proposed BACT to control $NO_x$ emissions from the Project's three CTs operating in simple cycle mode is the use of dry low $NO_x$ (DLN) combustors. The $NO_x$ concentration will be 15 parts per million, volume dry (ppmvd), corrected to 15 percent oxygen ($O_2$). The proposed BACT for PM, PM-10, and CO are good combustion practices utilizing the DLN combustor and firing natural gas fuel.

## 1.4 AIR QUALITY ANALYSIS

An air quality impact analysis was conducted to determine if the proposed operation of the Project would cause or contribute to a violation of any National Ambient Air Quality Standard (NAAQS) or allowable PSD increment concentration. It was demonstrated that emissions from the Project would not result in ambient concentrations above the PSD Class

II significant impact levels. As a result, the Project will not cause or contribute to any adverse impacts on air quality.

Additional impacts of the Project, such as soils, vegetation, and growth impacts, were analyzed and found to be negligible (see analysis in Section 7.0).

## 1.5 SUMMARY OF RESULTS

Results from the analyses presented in this PSD Air Permit application lead to the following conclusions.

- The proposed BACT for each applicable pollutant provides the maximum degree of emissions reduction based on energy, environmental, and economic impacts and technical feasibility.
- National and State Ambient Air Quality Standards will not be exceeded as a result of the operation of the Project.
- Applicable PSD increments will not be exceeded as a result of the operation of the Project.
- Non-criteria pollutants emitted from the Project will not adversely affect the public.
- Visibility impacts from the Project's plume on Class II areas are insignificant.
- No effects on soils and vegetation are expected as a result of the operation of the Project.
- The operation of the Project is not expected to adversely affect population or economic growth in the area; thus, no additional secondary emissions or impacts are anticipated.

As substantiated in this application, the Project will be constructed and operated in compliance with all applicable state and federal rules, regulations and laws.

## 1.6 AIR PERMIT APPLICATION ORGANIZATION

The air permit application is divided into seven major sections.

- Section 2.0 presents a description of the facility, including air emissions and stack parameters.

- Section 3.0 provides a review of the PSD and nonattainment requirements applicable to the proposed project.
- Section 4.0 includes the control technology review with discussions on BACT.
- Section 5.0 discusses the ambient air monitoring analysis (pre-construction monitoring) required by PSD regulations.
- Section 6.0 presents a summary of the air modeling approach and results used in assessing compliance of the proposed project with ambient air quality standards (AAQS), PSD increments, and good engineering practice (GEP) stack height regulations.
- Section 7.0 provides the additional impact analyses for soils, vegetation, and visibility.

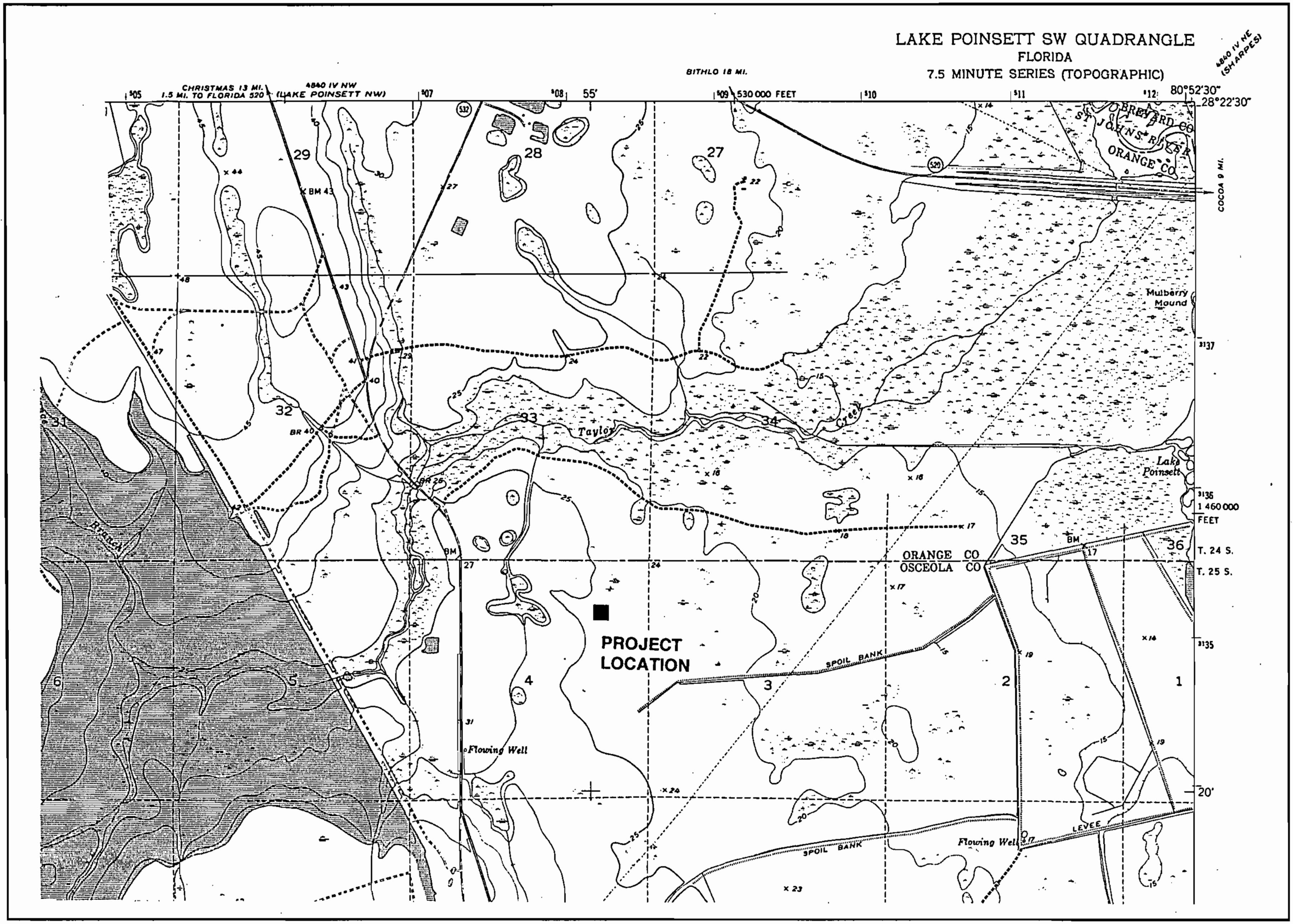


Figure 1-1. Location of Proposed Palmetto Power LLC Facility

Source: USGS, 1980.

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# 2.0 PROJECT DESCRIPTION

## 2.1 SITE DESCRIPTION

The project site consists of 150 acres that are undeveloped and have been historically utilized as agriculture/ranchland. This site is zoned for agricultural use. The Project will apply for a Conditional Use Permit for power plant development through the Osceola County Board of County Commissioners. The plant elevation will be approximately 20 feet above sea level.

Natural gas will be supplied by a lateral pipeline connected to the Florida Gas Transmission (FGT) natural gas pipeline located about 7 miles north of the site. The site has access to transmission facilities from a 230 kV transmission line owned by Florida Power & Light Company and Florida Power Corporation that is located approximately one mile south of the site. Water for the evaporative cooler, potable uses, other service and fire protection supply will be supplied by East Central Florida Services.

## 2.2 POWER PLANT

The Project will consist of three "F" Class CTs operating in simple cycle mode. A CT is an internal combustion engine that operates with rotary motion to drive an electric generator to produce electricity. CTs are essentially composed of three major components: compressor, combustor, and power turbine. In the compressor section, ambient air is drawn in, compressed and directed to the combustor section where fuel is introduced, ignited, and burned. The rotary power is achieved by the expansion of the combustion gases through the power turbine. For this project, the combustion process is based on lean premix staged combustion. For lean premix combustors, fuel and air are thoroughly mixed in an initial stage resulting in a uniform, lean, unburned fuel/air mixture which is delivered to a secondary stage where the combustion reaction takes place. Manufacturers use different types of fuel/air staging, including fuel staging, air staging, or both; however, the same staged, lean premix principle is applied. CTs using staged combustion are also referred to as dry, low $NO_X$ combustors.

Hot gases from the combustion section are diluted with additional air from the compressor section and directed to the power turbine section at very high temperatures. Energy from the hot exhaust gases, which expand in the power turbine section, is recovered in the form of shaft horsepower. More than 50 percent of the shaft horsepower is needed to drive the internal compressor and the balance of recovered shaft horsepower is available to drive an external load. The heat content of the exhaust gases exiting the turbine can be exhausted to the atmosphere without heat recovery (referred to as simple cycle mode) or recovered in a heat recovery steam generator (HRSG) to raise steam for a steam turbine (referred to as combined cycle mode). In combined cycle mode, the gas turbine drives an electric generator and the steam from the HRSG drives a steam turbine, which also drives an electric generator.

The Project will consist of three 180-MW CTs that will operate in simple cycle mode. The Project will also have administration, maintenance, and water treatment buildings; water storage tanks; emergency diesel generator; fuel gas heater; and various pumps, including an emergency firewater pump.

The total electric power capacity will be nominally 540 MW. The CTs will be Siemens-Westinghouse 501FD models or equivalent with dry low-nitrogen oxide ($NO_x$) burners fired by natural gas. The facility will not use backup fuel oil. Although the CTs operating in simple cycle mode have relatively high heat rates, this operating mode provides a faster response time to meet electrical demands in the market during peak hours. The Project may be required to operate in simple cycle mode for up to 3,750 hours each year. This corresponds to an approximate 43 percent annual capacity factor. This capacity factor is based on current market forecasts that indicate the Project would be competitive on a cost basis by operating in simple cycle mode.

A process flow diagram of the facility operating in simple cycle mode is presented in Figure 2-1.

The anticipated schedule for the Project is as follows:

- Obtain air permit and begin construction by third quarter, 2000; and
- Startup by the first quarter, 2002.

The Siemens-Westinghouse 501FD CTs are up to 10 percent more fuel-efficient than the previous generation of CT (501D5). Each CT will have an evaporative cooler at the turbine air inlet that reduces the inlet air temperature and increases the efficiency, mass flow and power output. These coolers add water vapor to the exhaust from the CTs but do not affect emissions of regulated pollutants.

The CTs typically will operate between 70 and 100 percent of load. The efficiency of the CTs decreases at part load. As a result, the economic incentive is to dispatch the plant as near to 100 percent load, whenever possible. The facility will be dispatched to meet peak electrical demand. The turbines may be operated individually or in any combination of one, two, or three.

Natural gas will be transported to the site via pipeline. No backup fuel will be used.

Air emissions control will consist of using state-of-the-art dry low-$NO_x$ burners. The dry low-$NO_x$ combustors for the Siemens-Westinghouse 501FD CT have premixed fuel zones plus a standard diffusion flame pilot burner for startup. Low $NO_x$ levels are achieved by introducing fuel primarily to the pre-mix zones to create a very uniform temperature in the combustion zone. The proposed $NO_x$ emission levels are 15 parts per million volume dry (ppmvd), corrected to 15 percent oxygen ($O_2$) for simple cycle operation.

The $SO_2$ emissions will be controlled by the use of natural gas, the cleanest-burning fossil fuel commercially available. Good combustion practices and the use of natural gas fuel will also minimize potential emissions of PM, $PM_{10}$, CO, VOC, and other pollutants (e.g., trace metals). The engineering and environmental design of the Project will maximize control of air emissions while minimizing economic, environmental, and energy impacts (see Section 4.0 for the BACT evaluation).

The project will have one 250-kW emergency diesel generator and 310-hp emergency fire water pump. These exempt units will use low sulfur content distillate oil. Each of these units will be operated for up to 1 hour per week for readiness testing and maintenance and up to 500 hours per year as required during emergencies.

The project will also have one fuel gas heater with a maximum heat input rate of 4.9 mmBtu/hr fired. This heater will be fired by natural gas only and will be operated for up to 800 hours per year.

## 2.3 PROPOSED SOURCE EMISSIONS AND STACK PARAMETERS

As discussed previously, the CTs will operate in simple cycle mode and will typically operate from 70 to 100 percent of full load. At CT operating loads below 100 percent, the mass emissions of all criteria pollutants decrease as load decreases to approximately 70 percent of full load. When the CTs are operated at less than about 70 percent load, the mass emissions (lb/hr) of certain pollutants ($NO_x$, VOC, and CO) may begin to increase above the mass emission levels in the operating loads between 70 to 100 percent. As a result, minimum load will be limited to 70 percent of full load except for startup, shutdown, and malfunction.

The estimated maximum hourly emissions and exhaust information representative of the advanced CT design operating at 100- and 70- percent load conditions for simple cycle mode are presented in Table 2-1. The information in these tables is presented for one CT unit operation based on natural gas combustion for air inlet ambient temperatures of 32, 59, and 95°F. These temperatures represent the range of ambient temperatures that the CTs are most likely to experience. The data in these tables were derived from the data provided on the vendor's data sheets found in Appendix A. The vendor data sheets also include operating scenarios with and without evaporative coolers in operation. The evaporative coolers will be used at full load operations when ambient temperatures are about 59°F or higher. When the evaporative coolers are operating, the CTs combust more natural gas and generate more mass emissions of pollutants than when the coolers are not operating. To provide a conservative estimate of maximum pollutant emissions, the maximum emissions presented in this section assume that the evaporative coolers would operate for all available hours, where appropriate (i.e., full load operations at 59 and 95°F).

The maximum potential annual emissions for the Project for regulated air pollutants are presented in Table 2-2 for one and three CTs operating in simple cycle mode based on an ambient temperature of 59°F. The potential annual emissions are based on the 59°F ambient air condition since it represents the temperature referenced in the new source performance standards (NSPS) for stationary gas turbines (40 CFR Part 60, Subpart GG). It also represents a nominal average between the higher emission levels at the 32°F ambient condition (winter) and the 95°F ambient condition (summer). Although the annual average temperature for the project site is slightly higher than 59°F, higher annual emissions are estimated assuming an ambient temperature of 59°F.

## 2.4 SITE LAYOUT, STRUCTURES, AND STACK SAMPLING FACILITIES

Plot plans of the proposed facility are presented in Figures 2-2 and 2-3. The dimensions of the buildings and structures are presented in Section 6.0. Stack sampling facilities will be constructed in accordance to Florida's Rule 62-297.310(6) F.A.C. for stack sampling. Stack sampling performed at the facility as required by FDEP will follow the methods specified in 40 CFR Part 60 Appendix B and adopted by reference in Rule 62-204.800 F.A.C.

Table 2-1. Stack, Operating, and Emission Data for the Palmetto Power L.L.C. Project with Dry Low-$NO_x$ Combustors firing Natural Gas

| Parameter | | Operating and Emission Data [a] for Ambient Temperarure | | |
|---|---|---|---|---|
| | | 32 °F | 59 °F | 95 °F |
| Stack Data (ft) | | | | |
| Height | | 50 | 50 | 50 |
| Diameter | | 19 | 19 | 19 |
| 100 Percent Load | | | | |
| Operating Data | | | | |
| Temperature (°F) | | 1,085 | 1,096 | 1,123 |
| Velocity (ft/sec) | | 147 | 144 | 136 |
| Maximum Hourly Emissions per Unit [b] | | | | |
| PM/PM10 | lb/hr | 8.6 | 8.2 | 7.5 |
| $SO_2$ | lb/hr | 5.5 | 5.3 | 4.9 |
| $NO_x$ | lb/hr | 111.2 | 106.8 | 98.4 |
| CO | lb/hr | 113.0 | 109.0 | 100.0 |
| VOC (as methane) | lb/hr | 3.7 | 3.6 | 3.3 |
| Sulfuric Acid Mist | lb/hr | 0.85 | 0.81 | 0.75 |
| Mercury | lb/hr | 1.48E-06 | 1.42E-06 | 1.31E-06 |
| 70 Percent Load | | | | |
| Operating Data | | | | |
| Temperature (°F) | | 1,026 | 1,041 | 1,064 |
| Velocity (ft/sec) | | 117 | 114 | 110 |
| Maximum Hourly Emissions per Unit [b] | | | | |
| PM/PM10 | lb/hr | 7.1 | 6.9 | 6.4 |
| $SO_2$ | lb/hr | 4.1 | 3.9 | 3.6 |
| $NO_x$ | lb/hr | 83.0 | 78.8 | 72.9 |
| CO | lb/hr | 85.0 | 80.0 | 74.0 |
| VOC (as methane) | lb/hr | 2.8 | 2.6 | 2.5 |
| Sulfuric Acid Mist | lb/hr | 0.63 | 0.60 | 0.55 |
| Mercury | lb/hr | 1.10E-06 | 1.04E-06 | 9.67E-07 |

[a] Refer to Appendix A for detailed information. Data at 100% load for 59 and 95°F are based on evaporative cooler on and operating at 85 percent efficiency. With evaporative cooler not operating, emissions (lb/hr) are slightly lower.

[b] Other regulated pollutants are assumed to have negligible emissions. These pollutants include lead, reduced sulfur compounds, hydrogen sulfide, fluorides, beryllium, arsenic, asbestos, vinyl chloride, and radionuclides.

Basis for pollutant emission rates at 59 °F ambient temperature are:

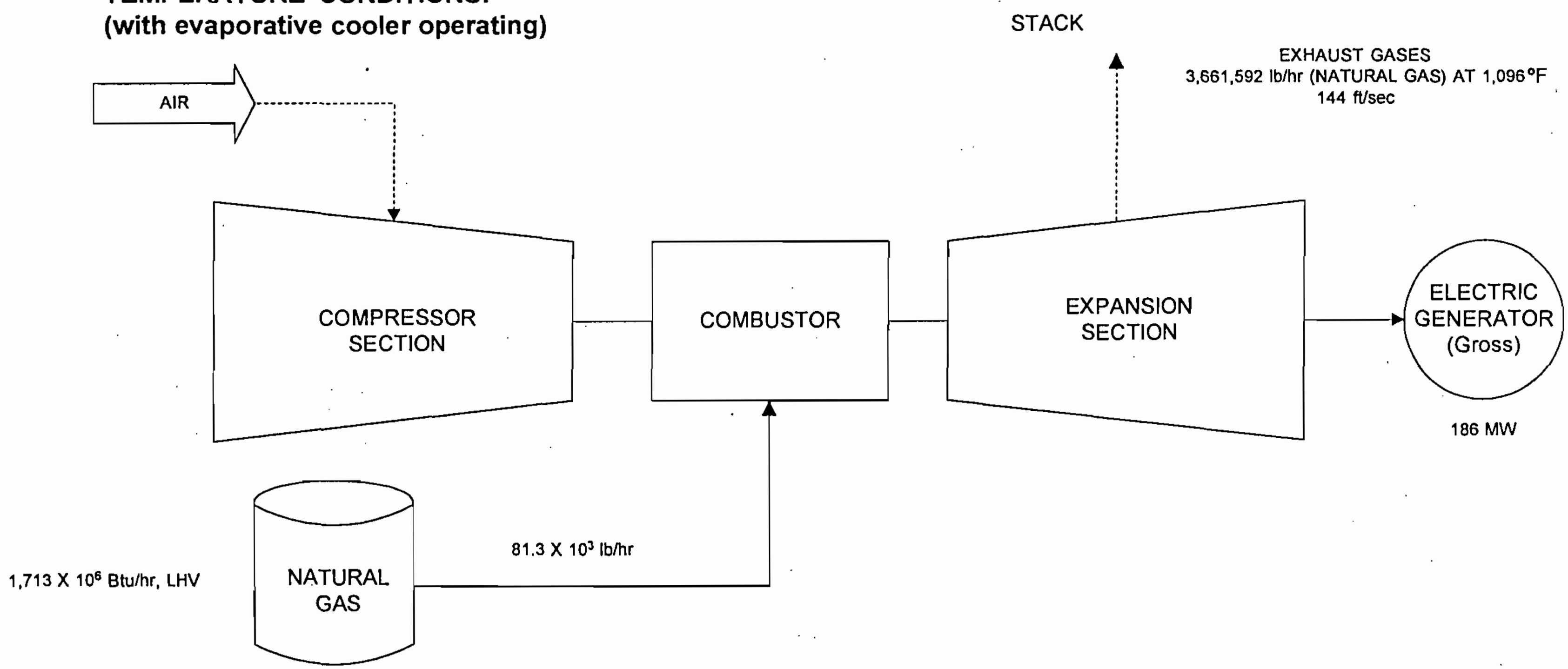
$SO_2$ = 1.0 grain sulfur/ 100 cubic feet
PM/PM10 = dry filterables
$NO_x$ = 15 ppmvd at 15% $O_2$
CO = 25 ppmvd at 15% $O_2$
VOC = 1.5 ppmvd at 15% $O_2$ (as methane)
Sulfuric acid mist = 10% $SO_2$ emissions
Mercury = 0.000748 lb/$10^{12}$ Btu

Table 2-2 Summary of Maximum Potential Annual Emissions for the Palmetto Power L.L.C. Project Simple Cycle Operation

| Pollutant | | Annual Emissions (tons/year) [a] | |
|---|---|---|---|
| | Load: | 100% | 70% |
| | Hours: | 3,750 | 3,750 |
| One Combustion Turbine- Simple Cycle | | | |
| PM/PM10 | | 15.5 | 12.8 |
| $SO_2$ | | 10.0 | 7.31 |
| $NO_x$ | | 200 | 148 |
| CO | | 204 | 150 |
| VOC (as methane) | | 6.7 | 5.0 |
| Sulfuric Acid Mist | | 1.53 | 1.12 |
| Mercury | | 2.67E-06 | 1.95E-06 |
| Three Combustion Turbines- Simple Cycle | | | |
| PM/PM10 | | 46.4 | 38.5 |
| $SO_2$ | | 29.9 | 21.9 |
| $NO_x$ | | 601 | 443 |
| CO | | 613 | 450 |
| VOC (as methane) | | 20.2 | 14.9 |
| Sulfuric Acid Mist | | 4.6 | 3.36 |
| Mercury | | 8.00E-06 | 5.86E-06 |

[a] Based on 59 °F ambient inlet air temperature. At 100% load, evaporative cooler is on and operating at 85% efficiency. With evaporative cooler not operating, emissions (lb/hr) are slightly lower.

**59°F AMBIENT**
**TEMPERATURE CONDITIONS:**
**(with evaporative cooler operating)**




**NOTE: See Appendix A for Design Information and Stack Parameters.**

Figure 2-1. Simplified Flow Diagram of Proposed Combustion Turbine Simple Cycle Operation, 100 Percent Load, Annual Design Conditions
Palmetto Power LLC Project

Golder Associates

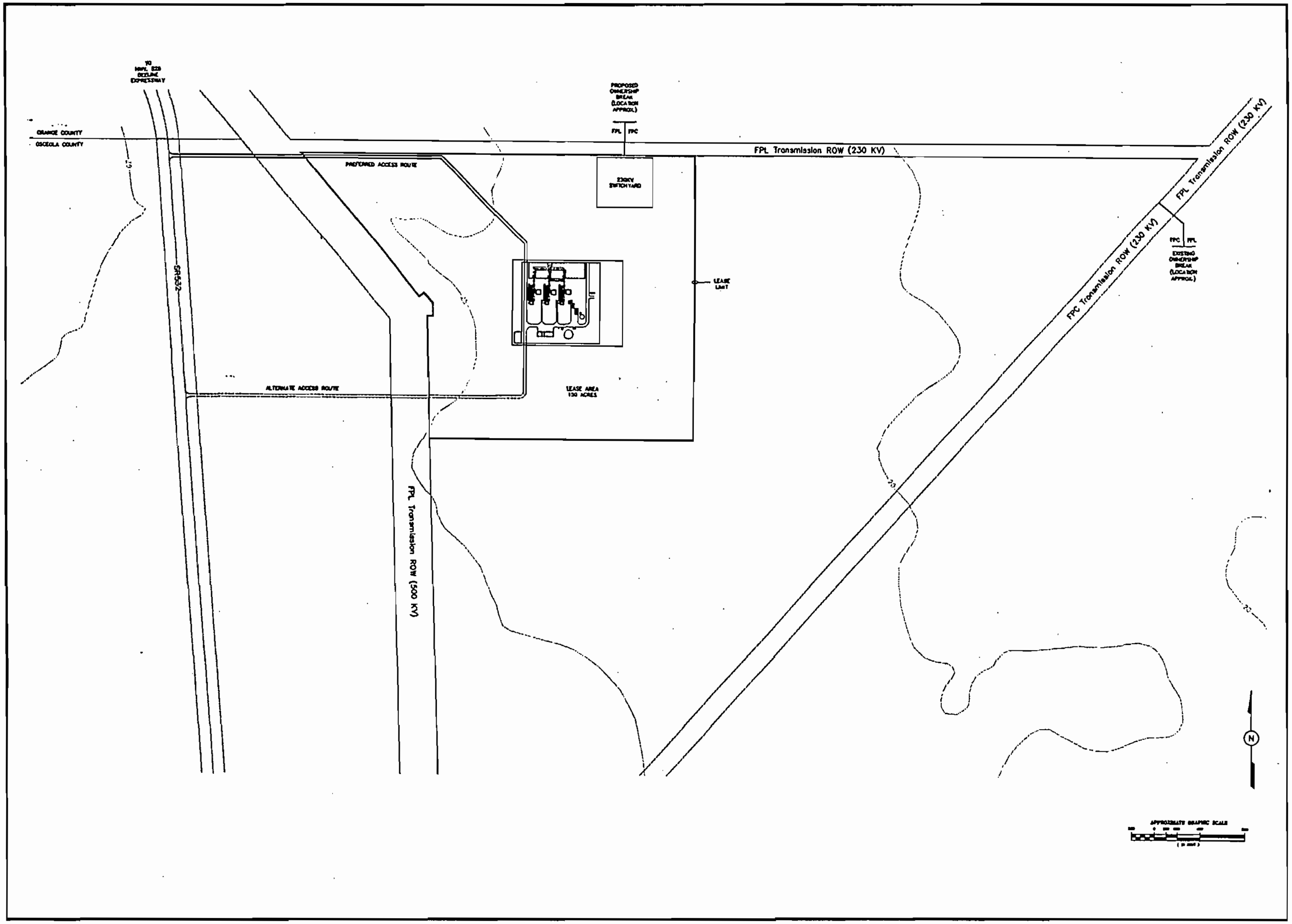



Figure 2-2. Site Location Plan of Proposed Palmetto Power LLC Facility

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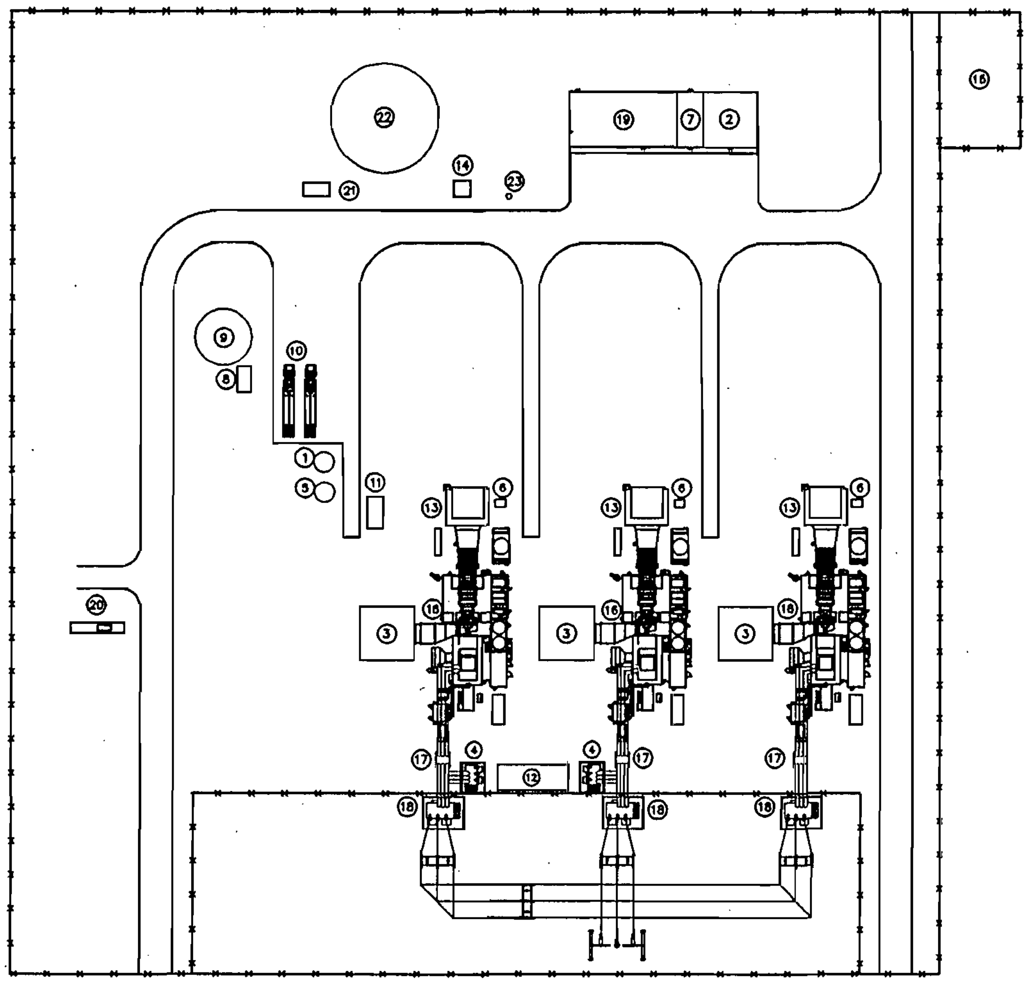


NOTE:
ALL SIZES, LOCATIONS AND ARRANGEMENT SHOWN ON THIS DRAWING ARE PRELIMINARY AND SUBJECT TO CHANGE.

| ITEM | DESCRIPTION |
|---|---|
| 1 | ACID STORAGE TANK (DEMINERALIZER) |
| 2 | ADMINISTRATION BUILDING |
| 3 | AIR INLET FILTER |
| 4 | AUXILIARY TRANSFORMER |
| 5 | CAUSTIC STORAGE TANK |
| 6 | CONTINUOUS EMISSION MONITORING SKID |
| 7 | CONTROL BUILDING |
| 8 | DEMINERALIZED WATER PUMPS |
| 9 | DEMINERALIZED WATER STORAGE TANKS |
| 10 | DEMINERALIZER TRAILER |
| 11 | DIESEL GENERATOR |
| 12 | ELECTRICAL BUILDING |
| 13 | EXHAUST STACK |
| 14 | FIREWATER PUMP HOUSE |
| 15 | FUEL GAS METERING AREA |
| 16 | GAS TURBINE GENERATOR |
| 17 | GENERATOR BREAKER |
| 18 | MAIN GENERATOR TRANSFORMER |
| 19 | MAINTENANCE BUILDING |
| 20 | OIL / WATER SEPARATOR |
| 21 | RAW WATER PUMPS |
| 22 | RAW WATER TANK |
| 23 | SEWAGE STORAGE TANK |

0' 100' 200'

REFERENCE DRAWINGS

A 05/10/99 ISSUED FOR REVIEW

SCALE NONE

DYNEGY

FOR REFERENCE ONLY

PALMETTO POWER PROJECT
PLOT PLAN

PROJECT NO. 11563

DWG. NO. 11563-C-101.01 REV. A

Figure 2-3.

# 3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

Federal and state air regulatory requirements for a new source of air pollution are discussed in Sections 3.1 to 3.3. The applicability of these regulations to the proposed Palmetto Power L.L.C. Project is presented in Section 3.4. These regulations must be satisfied before the proposed project can begin construction.

## 3.1 NATIONAL AND STATE AAQS

The existing applicable National and Florida Ambient Air Quality Standard (AAQS) are presented in Table 3-1. 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. Areas of the country 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.

## 3.2 PREVENTION OF SIGNIFICANT DETERIORATION (PSD) REQUIREMENTS

### 3.2.1 General Requirements

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a pre-construction permit issued. EPA has approved Florida's State Implementation Plan (SIP), which contains PSD regulations; therefore, PSD approval authority has been granted to DEP.

A "major facility" is defined as any one of 28 named source categories that have 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. Once a new source is determined to be a "major facility" for a particular pollutant, any pollutant emitted in amounts greater than the PSD significant emission rates is subject to PSD review. The PSD significant emission rates are presented in Table 3-2.

EPA has promulgated as regulations certain increases above an air quality baseline concentration level of $SO_2$, $PM_{10}$, and $NO_2$ concentrations that would constitute significant deterioration. The EPA class designations and allowable PSD increments are presented in Table 3-1. The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications are designated based on criteria established in the Clean Air Act Amendments. Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. The State of Florida has adopted the EPA class designations and allowable PSD increments for $SO_2$, $PM_{10}$, and $NO_2$ increments.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. The State of Florida has adopted PSD regulations that have been approved by EPA [Rule 62-212.400 F.A.C.]. Major facilities are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. 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. Discussions concerning each of these requirements are presented in the following sections.

### 3.2.2 Control Technology Review

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 Best Available Control Technology (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 exceeds the significant emission rate (see Table 3-2).

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 the most stringent (or top) 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. EPA has issued a draft guidance document on the top-down approach entitled *Top-Down Best Available Control Technology Guidance Document* (EPA, 1990).

### 3.2.3 Source 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 3-2). 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 source if the net increase in impacts as a result of the new source is above significant impact levels, as presented in Table 3-1. To address compliance with AAQS and PSD Class II increments, a source impact analysis must be performed for the criteria pollutants. This analysis may be limited to the new source alone if the new source's impacts are less than the EPA significant impact levels presented in Table 3-1. The significant impact levels are threshold levels that are used to determine the level of air impact analyses needed for the project. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance ambient standards.

The EPA has proposed significant impact levels for Class I areas as follows:

| | | | | |
|---|---|---|---|---|
| • | $SO_2$ | 3-hour | - | 1 $\mu g/m^3$ |
| | | 24-hour | - | 0.2 $\mu g/m^3$ |
| | | Annual | - | 0.1 $\mu g/m^3$ |
| • | $PM_{10}$ | 24- hour | - | 0.3 $\mu g/m^3$ |
| | | Annual | - | 0.2 $\mu g/m^3$ |
| • | $NO_2$ | Annual | - | 0.1 $\mu g/m^3$ |

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.

Various lengths of record for meteorological data can be used for impact analysis. A 5-year period is normally used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The meteorological data are selected based on an evaluation of measured weather data from a nearby weather station that represents weather conditions at the project site. The criteria used in this evaluation include determining the distance of the project site to the weather station; comparing topographical and land use features between the locations; and determining availability of necessary weather parameters. The selection of the weather data is normally discussed with and approved by the regulatory agency reviewing the air permit application prior to initiating air modeling.

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 important because short-term AAQS specify 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:

1. The actual emissions representative of facilities in existence on the applicable baseline date; and
2. 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:

1. 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
2. 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:

1. 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 $NO_2$.

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.
3. 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 SO2 and PM (TSP) has been set as December 27, 1977, for the entire State of Florida (Rule 62-204.360(1) and (2), F.A.C.). The minor source baseline for $NO_2$ has been set as March 28, 1988 (Rule 62-204.360(3), F.A.C). It should be noted that references to PM (TSP) are also applicable to PM10.

### 3.2.4 Air Quality Monitoring Requirements

In accordance with requirements of 40 CFR 52.21(m), 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 3-2).

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, 1987a).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that the Florida DEP 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 3-2 (adopted by Florida in Rule 62-212.400-3, F.A.C.).

### 3.2.5 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). The Florida DEP (Rule 62-210.550, F.A.C.) has adopted identical regulations. 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 five 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.

### 3.2.6 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); Florida 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 3-2).

## 3.3 EMISSION STANDARDS

### 3.3.1 New Source Performance Standards

The NSPS are a set of national emission standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated."

The proposed project will be subject to one or more NSPS.

**Combustion Turbine**

The CT is subject to emission limitations covered under Subpart GG, which limits $NO_x$ and $SO_2$ emissions from all stationary CTs with a heat input at peak load equal to 10.7 gigajoules per hour (10 mmBtu/hr), based on the lower heating value of the fuel fired.

$NO_x$ emissions are limited to 75 ppmvd corrected to 15 percent oxygen and heat rate while sulfur dioxide emissions are limited to using a fuel with a sulfur content of 0.8 percent. In addition to emission limitations, these are requirements for notification, record keeping, reporting, performance testing and monitoring. These are summarized below:

**40 CFR 60.7 Notification and Record Keeping**

(a)(1) Notification of the date of construction - within 30 days after such date.

(a)(2) Notification of the date of initial start-up - no more than 60 days or less than 30 days prior to date.

(a)(3) Notification of actual date of initial start-up - within 15 days after such date.

(a)(5) Notification of date which demonstrates CEM - not less than 30 days prior to date.

60.7 (b) Maintain records of the start-up, shutdown, and malfunction quarterly.

(c) Excess emissions reports - by the 30th day following end of quarter. (required even if no excess emissions occur)

(d) Maintain file of all measurements for two years.

60.8 Performance Tests

(a) Must be performed within 60 days after achieving maximum production rate but no later than 180 days after initial start-up.

(d) Notification of Performance tests at least 30 days prior to them occurring.

40 CFR Subpart GG

60.334 Monitoring of Operations

(b) Monitor sulfur and nitrogen content of fuel.

Gas - (2): daily monitoring required

### 3.3.2 Florida Rules

The Florida DEP regulations for new stationary sources are covered in the F.A.C. The Florida DEP has adopted the EPA NSPS by reference in Rule 62-204.800(7); subsection (b)39 for stationary gas turbines. Therefore, the project is required to meet the same emissions, performance testings, monitoring, reporting, and record keeping as those described in Section 3.4.1. DEP has authority for implementing NSPS requirements in Florida.

### 3.3.3 Florida Air Permitting Requirements

The Florida DEP regulations require any new source to obtain an air permit prior to construction. Major new sources must meet the appropriate PSD and nonattainment requirements as discussed previously. Required permits and approvals for air pollution sources include NSR for nonattainment areas, PSD, NSPS, National Emission Standards for Hazardous Air Pollutants (NESHAP), Permit to Construct, and Permit to Operate. The requirements for construction permits and approvals are contained in Rules 62-4.030, 62-4.050, 62-4.052, 62-4.210, and 62-210.300(1), F.A.C. Specific emission standards are set forth in Chapter 62-296, F.A.C.

## 3.4 PSD APPLICABILITY TO OSCEOLA COUNTY

### 3.4.1 Area Classification

The project site is located in Osceola County, which has been designated by EPA and Florida DEP as an attainment area for all criteria pollutants. Osceola County and surrounding counties are designated as PSD Class II areas for $SO_2$, PM (TSP), and $NO_2$. The nearest Class I areas to the site are the Chassahowitzka National Wilderness Area (NWA) and the Everglades National Park which are located about 170 and >250 km, respectively, from the site. Other PSD Class I areas are located more than 250 km from the site.

### 3.4.2 PSD Review

**Pollutant Applicability**

The proposed project is considered to be a "major facility" because the annual emissions of several regulated pollutants from the three simple cycle CTs are estimated to exceed 250 TPY; therefore, PSD review is required for any pollutant for which the emissions are considered major or exceed the PSD significant emission rates. The proposed project is not one of the named major sources and, therefore, the major source threshold is 250 TPY. As shown in Table 3-3, potential emissions from the proposed project will be major for $NO_x$ and CO, and greater than the significant emission rate levels for PM and $PM_{10}$. Because the proposed project impacts for these pollutants are predicted to be below the significant impact levels, a modeling analysis incorporating the impacts from other sources is not required.

The nearest Class I area, the Chassahowitzka NWA, to the plant site is greater than 150 km from the site. Based on the discussions with the Florida DEP, a PSD Class I increment-consumption analysis was not required because of the large distance between the facility and the Class I areas.

**Emission Standards**

The applicable NSPS for the CTs is 40 CFR Part 60, Subpart GG. The proposed emissions for the turbines will be well below the specified limits (see Section 4.0).

**Ambient Monitoring**

Based on the estimated pollutant emissions from the proposed plant (see Table 3-3), a pre-construction ambient monitoring analysis is required for $PM_{10}$, $NO_2$, and CO and monitoring data would be required to be submitted as part of the application. However, if the net increase in impact of these pollutants is less than the applicable *de minimis* monitoring concentration, then an exemption from submittal of pre-construction ambient monitoring data may be obtained [40 CFR 52.21(i)(8)]. In addition, if EPA has not established an acceptable ambient monitoring method for the pollutant, monitoring is not required.

Pre-construction monitoring data are not required to be submitted for this project because, as shown in Table 3-4, the proposed plant's impacts are predicted to be below the applicable *de minimis* monitoring concentration (see Table 3-2) levels for all pollutants.

**GEP Stack Height Impact Analysis**

The GEP stack height regulations allow any stack to be at least 65 m [213 feet (ft)] high. The proposed CT stacks will be 50 ft. These stack heights do not exceed the applicable GEP stack heights. However, as discussed in Section 6.0, Air Quality Modeling Approach, since the stack heights are less than GEP, building downwash effects must be considered in the modeling analysis. As a result, the potential for downwash of the CTs' emissions caused by nearby structures is included in the modeling analysis.

**Emergency Diesel Generator and Emergency Diesel Fire Water Pump**

The diesel generator and fire water pump are defined as "emergency" generators or units in Florida Rules, Chapter 62-210.200. Each of these units will be operated for up to 1 hour per week for readiness testing and maintenance and up to 500 hours per year as required during emergencies when the primary power source for that facility has been rendered inoperable by an emergency situation. They are exempt from permitting in Florida Rules, Chapter 62-210.300(3)(a) since they are not subject to the Federal Acid Rain Program and total fuel consumption will be limited to 32,000 gallons per year of diesel fuel.

**Fuel Gas Heater**

This heater will operate during the startup conditions for the CTs at up to 800 hours per year. The fuel gas heater is exempt from permitting in Florida Rules, Chapter 62-210.300(3)(a) since it is not subject to the Federal Acid Rain Program and total fuel consumption will be limited to 4.4 million standard cubic feet per year of natural gas.

### 3.4.3 NONATTAINMENT REVIEW

The project site is located in Osceola County, which is classified as an attainment area for all criteria pollutants. Therefore, nonattainment requirements are not applicable.

### 3.4.4 OTHER CLEAN AIR ACT REQUIREMENTS

The 1990 CAA Amendments established a program to reduce potential precursors of acidic deposition. The Acid Rain Program was delineated in Title IV of the CAA Amendments and required EPA to develop the program. EPA's final regulations were promulgated on January 11, 1993, and included permit provisions (40 CFR Part 72), allowance system (Part 73), continuous emission monitoring (Part 75), excess emission procedures (Part 77), and appeal procedures (Part 78).

EPA's Acid Rain Program applies to all existing and new utility units except those serving a generator less than 25 MW, existing simple cycle CTs, and certain non-utility facilities; units which fall under the program are referred to as affected units. The EPA regulations are applicable to the proposed project for the purposes for obtaining a permit and allowances, as well as emission monitoring. New units are required to obtain permits under the program by submitting a complete application 24 months before the later of January 1, 2000, or the date on which the unit begins serving an electric generator (greater than 25 MW). An Acid Rain Permit application will be submitted.

The Acid Rain (Title IV) permit will provide $SO_2$ and $NO_x$ emission limitations and the requirement to hold $SO_2$ emission allowances. Emission limitations established in the Acid Rain Program are presumed to be less stringent than BACT for new units. An allowance is a market-based financial instrument that is equivalent to 1 ton of $SO_2$ emissions. Allowances can be sold, purchased, or traded. For the proposed project, $SO_2$ allowances will be obtained from the market. There is currently no $NO_x$ allowance trading program in place (but there may be in the future).

Continuous emission monitoring (CEM) for $SO_2$ and $NO_x$ is required for gas-fired and oil-fired affected units. $SO_2$ emissions for natural gas may be determined using procedures established in Appendix D, 40 CFR Part. $CO_2$ emissions must also be determined either through a CEM (e.g., as a diluent for $NO_X$ monitoring) or calculation. Alternate procedures, test methods, and quality assurance/quality control (QA/QC) procedures for CEM are specified (Part 75 Appendices A through I). The CEM requirements including QA/QC procedures are, in general, more stringent than those specified in the NSPS for Subpart GG. New units are required to meet the requirements by the later of January 1, 1995, or not later than 90 days after the unit commences commercial operation. Peaking units, which are affected units with an average capacity of no more than 10 percent during 3 consecutive calendar years with no one year having a capacity factor of no more than 20 percent, can utilize an optional $NO_x$ emission estimating procedure [i.e., predictive emission monitoring (PEM)]. The Palmetto project will be required to either install CEMs for $NO_x$ or PEMs to meet the Part 75 requirements.

The 1990 CAAA also established a federally mandated air operating permitting program. The program requires the states to adopt regulations consistent with the CAA and the implementing regulations promulgated by EPA in 40 CFR 70. The program applies to

"Title V or Part 70" sources that include major stationary sources of air pollutants. The State of Florida has adopted the requirements of 40 CFR 70 in Florida Rules, Chapter 62-213 which specify that all applicable sources, such as those proposed for this project, have a Title V permit to operate. The Palmetto project must file an application for a Title V permit 90 days before expiration of the air construction/PSD permit, but no later than 180 days after commencing operation.

The US Environmental Protection Agency has, and is currently developing, emissions standards for hazardous air pollutants (HAPs) for various industrial categories. These new National Emission Standards for Hazardous Air Pollutants (NESHAPs) that result from the 1990 CAAA are referred to as Maximum Achievable Control Technology (MACT) standards. The adopted standards regulations are promulgated under 40 CFR Part 63. New sources that emit more than 10 tons/year of a single HAP or 25 tons/year of total HAPs are required to apply MACT for the promulgated industrial category or to obtain a case-by-case MACT from the regulatory authority after submitting a MACT analysis. For the Palmetto Project, emissions of HAPs will be less than 10 tons/year of a single HAP and 25 tons/year of all HAPs. There are no current or planned MACT standards for simple cycle power plants.

Table 3-1. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

| Pollutant | Averaging Time | AAQS (μg/m³) | | | PSD Increments (μg/m³) | | Significant Impact Levels (μg/m³) [b] |
|---|---|---|---|---|---|---|---|
| | | National Primary Standard [a] | National Secondary Standard [a] | Florida [a] | Class I [a] | Class II [a] | |
| Sulfur Dioxide | Annual Arithmetic Mean | 365 | NA | 60 | 2 | 20 | 1 |
| | 24-Hour Maximum | 80 | NA | 260 | 5 | 91 | 5 |
| | 3-Hour Maximum | NA | 1,300 | 1,300 | 25 | 512 | 25 |
| Particulate Matter[c] ($PM_{10}$) | Annual Arithmetic Mean | 50 | 50 | 50 | 4 | 17 | 1 |
| | 24-Hour Maximum | 150 | 150 | 150 | 8 | 30 | 5 |
| Nitrogen Dioxide | Annual Arithmetic Mean | 100 | 100 | 100 | 2.5 | 25 | 1 |
| 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 |
| 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: Particulate matter ($PM_{10}$) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.
NA = Not applicable, i.e., no standard exists.

[a] Short-term maximum concentrations are not to be exceeded more than once per year, except for $PM_{10}$ AAQS which is based on 6th highest over five years.

[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/m³ (3-year average of 98th percentile) and an annual standard of 15 g/m³ (3-year average at community monitors). These standards have been stayed by a court case against EPA and implementation of these standards are many years away pending EPA appeal.

[d] 0.08 ppm; achieved when 3-year average of 99th percentile is 0.08 ppm or less. These have been stayed by a court case against EPA. The 1-hour standard of 0.12 ppm is still applicable. FDEP has not yet adopted the revised standards.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.
40 CFR 50; 40 CFR 52.21. Florida Chapter 62-204, F.A.C.

Table 3-2. 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 | $3.5 \times 10^{-6}$ | 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.
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.
Florida Rule 62-212.400

Table 3-3. Net Increase in Emissions Due to the Proposed Palmetto Power L.L.C. Facility Compared to the PSD Significant Emission Rates

| Pollutant | Emissions (TPY) Potential Emissions from Proposed Project[a] | Significant Emission Rate | PSD Review Required? |
|---|---|---|---|
| Sulfur Dioxide | 29.9 | 40 | No |
| Particulate Matter [PM(TSP)] | 46.4 | 25 | Yes |
| Particulate Matter ($PM_{10}$) | 46.4 | 15 | Yes |
| Nitrogen Dioxide | 601 | 40 | Yes |
| Carbon Monoxide | 613 | 100 | Yes |
| Volatile Organic Compounds | 20.2 | 40 | No |
| Lead | NEG | 0.6 | No |
| Sulfuric Acid Mist | 4.6 | 7 | No |
| Total Fluorides | NEG | 3 | No |
| Total Reduced Sulfur | NEG | 10 | No |
| Reduced Sulfur Compounds | NEG | 10 | No |
| Hydrogen Sulfide | NEG | 10 | No |
| Mercury | 0.000008 | 0.1 | No |

Note: NEG= Negligible.

[a] Emissions are based on three CTs operating in simple cycle mode at 100% load conditions for 3,750 hours at 59°F firing natural gas only (refer to Table 2-2). $NO_x$ emission levels are 15 parts per million, volume dry (ppmvd), corrected to 15 percent oxygen ($O_2$).

Table 3-4. Predicted Net Increase in Impacts Due To the Proposed Palmetto Power L.L.C. Facility Compared to PSD *De Minimis* Monitoring Concentrations

| Pollutant | Concentration ($\mu g/m^3$) | | PSD Monitoring Required? |
|---|---|---|---|
| | Predicted Net Increase in Impacts[a] | *De Minimis* Monitoring Concentration | |
| Particulate Matter [PM (TSP)] | 0.076 | 10, 24-hour | No |
| Particulate Matter ($PM_{10}$) | 0.076 | 10, 24-hour | No |
| Nitrogen Dioxide | 0.061 | 14, annual | No |
| Carbon Monoxide | 2.1 | 575, 8-hour | No |

[a] See Section 6.0 for air dispersion modeling results. Predicted impacts for other pollutants are not required because PSD review is not required for those pollutants.

# 4.0 CONTROL TECHNOLOGY REVIEW

## 4.1 APPLICABILITY

The PSD regulations require new major stationary sources to undergo a control technology review for each pollutant that may potentially be emitted above significant emission rates. The maximum potential "worst-case" annual emissions of these pollutants from the proposed project are summarized below (see Table 2-3):

| Total Facility Annual Emissions (TPY) [a] | | PSD Review |
|---|---|---|
| Pollutant | Westinghouse 501F or Equivalent | Required? |
| $SO_2$ | 29.9 | No |
| $PM/PM_{10}$ | 46.4 | Yes |
| $NO_x$ | 601 | Yes |
| CO | 613 | Yes |
| VOC | 20.2 | No |
| Sulfuric Acid Mist | 4.6 | No |
| Mercury | 0.000008 | No |

[a] Based on 3 CTs operating at 100 percent load for 3,750 hours per year.

The control technology review requirements of the PSD regulations are applicable to emissions of $NO_x$, CO, and $PM/PM_{10}$ (see Section 3.0). Maximum emissions are based on three CTs in simple cycle configuration each operating for 3,750 hours at 59°F using natural gas fuel. A turbine inlet air temperature of 59°F represents the manufacturer's rated load condition at ISO and provides a conservative estimate of annual emissions.

The emissions will be controlled by the use of natural gas and the latest combustion technology. Natural gas is the cleanest-burning fossil fuel, and, when combined with dry low $NO_x$ combustion technology, thereby minimizing potential emissions of PM, $PM_{10}$, $SO_2$, $NO_x$, CO, VOC, and other pollutants (e.g., trace metals). The Project's engineering and environmental designs will maximize control of air emissions while minimizing economic, environmental, and energy impacts.

This section presents the applicable NSPS and the proposed BACT for these pollutants. The approach to the BACT analysis is based on the regulatory definitions of BACT, as well as EPA's current policy guidelines requiring a top-down approach. A BACT determination requires an analysis of the economic, environmental, and energy impacts of the proposed and alternative control technologies [see 40 CFR 52.21(b)(12)]. The analysis must, by definition, be specific to the project (i.e., case-by-case).

## 4.2 NEW SOURCE PERFORMANCE STANDARDS

The applicable NSPS for CTs are codified in 40 CFR 60, Subpart GG and summarized in Appendix B. The applicable NSPS emission limit for $NO_x$ is 75 parts per million by volume dry (ppmvd) corrected for heat rate and 15 percent oxygen. For the CTs being considered for the project, the NSPS emission limit for $NO_x$ with the NSPS heat rate correction about 111 ppm on natural gas (corrected to 15 percent oxygen at a fuel-bound nitrogen content of 0.015 percent). The proposed $NO_x$ emission limits for the project will be much lower than the NSPS.

## 4.3 BEST AVAILABLE CONTROL TECHNOLOGY FOR SIMPLE CYCLE OPERATION

The control technology review requirements of PSD regulations require a determination of BACT. As described in Section 3.2.2, BACT is determined on a case-by-case basis after taking into account the specific energy, environmental and economic impacts and other costs of the project. The EPA top-down approach is the recommended evaluation method that must consider technically feasible and available control technologies that achieve the maximum degree of emission reduction. These technologies must then be evaluated against the energy, environmental and economic impacts. The rejection of the "top" technically feasible and available technologies must be justified as "inappropriate" based on this case-by-case evaluation.

A BACT analysis has been performed for a Westinghouse 501F CT operating in simple cycle mode. The results of the analysis have concluded the following controls will be BACT for the project. The CTs will utilize dry low-$NO_x$ (DLN) for $NO_x$ control that will achieve, at 59°F ambient conditions:

- $NO_x$ emission levels of up to 15 ppmvd corrected to 15 percent $O_2$ at 70 to 100 percent load (baseload) conditions; and
- CO emissions will be limited to 25 ppmvd corrected to 15 percent $O_2$ at 70 to 100 percent load.
- $PM/PM_{10}$ emissions (dry filterables) will be limited to 6.9 to 8.2 lb/hr at 70 to 100 percent load, respectively, at ambient temperature of 59 °F.

### 4.3.1 Nitrogen Oxides

The BACT analysis was performed for simple cycle operation for the following alternatives:

- DLN with selective catalytic reduction (SCR) at an emission rate of 4.5 ppmvd corrected to 15 percent $O_2$ for 3,750 hours.
- Westinghouse 501F CT with DLN at an emissions rate of 15 ppmvd corrected to 15 percent $O_2$ for 3,750 hours.

The evaluated technologies are those that are technically feasible and potentially available for the project using the EPA top-down approach (see Appendix B). For the proposed project, the technologies evaluated included DLN in combination with "hot" SCR and DLN alone.

**$NO_x$ Control Technologies**

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. $NO_x$ emission rates from 25 ppmvd (corrected to 15-percent $O_2$) and less have been demonstrated with DLN technology. The $NO_x$ emission level proposed for the project when only firing natural gas at baseload conditions is 15 ppmvd (corrected to 15-percent $O_2$), which is guaranteed by the selected vendor (Westinghouse).

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 (refer to Appendix B). The reaction occurs typically between 600°F and 750°F, which is appropriate for combined cycle units where such temperatures occur in the heat recovery steam generator (HRSG). Exhausts from simple cycle operation are in the range of 1,100°F and greater, thus precluding the application of combined cycle SCR systems for this mode of operation due to damage to the catalyst. With the higher cost ceramic catalyst, SCR at temperatures up to 1,100°F is theoretically possible. However, flue gas cooling would still be required to maintain temperatures at or below 1,050°F to insure the catalyst is not damaged during the range of operation. There have been only a few applications of SCR on simple cycle gas turbines primarily associated with much smaller turbines with low exhaust temperatures, i.e., less than 1,000°F operating on a continuous basis. Experience with these SCR has not been entirely successful with catalyst damage occurring on several of the projects. The exhaust temperatures associated with the Westinghouse 501F exceed 1,100°F and would require a temperature reduction to less than 1,050°F for high temperature SCR to be technically feasible. This can be accomplished with dilution air or heat exchange mechanism (referred to as attemperation) but has not been commercially demonstrated on an "F" Class turbine. Even with the proper design, the uncertainty of maintaining such temperatures throughout the peaking service cycle has not been demonstrated. Such a system has not been determined or demonstrated as BACT on an "F" Class CT (i.e., 180 MW) operating in peaking mode.

As discussed in Section 2.1, the proposed CTs will be fired only with natural gas. No backup fuel will be used. Table 4-1 presents a summary of $NO_x$ emissions with DLN and DLN with SCR assuming 3,750 hours of operation at an ambient (turbine inlet) temperature of 59°F. This temperature represents an average expected condition over an annual period. The $NO_x$ removed is based on 3,750 hours per year per CT at baseload.

**Proposed $NO_x$ BACT and Rationale**

The proposed BACT for the project is DLN for simple-cycle "F" Class CTs. The proposed $NO_x$ emissions level using this technology is 15 ppmvd (corrected to 15 percent oxygen) when firing natural gas. Control of $NO_x$ emissions using DLN is proposed for the following reasons:

1. The proposed BACT (i.e., DLN) provides the most cost effective and pollution preventing control alternative, and results in low environmental impacts. DLN at the proposed emissions levels has been adopted previously in Florida as BACT in a

recent determination. Indeed, the definition of BACT specifically includes "innovative fuel combustion techniques" as being appropriate in determining BACT.

2. SCR was rejected based on technical, economic, environmental, and energy grounds. Table 4-2 summarizes these considerations which favor DLN technology. A specific cost breakdown for SCR use is detailed in Table B-3 and B-4 of Appendix B.

3. The estimated incremental cost of SCR is approximately $11,850 per ton of $NO_x$ removed. The excessive costs are even more apparent if additional pollutant emissions due to SCR are considered. The cost effectiveness is more than $18,000 per ton of pollutant removed when the net emissions of all pollutants (exclusive of $CO_2$) are considered.

4. Additional environmental impacts would result from SCR operation (see Table 4-3), including emissions of ammonia; from secondary emissions (to replace the lost generation); and from the generation of hazardous waste (i.e., spent catalyst replacement). While $NO_x$ emissions would be reduced by about 140 TPY/CT with SCR, the net emissions reduction would not be as great. There are three additional factors that must be considered:

   a. Ammonia slip would occur, and it may be as high as 41.7 TPY/CT.

   b. Additional particulate matter may be formed through the reaction of ammonia and sulfur oxides forming ammonium salts. As much as 3.1 TPY/CT of additional particulate matter may be formed.

   c. SCR will require energy for system operation and reduce the efficiency of the CT. This lost energy would have to be replaced since the proposed project would be an efficient baseload plant while operating. Any power plants replacing this lost energy would be lower on the dispatch list and inevitably more polluting. Additional emissions of carbon dioxide would also result.

5. The energy impacts of SCR will reduce potential electrical power generation by more than 4.55 million kilowatt-hours (kWh) per year per CT. This amount of energy is sufficient to provide the annual electrical needs of 379 residential customers/CT.

6. DLN technology has been demonstrated to meet $NO_x$ emission levels proposed for the project. In contrast, application of SCR on a simple cycle "F" Class turbine has not been demonstrated or not yet commercially available for this type of CT. There are considerable technical uncertainties, which would likely affect the reliability of the SCR system and its ultimate economic impacts to the project.

A description of the proposed technology and feasibility and the BACT analyses of economic, environmental and energy impacts follow.

**Technology Demonstration and Feasibility**

The project will use a heavy-duty industrial CT with advanced dry low-$NO_x$ combustors. Appendix B describes in detail a technology comparison of combustion process modifications (i.e. water/steam injection, DLN) and post-combustion exhaust gas treatment systems (i.e. SCR, $SCONO_x$, $NO_xOUT$ process, Thermal $DeNO_x$, and NSCR)

A heavy-duty industrial CT is unique from an engineering perspective in two ways. First, the machine is larger and has higher initial firing (i.e., combustion) temperatures than previous turbines. This results in a larger, more thermally efficient machine. For example, the electrical generating capability of the "F" Class machine is about 180 MW compared to the 70 MW to 120 MW size of the conventional machines. The higher initial firing temperature (i.e., 2,400 F) results in about 10 percent more electrical energy produced for the same amount of fossil fuel used in conventional machines. This has the added advantage of producing lower air pollutant emissions (e.g., $NO_x$, PM, and CO) for each MW generated. While the increased firing temperature increases the thermal $NO_x$ generated, this $NO_x$ increase is controlled through combustor design.

The second unique attribute of this machine is the use of dry low-$NO_x$ combustors that will reduce $NO_x$ emissions to 15 ppmvd when firing natural gas. Thermal $NO_x$ formation is inhibited by using staged combustion techniques where the natural gas and combustion air are premixed prior to ignition. This level of control will result in $NO_x$ emissions of about 0.06 lb/$10^6$ Btu, which is less than half of the new NSPS emissions limits for conventional fossil fuel-fired steam generators (i.e., 1.6 lb/net MWh in 40 CFR Part 60, Subpart Da). While the new NSPS for fossil-fuel steam generators is not applicable to the proposed project, it does establish an output-based emission limit for the production of electric power from this type of technology. The electric power produced by the proposed project will already have much lower $NO_x$ emission rates from power produced by even the lowest NSPS limits for steam technology.

Since the purpose of the project is to produce electrical energy, and CT technology is rapidly advancing, it is appropriate to compare the proposed emissions on an equivalent generation basis to that of a conventional CT. The heat rate of the "F" Class machines in simple-cycle operation will be about 9,200 Btu/kWh (LHV) at 59°F. In contrast, the heat rate for a new conventional CT, is about 11,000 Btu/kWh (LHV). Older existing peaking turbines have heat rates typically greater than 13,000 Btu/kWh (LHV). Therefore, the amount of total $NO_x$ from the CT will be at least 10 percent lower than that of a new conventional turbine for the same amount of generation.

Also, the amount of $NO_x$ control achieved by the dry low-$NO_x$ combustor on the proposed CT is considerably higher than that achieved by a conventional CT. Because of the higher firing initial temperatures, this CT results in greater $NO_x$ emission formation. Since the advanced machine has higher firing temperatures, the $NO_x$ emissions without the use of dry low-$NO_x$ combustion technology are much higher than a conventional CT (greater than 180 ppmvd vs. 150 ppmvd). This results in an overall greater $NO_x$ reduction on the advanced CT.

**$NO_x$ BACT Impacts Analysis**

*Economic Impacts for $NO_x$*

The total capital cost of selective catalytic reduction on a per CT basis is $5,290,700. The total annualized cost of applying SCR with water injection is $1,661,000. The capital cost is about 12 percent of the total cost of a simple cycle unit which is a significant percent of the overall cost. Detailed cost estimates for the capital and annualized costs are provided in Tables B-3 and B-4 of Appendix B. The incremental cost effectiveness of adding SCR to the water injection is estimated to be $11,850 per ton of $NO_x$ removed. This cost effectiveness accounts only for the reduction of $NO_x$ with SCR use and not the potential emissions from ammonia slip or other criteria pollutants that may result. The net cost effectiveness will be much higher.

*Environmental Impact for $NO_x$*

The maximum predicted $NO_x$ impacts using the dry low-$NO_x$ technology with SCR are considerably below the PSD Class II increment for $NO_x$ of 25 ug/m$^3$, annual average, and the AAQS for $NO_x$, 100 ug/m$^3$. Indeed, the maximum annual impact is predicted to be 0.5 ug/m$^3$, which is about 50 percent of the significant impact level.

The use of SCR on the proposed project will cause emissions of ammonia and ammonium salts, such as ammonium sulfate and bisulfate. Ammonia emissions associated with SCR are typically guaranteed by SCR vendors at 10 ppm and previous permit conditions have specified this level. Indeed, ammonia emissions could be as high as 41.7 TPY for a CT at 10 ppm. Potential emissions of ammonium sulfate and bisulfate will increase emissions of $PM_{10}$; up to 3.1 TPY/CT could be emitted.

The electrical energy required to run the SCR system and the back pressure from the turbine will reduce the available power from the project. This power, which would otherwise be available to the electrical system, will have to be replaced by other less efficient CTs. The replacement power will cause air pollutant emissions that would not have occurred without SCR.

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.

*Energy Impacts for $NO_x$*

Significant energy penalties occur with SCR. With SCR, the output of the CT may be reduced by about 0.50 percent over that of DLN for $NO_x$ control. This penalty is the result of the SCR pressure drop, which would be about 2.5 inches of water and would amount to about 3.5 million kWh per year per CT in potential lost generation. The energy required by the SCR equipment would be about 1.05 million kWh per year per CT. Taken together, the total lost generation and energy requirements of SCR of 4.55 million kWh per year per CT could supply the annual electrical needs of about 379 residential customers. To replace this lost energy, an additional $44.03 \times 10^9$ British thermal CTs per year (Btu/yr) or about 44 million cubic feet per year ($ft^3$/yr) of natural gas would be required.

### 4.3.2 Carbon Monoxide

Emissions of CO are dependent upon the combustion design, which is a result of the manufacturer's design and operating performance. The CTs proposed for the project have designs to optimize combustion efficiency and minimize CO as well as $NO_x$ emissions.

The following alternatives were evaluated as BACT for CO for the project:

1. Combustion controls at 25 ppmvd at 15 percent $O_2$ when firing natural gas (at 70 to 100 percent load); with emissions of 204 TPY assuming operation of 3,750 hours per year per turbine at baseload; and
2. Oxidation catalyst at 10 ppmvd; maximum annual CO emissions are 66 TPY based on 3,750 hours per year per turbine operation.

**Proposed CO BACT and Rationale**

Combustion design is proposed as BACT as a result of the technical and economic consequences of using catalytic oxidation on CTs. The proposed BACT emission rates for CO will not exceed 25 ppmvd when firing natural gas at baseload conditions. Catalytic oxidation is considered inappropriate for the following reasons:

1. Catalytic oxidation will not produce measurable reduction in the air quality impacts, based on air modeling results;
2. The economic impacts are significant (i.e., the capital cost is about $1.75 million per CT, with an annualized cost of $575,529 per year per CT) (see Tables B-6 and B-7).

Combustion design is proposed as BACT as a result of the technical and economic consequences of using catalytic oxidation on CTs. Catalytic oxidation is considered inappropriate since it will not produce a measurable reduction in the air quality impacts. Indeed, recent BACT decisions for similar advanced CTs have set limits in the 30 ppmvd range and higher. Even the Northeast States for Coordinated Air Use Management (NESCAUM) has recognized a BACT level of 50 ppmvd for CO emissions.

**CO Technology Demonstration and Feasibility**

The DLN combustor technology has been demonstrated and is technically feasibility. High temperature oxidation catalyst can be used to reduce CO emissions. Temperatures greater than 1,200°F may cause catalyst damage. While the data provided by Westinghouse suggest exhaust temperatures less than 1,200°F, the thermal stress for peaking operation, would likely result in temperature variations that may require an attemperation system to assure no catalyst damage. Such a system including high temperature has not been determined or demonstrated as BACT for CO on an "F" class combustion turbine in peaking service

**BACT Impact Analysis**

*Economic Impact for CO*

The estimated annualized cost of a CO oxidation catalyst is $575,529/CT, resulting in a cost effectiveness of approximately $4,150 per ton of CO removed (see Tables B-6 and B-7). The cost effectiveness is based on 3,750 hours per year per with the maximum emissions controlled to 10 ppmvd. No costs are associated with combustion techniques since they are inherent in the design.

The CO emissions estimate for the "F" Class machines is a result of uncertainty associated with maintaining low $NO_x$ emissions while keeping emissions of CO as low as possible over the load range for the machine. Experience has shown, however, that actual CO emissions are much lower. Recent tests on a Westinghouse "F" class turbine with DLN found CO concentrations less than 10 ppmvd. By maintaining an emission rate of 20 ppmvd or less for 3,750 hours per year the cost effectiveness of an oxidation catalyst is $8,770 per ton of CO removed, or about 110 percent higher .

*Environmental Impacts for CO*

The air quality impacts based on air dispersion modeling of both oxidation catalyst control and combustion design control techniques are below the significant impact levels for CO. Therefore, no significant environmental benefit would be realized by the installation of a CO catalyst. Indeed, additional particulate and secondary emissions as a result of an oxidation catalyst. The particulate would result from the conversion of $SO_2$ to sulfates, and the secondary emissions would result from worsening the heat rate. Moreover, the air quality impacts at the proposed BACT emission rate of 25 ppmvd at 15 percent $O_2$ are predicted to be much less than the PSD significant impact levels. There would also be no secondary benefits, such as reduction of acidic deposition, to reducing CO emissions.

*Energy Impact for CO*

An energy penalty would result from the pressure drop across the catalyst bed. A pressure drop of about 2 inches of water would be expected. At a catalyst backpressure of about 2 inches, an energy penalty of about 1,398,450 kWh/yr per CT would result at peak load. This energy penalty is sufficient to supply the electrical needs of about 117 residential customers for a year. To replace this lost energy, about 13.5 x $10^9$ Btu/yr or about 14 million $ft^3$/yr of natural gas would be required.

### 4.3.3 $PM_{10}$ and Other Regulated and Nonregulated Pollutant Emissions

The emission of particulates from the CTs is a result of incomplete combustion, trace elements in the fuel, and particulates in the filtered incoming air. The design of the CT ensures that combustion controls and the use of clean fuels will minimize particulate emissions. A review of EPA's BACT/LAER Clearinghouse Documents did not reveal any post-combustion particulate control technologies being used on natural gas fired CTs.

The maximum particulate emissions from the CT 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 6 pounds per hour (lb/hr) when firing natural gas]} is less than 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 CTs, other than the inherent quality of the fuel. Clean fuels such as natural gas represents BACT for PM/ $PM_{10}$. The use of SCR for controlling $NO_x$ would result in an increase in PM/$PM_{10}$ emissions due to the reaction of ammonia and sulfur oxides. Ammonium sulfates (e.g., ammonium sulfate) are formed by the unreacted ammonia (i.e., ammonia slip) and $SO_3$ downstream of the SCR system.

None of the control technologies evaluated above for other pollutants (i.e., SCR) would reduce emissions of nonregulated pollutants such as trace organic compounds (e.g., formaldehyde). Natural gas, and good combustion practices represent BACT because of the inherently low contaminant content found in the fuel.

Table 4-1. $NO_x$ Emission Estimates (TPY) of BACT Alternative Technologies for Simple Cycle Operation Per Combustion Turbine

| Alternative BACT Control Technologies | Operating Mode[a] | |
|---|---|---|
| | lb/hr | TPY |
| <u>$NO_x$ Emission</u> | | |
| Dry Low-$NO_x$ (DLN) only | 106.8 | 200.3 |
| DLN with SCR[b] | 32.0 | 60.1 |
| Reduction | (74.8) | (140.2) |
| | | |
| <u>Basis of Emissions (ppmvd)</u> | | |
| DLN only | | 15 |
| DLN with SCR | | 4.5 |
| Hours of Operation | | 3,750 |

Note: DLN = Dry low-$NO_x$.
SCR = selective catalytic reduction.
TPY = tons per year.

[a] Emission rates were based on a Westinghouse 501FD CT or equivalent firing natural gas for 3,750 hours at base load with an ambient temperature of 59°F.

[b] Based on primary emissions with SCR; no account is made for additional emissions (secondary) due to lost energy from heat rate penalty and electrical usage for SCR operation.

Table 4-2. Comparison of Alternative BACT Control Technologies for $NO_x$ - Simple Cycle Mode (per CT)

| Impact Analysis | Alternative BACT Control Technologies: DLN Only | SCR |
|---|---|---|
| Technical Feasibility Demonstration | Feasible | Not Demonstrated on "F" Simple Cycle |
| Economic Impact[a] | | |
| Capital Costs | Included | $5,290,745 |
| Annualized Costs | Included | $1,661,050 |
| Cost Effectiveness | | |
| $NO_x$ Removed ( TPY) | NA | $11,850 |
| Environmental Impact[b] | | |
| Total $NO_x$ (TPY) | 200.3 | 60.1 |
| $NO_x$ Reduction (TPY) | NA | (140.2) |
| Ammonia Emissions (TPY) | 0 | 41.4 |
| PM Emissions (TPY) | 0 | 3.1 |
| Secondary Emissions (TPY) | 0 | 5.1 |
| Net Emission Reduction (TPY) | NA | (60) |
| Energy Impacts[c] | | |
| Energy Use (kWh/yr) | 0 | 4,546,125 |
| Energy Use (mmBtu/yr) At 10,000 Btu/kWh | 0 | 44,029 |
| Energy Use (mmcf/yr) at 1,000 Btu/cf for natural gas | 0 | 44 |

a See Appendix B for detailed development of capital costs (including recurring costs) and annualized costs.

b See data presented in Table 4-3.

c Energy impacts are estimated due to the lost energy from heat rate penalty and electrical usage for the SCR operation at 3,750 hours per year. Lost energy is based on 0.5 percent of 186.46 MW. SCR electrical usage is based on 0.080 MWh per SCR system.

Table 4-3. Maximum Potential Incremental Emissions (TPY) with Selective Catalytic Reduction

| Pollutants | Incremental Emissions (tons/year) of SCR | | |
|---|---|---|---|
| | Primary | Secondary | Total |
| Particulate | 3.09 | 0.16 | 3.25 |
| Sulfur Dioxide | | 0.06 | 0.06 |
| Nitrogen Oxides | -140.18 | 2.94 | -137.24 |
| Carbon Monoxide | | 1.76 | 1.76 |
| Volatile Organic Compounds | | 0.12 | 0.12 |
| Ammonia | 41.68 | | |
| Total: | -95.40 | 5.03 | -90.37 |
| Carbon Dioxide (additonal from gas firing) | | 2,788.52 | 2,788.52 |

Basis:

Lost Energy (mmBtu/year) 44,029

Secondary Emissions (lb/mmBtu): Assumes natural gas firing in $NO_x$ controlled steam unit.

| | |
|---|---|
| Particulate | 0.0072 |
| Sulfur Dioxide | 0.0027 |
| Nitrogen Oxides w/LNB | 0.1333 |
| Carbon Monoxide | 0.0800 |
| Volatile Organic Compounds | 0.0052 |

Reference: Table 1.4-1 and 1.4-2, AP-42, Version 2/98

## 5.0 AMBIENT MONITORING ANALYSIS

The CAA requires that an air quality analysis be conducted for each criteria and noncriteria pollutant subject to regulation under the act before a major stationary source is constructed. Criteria pollutants are those pollutants for which AAQS have been established. Noncriteria pollutants are those pollutants that may be regulated by emission standards, but no AAQS have been established. This analysis may be performed by the use of modeling and/or by monitoring the air quality.

A major source may waive the ambient monitoring analysis requirement if it can be demonstrated that the proposed source's maximum air quality impacts will not exceed the PSD *de minimis* concentration levels. The maximum impacts of the proposed source are compared with the PSD *de minimis* concentrations in Table 3-5. As can be seen from Table 3-5, the proposed plant's maximum air quality impacts will be well below the *de minimis* concentrations for all applicable pollutants. As a result, preconstruction monitoring data are not required to be submitted as part of this application.

# 6.0 AIR QUALITY IMPACT ANALYSIS

## 6.1 AIR MODELING PROTOCOL

Prior to performing air modeling for this project, an air modeling protocol was prepared and sent to the Florida DEP for review and approval. The Florida DEP provided comments to the protocol which are incorporated into the modeling approach described in the following sections. As a result, the proposed modeling approach conforms to procedures and guidelines used by the Florida DEP to assess air modeling projects that undergo PSD review.

Copies of the letters that present the air modeling protocol and comments provided by the Florida DEP are presented in Appendix C.

## 6.2 SIGNIFICANT IMPACT ANALYSIS APPROACH

The general modeling approach followed EPA and Florida DEP modeling guidelines for determining compliance with AAQS and PSD increments. For all applicable pollutants that have emission increases that will exceed the PSD significant emission rate due to a proposed project, a significant impact analysis is performed. This analysis determines whether the project alone will result in predicted impacts that will exceed the EPA significant impact levels at any off-plant property areas in the vicinity of the plant.

If the project's impacts are above the significant impact levels, then a more detailed air modeling analysis that includes background sources is performed. If the project's impacts are below the significant impact levels, more detailed air modeling analysis is not required. The project is assumed to have an insignificant impact on surrounding air quality.

For this project, the significant impact levels were estimated in the vicinity of the plant following Florida DEP policies.

Generally, if a new project also is within 150 kilometers of a PSD Class I area, then a significant impact analysis is also performed for the PSD Class I area. EPA has proposed PSD Class I significant impact levels that have not been finalized as of this report (see Section 3.2.3).

Based on comments provided by the Florida DEP, a PSD Class I modeling analysis was not required since the project is more than 150 km from the nearest Class I area.

## 6.3 PRECONSTRUCTION MONITORING ANALYSIS APPROACH

The general modeling approach followed EPA and Florida DEP modeling guidelines for evaluating a project's impacts relative to the *de minimis* monitoring levels to determine the need to submit continuous monitoring data prior to construction. For all applicable pollutants that have emission increases that will exceed the PSD significant emission rate due to a proposed project, a *de minimis* impact analysis is performed. This analysis determines whether the project alone will result in predicted impacts that will exceed the EPA *de minimis* levels at any off-plant property areas in the vicinity of the plant. Current Florida DEP policies stipulate that the highest annual average and highest short-term concentrations are to be compared to the applicable *de minimis* monitoring levels.

A proposed major stationary facility or major modification may be exempt 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.

For this project, the project's impacts were estimated in the vicinity of the plant for comparison to *de minimis* levels following Florida DEP policies.

## 6.4 AIR MODELING ANALYSIS APPROACH

### 6.4.1 General Procedures

As stated in the previous sections, for each pollutant which is emitted above the significant emission rate, air modeling analyses are required to determine if the project's impacts are predicted to be greater than the significant impact levels and *de minimis* monitoring levels. These analyses consider the project's impacts alone. Air quality impacts are predicted using 5 years of meteorological data and selecting the highest annual and the highest short-term concentrations for comparison are compared to the significant impact levels and *de minimis* levels.

If the project's impacts are greater than the significant impact levels, the air modeling analyses must consider other nearby sources and background concentrations, and predict concentration for comparison to ambient standards. 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:

1. Eliminating the highest concentration predicted at each receptor,

2. Identifying the second-highest concentration at each receptor, and
3. 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.

To develop the maximum short-term concentrations for the proposed project, the modeling approach was divided into screening and refined phases to reduce the computation time required to perform the modeling analysis. For this study, the only difference between the two modeling phases is the density of the receptor grid spacing employed when predicting concentrations. Concentrations are predicted for the screening phase using a coarse receptor grid and a 5-year meteorological data record.

Refinements of the maximum predicted concentrations are typically performed for the receptors of the screening receptor grid at which the highest and/or HSH concentrations occurred over the 5-year period. Generally, if the maximum concentrations from other years in the screening analysis are within 10 percent of the overall maximum concentration, then those other concentrations are refined as well. Typically, if the highest and HSH concentrations are in different locations, concentrations in both areas are refined.

Modeling refinements are performed for short-term averaging times by using a denser receptor grid, centered on the screening receptor at which the maximum concentration was predicted. The angular spacing between radials is 2 degrees and the radial distance interval between receptors is 100 m. Annual modeling refinements employ an angular spacing between radials of 2 degrees and a distance interval from 100 to 300 m, depending on the concentration gradient in the vicinity of the screening receptor to be refined. If the maximum screening concentration is located on the plant property boundary, additional plant boundary receptors are input, spaced at a 2-degree angular interval and centered on the screening receptor. The domain of the refinement grid will extend to all adjacent screening receptors. The air dispersion model is then executed with the refined grid for the entire year of meteorology during which the screening concentration occurred. This approach is used to ensure that a valid highest concentration is obtained. A more detailed description of the model, along with the emission inventory, meteorological data, and screening receptor grids are presented in the following sections.

### 6.4.2 Model Selection

The Industrial Source Complex Short-term (ISCST3, Version 99155) dispersion model (EPA, 1999) was used to evaluate the pollutant impacts due to the proposed CTs. This model is maintained by the EPA on its Internet website, Support Center for Regulatory Air Models (SCRAM), within the Technical Transfer Network (TTN). A listing of ISCST3 model features is presented in Table 6-1. The ISCST3 model is designed to calculate hourly concentrations based on hourly meteorological data (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The ISCST3 model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights. These areas are referred to as simple terrain. The model can also be applied in areas where the terrain exceeds the stack heights. These areas are referred to as complex terrain.

In this analysis, the EPA regulatory default options were used to predict all maximum impacts. The ISCST3 model can run in the rural or urban land use mode that affects stability dispersion coefficients, wind speed profiles, and mixing heights. Land use can be characterized based on a scheme recommended by EPA (Auer, 1978). If more than 50 percent land use within a 3-km radius around a project is classified as industrial or commercial, or high-density residential, then the urban option should be selected. Otherwise, the rural option is appropriate. Based on the land-use within a 3-km radius of the proposed plant site (see Figure 1-1), the rural dispersion coefficients were used in the modeling analysis.

The ISCST3 model was used to provide maximum concentrations for the annual and 24-, 8-, 3-, and 1-hour averaging times. A generic emission rate of 10 grams per second (g/s) was used as emissions for the proposed source. Maximum pollutant-specific air impacts were determined by multiplying the maximum pollutant-specific emission rate in pounds per hour (lb/hr) to the maximum predicted generic impact divided by 79.365 lb/hr (10 g/s).

### 6.4.3 Meteorological Data

Meteorological data used in the ISCST3 model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the National Weather Service (NWS) stations at Orlando, Florida, and West Palm Beach, Florida, respectively. The 5-year period of meteorological data was from 1987 through 1991, which is the latest readily available data for this station that is acceptable to the Florida DEP (see Appendix C). The NWS station at Orlando is located approximately 40 km (24 miles) west of the proposed plant site while the NWS station at West Palm Beach is located approximately 200 km (120 miles) south-southeast of the proposed plant site. The surface meteorological data from Orlando are assumed to be representative of the project site because both the project site and the weather station are located in areas to experience similar weather conditions, such as frontal passages. In addition, these data have been accepted for use by the Florida DEP in other PSD permit applications to address air quality impacts for other proposed sources locating in Osceola County and adjacent counties.

### 6.4.4 Emission Inventory

A summary of the criteria pollutant emission rates, physical stack and stack operating parameters for the proposed CTs used in the air modeling analysis is presented in Table 2-1. Emission and stack operating parameters are presented for 32°F, 59°F, and 95°F ambient temperatures. In an effort to obtain the maximum air quality impacts for a range of possible operating conditions, the air modeling analysis used a range of emission rates and stack parameter data to predict air quality impacts.

Six modeling scenarios were considered:

1. 100 percent operating load for the ambient temperature of 32°F;
2. 100 percent operating load for the ambient temperature of 59°F;
3. 100 percent operating load for the ambient temperature of 95°F;
4. 70 percent operating load for the ambient temperature of 32°F;
5. 70 percent operating load for the ambient temperature of 59°F; and
6. 70 percent operating load for the ambient temperature of 95°F.

The proposed CTs will have a stack height of 50 feet and an inside stack diameter of 19 ft. The relative locations of the stacks used in the modeling were:

| Emission source | Relative Location (ft) | |
|---|---|---|
| | X | Y |
| CT No. 1 (simple-cycle) | -130 | 0 |
| CT No. 2 (simple-cycle) | 0 | 0 |
| CT No. 3 (simple-cycle) | 130 | 0 |

### 6.4.5 Receptor Locations

For predicting maximum concentrations in the vicinity of the plant, a polar receptor grid comprised of 1,0691 grid receptors was used. These receptors included 36 receptors located on radials extending out from the proposed CTs' stack locations. Along each radial, receptors were at distances of 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.25, 2.5, 2.75, 3.0, 3.5, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 13.0, 15.0, 17.0, 20.0, 22.5, and 25.0 km from the center of the proposed stack locations. The distance of 0.2 km was selected as the minimum receptor distance since this distance represents the minimum distance in any direction from the stack for CT No. 2 (used as the modeling origin) to the plant boundary. The proposed plant property extends out from a minimum distance of about 0.2 km to more than 0.4 km for other directions. However, since the proposed CTs will only operate in simple cycle mode, the maximum impacts are expected to occur well beyond the plant property. Minimal, if any, impacts due to the proposed CTs are expected at receptors located on the plant property or at the plant boundary.

Modeling refinements were performed, as needed, by employing a polar receptor grid with a maximum spacing of 100 m along each radial and an angular spacing between radials of 2 degrees.

For each receptor location, terrain elevations were assumed equal to the stack base elevation since the terrain is flat surrounding the project site. The stackbase elevation was assumed to be 20 ft above mean sea level (MSL).

### 6.4.6 Building Downwash Effects

The only significant structures in the vicinity of the proposed CT stacks are the proposed CT air inlet filters and CT enclosure/air inlet ducts. The height and widths of these structures are as follows:

| Structure | Height (ft) | Width (ft) | Length (ft) |
|---|---|---|---|
| CT air inlet filter | 40 | 40 | 40 |
| CT enclosure/air inlet duct | 28 | 20 | 60 |

Building dimensions for the project's structures were entered into the EPA's Building Profile Input Program (BPIP, Version 95086) for the purpose of obtaining direction-specific building heights and widths for all downwash-affected sources. The direction-specific building dimensions were then input to the ISCST3 model as the building height and width for each of 36 ten-degree wind sectors. A summary of the direction-specific building dimensions used in the modeling is presented in Appendix D.

## 6.5 AIR MODELING RESULTS

The modeling analysis results for the proposed CTs operating are summarized in Tables 6-2 through 6-4. The maximum pollutant concentrations predicted in the screening analysis for one CT and three CTs are given in Tables 6-2 and 6-3, respectively. The results from the refined analyses are given in Table 6-4. Although, $SO_2$ emissions are not subject to PSD review in this phase, the maximum $SO_2$ concentrations are also provided for completeness and comparison to significant impact levels.

As shown in Table 6-4, the maximum predicted PM, $SO_2$, $NO_2$, and CO impacts due to the proposed CTs are all below the significant impact levels. Because the Project will not have a significant impact upon the air quality in the vicinity of the plant site, more detailed modeling analyses for determining compliance with the AAQS and PSD Class II increments are not required.

The maximum predicted PM, $SO_2$, $NO_2$, and CO impacts due to the proposed CTs are also below the *de minimis* monitoring levels. Because the proposed source will not have predicted impacts greater than *de minimis* levels, preconstruction monitoring data are not required to be submitted as part of the PSD review.

A summary of the model results for each year is presented in Appendix E. The locations of the maximum predicted concentrations are also given in the summary. An example of the model input file is also provided in Appendix E.

Table 6-1. Major Features of the ISCST3 Model

| ISCST3 Model Features |
|---|
| • Polar or Cartesian coordinate systems for receptor locations |
| • Rural or one of three urban options which affect wind speed profile exponent, dispersion rates, and mixing height calculations |
| • Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1972, and 1975; Bowers, et al., 1979). |
| • Procedures suggested by Huber and Snyder (1976); Huber (1977); and Schulman and Scire (1980) for evaluating building wake effects |
| • Procedures suggested by Briggs (1974) for evaluating stack-tip downwash |
| • Separation of multiple emission sources |
| • Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations |
| • Capability of simulating point, line, volume, area, and open pit sources |
| • Capability to calculate dry and wet deposition, including both gaseous and particulate precipitation scavenging for wet deposition |
| • Variation of wind speed with height (wind speed-profile exponent law) |
| • Concentration estimates for 1-hour to annual average times |
| • Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm for ISCST3; a built-in algorithm for predicting concentrations in complex terrain |
| • Consideration of time-dependent exponential decay of pollutants |
| • The method of Pasquill (1976) to account for buoyancy-induced dispersion |
| • A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used) |
| • Procedure for calm-wind processing including setting wind speeds less than 1 m/s to 1 m/s. |

Note: ISCST3 = Industrial Source Complex Short-Term.
Source: EPA, 1999.

Table 6-2. Maximum Predicted Pollutant Concentrations For One Simple-Cycle Combustion Turbine
Screening Analysis, 501D Combustion Turbine, Natural Gas- Fired
Palmetto Power LLC Project

| | Maximum Emission Rates (lb/hr) by Operating Load and Air Inlet Temperature | | | | | | | Maximum Predicted Concentrations (ug/m$^3$) by Operating Load and Air Inlet Temperature (1) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base Load | | | 70% Load | | | Averaging | Base Load | | | 70% Load | | |
| Pollutant | 32 °F | 59 °F | 95 °F | 32 °F | 59 °F | 95 °F | Time | 32 °F | 59 °F | 95 °F | 32 °F | 59 °F | 95 °F |
| Generic (10 g/s) | 79.37 | 79.37 | 79.37 | 79.37 | 79.37 | 79.37 | Annual | 0.015 | 0.015 | 0.015 | 0.017 | 0.018 | 0.018 |
| | | | | | | | 24-Hour | 0.184 | 0.188 | 0.197 | 0.236 | 0.240 | 0.246 |
| | | | | | | | 8-Hour | 0.484 | 0.494 | 0.516 | 0.608 | 0.618 | 0.632 |
| | | | | | | | 3-Hour | 0.871 | 0.891 | 0.937 | 1.241 | 1.334 | 1.339 |
| | | | | | | | 1-Hour | 1.970 | 2.007 | 2.097 | 2.460 | 2.552 | 2.596 |
| PM10 | 8.6 | 8.2 | 7.5 | 7.1 | 6.9 | 6.4 | Annual | 0.0016 | 0.0015 | 0.0014 | 0.0015 | 0.0015 | 0.0015 |
| | | | | | | | 24-Hour | 0.020 | 0.020 | 0.018 | 0.021 | 0.021 | 0.020 |
| $NO_x$ | 111.2 | 106.8 | 98.4 | 83.0 | 78.8 | 72.9 | Annual | 0.020 | 0.020 | 0.018 | 0.018 | 0.018 | 0.017 |
| CO | 113.0 | 109.0 | 100.0 | 85.0 | 80.0 | 74.0 | 8-Hour | 0.69 | 0.68 | 0.65 | 0.65 | 0.62 | 0.59 |
| | | | | | | | 1-Hour | 2.8 | 2.8 | 2.6 | 2.6 | 2.6 | 2.4 |

(1) Concentrations are based on highest predicted concentrations using five years of meteorological for 1987 to 1991 of surface and upper air data from the National Weather Service stations in Orlando and West Palm Beach, Florida, respectively.

Pollutant concentrations were based on a modeled or generic concentration predicted using a modeled emission rate of 79.37 lb/hr [10(g/s)]. Specific pollutant concentrations were estimated by multiplying the modeled concentration (at 10 g/s) by the ratio of the specific pollutant emission rate to the modeled emission rate of 10 g/s.

Table 6-3. Maximum Pollutant Concentrations Predicted for Three Simple Cycle Combustion Turbines Compared to EPA Significant Impact and Deminimis Monitoring Levels- Screening Analysis Palmetto Power LLC Project

| Pollutant | Averaging Time | Maximum Predicted Concentrations ($ug/m^3$) by Operating Load and Air Inlet Temperature (1) | | | | | | EPA Significant Impact Levels ($ug/m^3$) | EPA Deminimis Levels ($ug/m^3$) |
|---|---|---|---|---|---|---|---|---|---|
| | | Base Load | | | 70% Load | | | | |
| | | 32 °F | 59 °F | 95 °F | 32 °F | 59 °F | 95 °F | | |
| PM10 | Annual | 0.5513 | 0.5630 | 0.5898 | 0.7065 | 0.7203 | 0.7374 | 1 | NA |
| | 24-Hour | 1.451 | 1.481 | 1.549 | 1.823 | 1.855 | 1.895 | 5 | 10 |
| $NO_2$ | Annual | 0.061 | 0.059 | 0.055 | 0.054 | 0.053 | 0.050 | 1 | 14 |
| CO | 8-Hour | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.8 | 500 | 575 |
| | 1-Hour | 8.4 | 8.3 | 7.9 | 7.9 | 7.7 | 7.3 | 2,000 | NA |

(1) Concentrations are based on highest predicted concentrations using five years of meteorological for 1987 to 1991 of surface and upper air data from the National Weather Service stations in Orlando and West Palm Beach, Florida, respectively.

Table 6-4. Summary of Maximum Pollutant Concentrations Predicted for Three SimpleCycle Combustion Turbines Compared to EPA Significant Impact and Deminimis Monitoring Levels
Palmetto Power LLC Project

| Pollutant | Averaging Time | Maximum Predicted Concentrations (ug/m$^3$) | EPA Significant Impact Levels (ug/m$^3$) | EPA Deminimis Levels (ug/m$^3$) |
|---|---|---|---|---|
| PM10 | Annual | 0.0047 (1) | 1 | NA |
| | 24-Hour | 0.076 (2) | 5 | 10 |
| $NO_2$ | Annual | 0.061 (1) | 1 | 14 |
| CO | 8-Hour | 2.1 (1) | 500 | 575 |
| | 1-Hour | 8.4 (1) | 2,000 | NA |

(1) Based on operating conditions at 100 percent load and ambient inlet temperature of 32 °F.
(2) Based on operating conditions at 70 percent load and ambient inlet temperature of 32 °F.

# 7.0 ADDITIONAL IMPACT ANALYSIS

## 7.1 IMPACTS DUE TO DIRECT GROWTH

The Project is being constructed to meet current and projected electric demands. Additional growth as a direct result of the additional electric power provided by the project is not expected. The project will be constructed and operated with minimum labor and associated facilities and is not expected to significantly affect growth in the area. As a result, air pollution impacts from additional growth are not anticipated.

## 7.2 IMPACT ON SOILS, VEGETATION AND WILDLIFE

Because the Project's impacts on the local air quality are predicted to be less than the significant impact levels for PSD Class II areas, the project's impacts on soils, vegetation, and wildlife are also not expected to be significant.

## 7.3 IMPACTS UPON PSD CLASS I AREAS

The proposed project is located more than 150 km from any PSD Class I area. The nearest Class I areas to the site are the Chassahowitzka NWA and the Everglades National Park which are located about 170 and 220 km, respectively, from the site. Other PSD Class I areas are located more than 250 km from the site. Based on discussions with the Florida DEP, an air quality impact evaluation was not required for this project since the project's impacts are not expected to be significant at the distances of the Class I areas. Because the proposed CTs will be fired with natural gas, a clean fuel, it is expected that the project's impacts for $SO_2$, $NO_2$, and $PM_{10}$ will be minimal and not significantly affect or impair visibility or soils and vegetation at the Class I areas.

# APPENDIX A

# VENDOR INFORMATION ON "F" CLASS COMBUSTION TURBINE

Table A-1. Design Information and Stack Parameters for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load

| Parameter | Ambient/Compressor Inlet Temperature | | | | |
|---|---|---|---|---|---|
| | 32 °F | 59 °F | 59 °F | 95 °F | 95 °F |
| | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 |
| Combustion Turbine Performance | | | | | |
| Evaporative cooler status/ efficiency (%) | Off | 85 | Off | 85 | Off |
| Ambient Relative Humidity (%) | 50 | 60 | 60 | 60 | 60 |
| Gross power output (MW) | 196.20 | 186.46 | 182.47 | 167.59 | 160.93 |
| Gross heat rate (Btu/kWh, LHV) | 9,095 | 9,190 | 9,215 | 9,415 | 9,495 |
| (Btu/kWh, HHV) | 10,100 | 10,200 | 10,230 | 10,455 | 10,540 |
| Heat Input (MMBtu/hr, LHV)- calculated | 1,784 | 1,714 | 1,681 | 1,578 | 1,528 |
| - provided | 1,784 | 1,713 | 1,681 | 1,578 | 1,528 |
| (MMBtu/hr, HHV) - provided | 1,981 | 1,902 | 1,867 | 1,752 | 1,696 |
| (HHV/LHV) | 1.110 | 1.110 | 1.110 | 1.110 | 1.110 |
| Fuel heating value (Btu/lb, LHV) | 20,981 | 20,981 | 20,981 | 20,981 | 20,981 |
| (Btu/lb, HHV) | 23,299 | 23,299 | 23,299 | 23,299 | 23,299 |
| (HHV/LHV) | 1.110 | 1.110 | 1.110 | 1.110 | 1.110 |
| CT Exhaust Flow | | | | | |
| Mass Flow (lb/hr) | 3,793,672 | 3,661,592 | 3,612,916 | 3,368,437 | 3,291,632 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Moisture (% Vol.) | 7.90 | 8.74 | 8.49 | 11.07 | 10.66 |
| Oxygen (% Vol.) | 12.50 | 12.38 | 12.46 | 11.94 | 12.08 |
| Molecular Weight - calculated | 28.44 | 28.35 | 28.38 | 28.09 | 28.13 |
| - provided | | | | | |
| Volume Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F) + 460°F)] / [Molecular weight x 2116.8] / 60 min/hr | | | | | |
| Mass flow (lb/hr) | 3,793,672 | 3,661,592 | 3,612,916 | 3,368,437 | 3,291,632 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Molecular weight | 28.44 | 28.35 | 28.38 | 28.09 | 28.13 |
| Volume flow (acfm)- calculated | 2,506,572 | 2,445,344 | 2,414,762 | 2,309,422 | 2,261,718 |
| - provided | 2,522,120 | 2,460,472 | 2,429,695 | 2,323,628 | 2,275,619 |
| | 1.006 | 1.006 | 1.006 | 1.006 | 1.006 |
| Fuel Usage | | | | | |
| Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV)) | | | | | |
| Heat input (MMBtu/hr, LHV) | 1,784 | 1,713 | 1,681 | 1,578 | 1,528 |
| Heat content (Btu/lb, LHV) | 20,981 | 20,981 | 20,981 | 20,981 | 20,981 |
| Fuel usage (lb/hr)- calculated | 85,048 | 81,641 | 80,129 | 75,192 | 72,815 |
| - provided | 85,050 | 81,640 | 80,130 | 75,190 | 72,810 |
| Heat content (Btu/cf, LHV)- assumed | 920 | 920 | 920 | 920 | 920 |
| Fuel density ($lb/ft^3$) | 0.0438 | 0.0438 | 0.0438 | 0.0438 | 0.0438 |
| Fuel usage (cf/hr)- calculated | 1,939,563 | 1,861,858 | 1,827,375 | 1,714,785 | 1,660,584 |
| Stack and Exit Gas Conditions- Simple Cycle | | | | | |
| Stack height (ft) | 50 | 50 | 50 | 50 | 50 |
| Diameter (ft) | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Velocity (ft/sec) = Volume flow (acfm) / [((diameter)$^2$ /4) x 3.14159] / 60 sec/min | | | | | |
| Volume flow (acfm) | 2,506,572 | 2,445,344 | 2,414,762 | 2,309,422 | 2,261,718 |
| Diameter (ft) | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 |
| Velocity (ft/sec)- calculated | 147.3 | 143.7 | 141.9 | 135.8 | 133.0 |
| Velocity (m/sec)- calculated | 44.91 | 43.81 | 43.27 | 41.38 | 40.52 |

Source: Siemens-Westinghouse, 1999 (CTT-1914, Revision 1, 8/19/99).

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft$^2$

Table A-2. Maximum Emissions for Criteria and Other Regulated Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load

| Parameter | Ambient/Compressor Inlet Temperature<br>32 °F<br>Case 1 | 59 °F<br>Case 2 | 59 °F<br>Case 3 | 95 °F<br>Case 4 | 95 °F<br>Case 5 |
|---|---|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 | 3,750 | 3,750 |
| Particulate (lb/hr) = Emission rate (lb/hr) from manufacturer (front-half) | | | | | |
| Basis, lb/hr (a) | 8.6 | 8.2 | 8.2 | 7.5 | 7.3 |
| Emission rate (lb/hr)- provided | 8.6 | 8.2 | 8.2 | 7.5 | 7.3 |
| (TPY) | 16.1 | 15.5 | 15.3 | 14.0 | 13.7 |
| Sulfur Dioxide (lb/hr) = Natural gas (cf/hr) x sulfur content(gr/100 cf) x 1 lb/7000 gr x (lb $SO_2$ /lb S) /100 | | | | | |
| Fuel use (cf/hr) | 1,939,563 | 1,861,858 | 1,827,375 | 1,714,785 | 1,660,584 |
| Sulfur content (grains/ 100 cf) - assumed (b) | 1 | 1 | 1 | 1 | 1 |
| lb $SO_2$ /lb S (64/32) | 2 | 2 | 2 | 2 | 2 |
| Emission rate (lb/hr)- calculated | 5.5 | 5.3 | 5.2 | 4.9 | 4.7 |
| (lb/hr)- provided none | 5.5 | 5.3 | 5.2 | 4.9 | 4.7 |
| (TPY) | 10.4 | 10.0 | 9.8 | 9.2 | 8.9 |
| Nitrogen Oxides (lb/hr) = NOx(ppm) x {[20.9 x (1 - Moisture(%)/100)] - Oxygen(%)} x 2116.8 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 5.9 x 1,000,000 (adj. for ppm)] | | | | | |
| Basis, ppmvd @15% $O_2$ (a) | 15 | 15 | 15 | 15 | 15 |
| Moisture (%) | 7.90 | 8.74 | 8.49 | 11.07 | 10.66 |
| Oxygen (%) | 12.50 | 12.38 | 12.46 | 11.94 | 12.08 |
| Volume Flow (acfm) | 2,506,572 | 2,445,344 | 2,414,762 | 2,309,422 | 2,261,718 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Emission rate (lb/hr)- calculated | 105.3 | 101.1 | 99.2 | 93.2 | 90.2 |
| (lb/hr)- provided | 111.2 | 106.8 | 104.8 | 98.4 | 95.3 |
| (TPY) | 208.6 | 200.2 | 196.5 | 184.5 | 178.6 |
| [Ratio lb/hr provided/calculated] | 1.056 | 1.056 | 1.056 | 1.056 | 1.056 |
| Carbon Monoxide (lb/hr) = CO(ppm) x {[20.9 x (1 - Moisture(%)/100)] - Oxygen(%)} x 2116.8 lb/ft2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)] | | | | | |
| Basis, ppmvd (a) | 31.1 | 31.1 | 30.9 | 31.7 | 31.3 |
| Basis, ppmvd @ 15% O2- calculated | 22 | 22 | 22 | 21 | 21 |
| - provided | 25 | 25 | 25 | 25 | 25 |
| Moisture (%) | 7.90 | 8.74 | 8.49 | 11.07 | 10.66 |
| Oxygen (%) | 12.50 | 12.38 | 12.46 | 11.94 | 12.08 |
| Volume Flow (acfm) | 2,506,572 | 2,445,344 | 2,414,762 | 2,309,422 | 2,261,718 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Emission rate (lb/hr)- calculated from given ppmv | 106.9 | 102.6 | 100.7 | 94.5 | 91.5 |
| (lb/hr)- provided | 113.0 | 109.0 | 107.0 | 100.0 | 97.0 |
| (TPY) | 211.9 | 204.4 | 200.6 | 187.5 | 181.9 |
| [Ratio lb/hr provided/calculated] | 1.057 | 1.063 | 1.063 | 1.058 | 1.060 |
| VOCs (lb/hr) = VOC(ppm) x [1 - Moisture(%)/ 100] x 2116.8 lb/ft2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)] | | | | | |
| Basis, ppmvd (as $CH_4$) (a) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Basis, ppmvd @ 15% O2- calculated | 1.3 | 1.2 | 1.3 | 1.2 | 1.2 |
| - provided | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Moisture (%) | 7.90 | 8.74 | 8.49 | 11.07 | 10.66 |
| Oxygen (%) | 12.50 | 12.38 | 12.46 | 11.94 | 12.08 |
| Volume Flow (acfm) | 2,506,572 | 2,445,344 | 2,414,762 | 2,309,422 | 2,261,718 |
| Temperature (°F) | 1,085 | 1,096 | 1,099 | 1,123 | 1,129 |
| Emission rate (lb/hr)- calculated | 3.5 | 3.4 | 3.3 | 3.1 | 3.0 |
| (lb/hr)- provided | 3.7 | 3.6 | 3.5 | 3.3 | 3.2 |
| (TPY) | 7.0 | 6.7 | 6.6 | 6.2 | 6.0 |
| [Ratio lb/hr provided/calculated] | 1.056 | 1.056 | 1.056 | 1.056 | 1.056 |
| Lead (lb/hr) = NA | | | | | |
| Emission Rate Basis | NA | NA | NA | NA | NA |
| Emission rate (lb/hr) | NA | NA | NA | NA | NA |
| (TPY) | NA | NA | NA | NA | NA |
| Mercury (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | | | |
| Basis, lb/$10^{12}$ Btu ( c) | 7.48E-04 | 7.48E-04 | 7.48E-04 | 7.48E-04 | 7.48E-04 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,902 | 1,867 | 1,752 | 1,696 |
| Emission Rate (lb/hr) | 1.48E-06 | 1.42E-06 | 1.40E-06 | 1.31E-06 | 1.27E-06 |
| (TPY) | 2.78E-06 | 2.67E-06 | 2.62E-06 | 2.46E-06 | 2.38E-06 |
| Sulfuric Acid Mist = Fuel Use (lb/hr) x sulfur (S) content (fraction) x conversion of S to $H_2SO_4$ (%) x MW $H_2SO_4$ /MW S (98/32) | | | | | |
| SO2 emission rate (lb/hr) | 5.5 | 5.3 | 5.2 | 4.9 | 4.7 |
| lb $H_2SO_4$ /lb $SO_2$ (98/64) | 1.53 | 1.53 | 1.53 | 1.53 | 1.53 |
| Conversion to $H_2SO_4$ (%) (b) | 10 | 10 | 10 | 10 | 10 |
| Emission Rate (lb/hr) | 0.85 | 0.81 | 0.80 | 0.75 | 0.73 |
| (TPY) | 1.59 | 1.53 | 1.50 | 1.41 | 1.36 |

Source: (a) Siemens-Westinghouse 1999; (b) Golder Associates, 1999; ( c) EPA, 1996

Note: ppmvd = parts per million, volume dry; ppmvw = parts per million, volume wet; O2 = oxygen.

Table A-3. Maximum Emissions for Other Regulated PSD Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load

| Parameter | Ambient/Compressor Inlet Temperature<br>32 °F<br>Case 1 | <br>59 °F<br>Case 3 | <br>95 °F<br>Case 5 |
|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 |
| 2,3,7,8 TCDD Equivalents (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a) , lb/$10^{12}$ Btu | 1.20E-06 | 1.20E-06 | 1.20E-06 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 2.38E-09 | 2.24E-09 | 2.04E-09 |
| (TPY) | 4.46E-09 | 4.20E-09 | 3.82E-09 |
| Beryllium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a) , lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Fluoride (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis, lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Sources: (a) Golder Associates, 1998

Note: No emission factors for hydrogen chloride (HCl) from natural gas-firing.

Table A-4. Maximum Emissions for Hazardous Air Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load

| Parameter | Ambient/Compressor Inlet Temperature 32 °F Case 1 | 59 °F Case 3 | 95 °F Case 5 |
|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 |
| Antimony (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Benzene (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0.8 | 0.8 | 0.8 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 1.59E-03 | 1.49E-03 | 1.36E-03 |
| (TPY) | 2.97E-03 | 2.80E-03 | 2.54E-03 |
| Cadmium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Chromium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Formaldehyde (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 34 | 34 | 34 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 6.74E-02 | 6.35E-02 | 5.77E-02 |
| (TPY) | 1.26E-01 | 1.19E-01 | 1.08E-01 |
| Cobalt (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Manganese (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Nickel (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Phosphorous (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (b), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Selenium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Toluene (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 10 | 10 | 10 |
| Heat Input Rate (MMBtu/hr) | 1,981 | 1,867 | 1,696 |
| Emission Rate (lb/hr) | 1.98E-02 | 1.87E-02 | 1.70E-02 |
| (TPY) | 3.72E-02 | 3.50E-02 | 3.18E-02 |

Sources: (a) Golder Associates, 1998; (b) EPA,1996 (AP-42,Table 3.1-4)

Table A-5. Design Information and Stack Parameters for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 % Load

| Parameter | Ambient/Compressor Inlet Temperature 32 °F Case 6 | 59 °F Case 7 | 95 °F Case 8 |
|---|---|---|---|
| Combustion Turbine Performance | | | |
| Evaporative cooler status/ efficiency (%) | Off | Off | Off |
| Ambient Relative Humidity (%) | 50 | 60 | 60 |
| Gross power output (MW) | 137.01 | 127.37 | 112.26 |
| Gross heat rate (Btu/kWh, LHV) | 9,650 | 9,855 | 10,370 |
| (Btu/kWh, HHV) | 10,715 | 10,940 | 11,510 |
| Heat Input (MMBtu/hr, LHV)- calculated | 1,322 | 1,255 | 1,164 |
| - provided | 1,322 | 1,255 | 1,164 |
| (MMBtu/hr, HHV) - provided | 1,468 | 1,394 | 1,292 |
| (HHV/LHV) | 1.110 | 1.110 | 1.110 |
| Fuel heating value (Btu/lb, LHV) | 20,981 | 20,981 | 20,981 |
| (Btu/lb, HHV) | 23,299 | 23,299 | 23,299 |
| (HHV/LHV) | 1.110 | 1.110 | 1.110 |
| CT Exhaust Flow | | | |
| Mass Flow (lb/hr) | 3,133,033 | 3,017,700 | 2,849,774 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Moisture (% Vol.) | 7.19 | 7.76 | 9.84 |
| Oxygen (% Vol.) | 13.29 | 13.27 | 13.00 |
| Molecular Weight - calculated | 28.49 | 28.42 | 28.19 |
| - provided | | | |
| Volume Flow (acfm) = [(Mass Flow (lb/hr) x 1,545 x (Temp. (°F) + 460°F)] / [Molecular weight x 2116.8] / 60 min/hr | | | |
| Mass flow (lb/hr) | 3,133,033 | 3,017,700 | 2,849,774 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Molecular weight | 28.49 | 28.42 | 28.19 |
| Volume flow (acfm)- calculated | 1,987,413 | 1,938,564 | 1,874,889 |
| - provided | 1,999,900 | 1,950,697 | 1,886,565 |
| | 1.006 | 1.006 | 1.006 |
| Fuel Usage | | | |
| Fuel usage (lb/hr) = Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV)) | | | |
| Heat input (MMBtu/hr, LHV) | 1,322 | 1,255 | 1,164 |
| Heat content (Btu/lb, LHV) | 20,981 | 20,981 | 20,981 |
| Fuel usage (lb/hr)- calculated | 63,002 | 59,813 | 55,463 |
| - provided | 63,000 | 59,810 | 55,460 |
| Heat content (Btu/cf, LHV) | 920 | 920 | 920 |
| Fuel density (lb/ft$^3$) | 0.0438 | 0.0438 | 0.0438 |
| Fuel usage (cf/hr)- calculated | 1,436,787 | 1,364,066 | 1,264,859 |
| Stack and Exit Gas Conditions- Simple Cycle | | | |
| Stack height (ft) | 50 | 50 | 50 |
| Diameter (ft) | 19.0 | 19.0 | 19.0 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Velocity (ft/sec) = Volume flow (acfm) / [((diameter)$^2$ /4) x 3.14159] / 60 sec/min | | | |
| Volume flow (acfm) | 1,987,413 | 1,938,564 | 1,874,889 |
| Diameter (ft) | 19.0 | 19.0 | 19.0 |
| Velocity (ft/sec)- calculated | 116.8 | 114.0 | 110.2 |
| Velocity (m/sec)- calculated | 35.61 | 34.73 | 33.59 |

Source: Siemens-Westinghouse, 1999 (CTT-1914, Revision 1, 8/19/99).

Note: Universal gas constant = 1,545 ft-lb(force)/°R; atmospheric pressure = 2,116.8 lb(force)/ft$^2$

Table A-6. Maximum Emissions for Criteria and Other Regulated Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 % Load

| Parameter | Ambient/Compressor Inlet Temperature 32 °F Case 6 | 59 °F Case 7 | 95 °F Case 8 |
|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 |
| Particulate (lb/hr) = Emission rate (lb/hr) from manufacturer (front-half) | | | |
| Basis, lb/hr (a) | 7.1 | 6.9 | 6.4 |
| Emission rate (lb/hr)- provided | 7.1 | 6.9 | 6.4 |
| (TPY) | 13.4 | 12.8 | 12.0 |
| Sulfur Dioxide (lb/hr) = Natural gas (cf/hr) x sulfur content(gr/100 cf) x 1 lb/7000 gr x (lb $SO_2$ /lb S) /100 | | | |
| Fuel use (cf/hr) | 1,436,787 | 1,364,066 | 1,264,859 |
| Sulfur content (grains/ 100 cf) - assumed (b) | 1 | 1 | 1 |
| lb $SO_2$ /lb S (64/32) | 2 | 2 | 2 |
| Emission rate (lb/hr)- calculated | 4.1 | 3.9 | 3.6 |
| (lb/hr)- none provided | 4.1 | 3.9 | 3.6 |
| (TPY) | 7.7 | 7.3 | 6.8 |
| Nitrogen Oxides (lb/hr) = NOx(ppm) x {[20.9 x (1 - Moisture(%)/100)] - Oxygen(%)} x 2116.8 x Volume flow (acfm) x 46 (mole. wgt NOx) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 5.9 x 1,000,000 (adj. for ppm)] | | | |
| Basis, ppmvd @15% $O_2$ (a) | 15 | 15 | 15 |
| Moisture (%) | 7.19 | 7.76 | 9.84 |
| Oxygen (%) | 13.29 | 13.27 | 13.00 |
| Volume Flow (acfm) | 1,987,413 | 1,938,564 | 1,874,889 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Emission rate (lb/hr)- calculated | 78.6 | 74.6 | 69.1 |
| (lb/hr)- provided | 83.0 | 78.8 | 72.9 |
| (TPY) | 155.6 | 147.7 | 136.8 |
| [Ratio lb/hr provided/calculated] | 1.056 | 1.056 | 1.056 |
| Carbon Monoxide (lb/hr) = CO(ppm) x {[20.9 x (1 - Moisture(%)/100)] - Oxygen(%)} x 2116.8 lb/ft2 x Volume flow (acfm) x 28 (mole. wgt CO) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)] | | | |
| Basis, ppmvd (a) | 27.9 | 27.6 | 27.5 |
| Basis, ppmvd @ 15% O2- calculated | 22 | 21 | 21 |
| - provided | 25 | 25 | 25 |
| Moisture (%) | 7.19 | 7.76 | 9.84 |
| Oxygen (%) | 13.29 | 13.27 | 13.00 |
| Volume Flow (acfm) | 1,987,413 | 1,938,564 | 1,874,889 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Emission rate (lb/hr)- calculated from given ppmv | 79.7 | 75.7 | 70.1 |
| (lb/hr)- provided | 85.0 | 80.0 | 74.0 |
| (TPY) | 159.4 | 150.0 | 138.8 |
| [Ratio lb/hr provided/calculated] | 1.066 | 1.057 | 1.056 |
| VOCs (lb/hr) = VOC(ppm) x [1 - Moisture(%)/ 100] x 2116.8 lb/ft2 x Volume flow (acfm) x 16 (mole. wgt as methane) x 60 min/hr / [1545 x (CT temp.(°F) + 460°F) x 1,000,000 (adj. for ppm)] | | | |
| Basis, ppmvd (as $CH_4$) (a) | 1.6 | 1.6 | 1.6 |
| Basis, ppmvd @ 15% O2- calculated | 1.3 | 1.2 | 1.2 |
| - provided | 1.5 | 1.5 | 1.5 |
| Moisture (%) | 7.19 | 7.76 | 9.84 |
| Oxygen (%) | 13.29 | 13.27 | 13.00 |
| Volume Flow (acfm) | 1,987,413 | 1,938,564 | 1,874,889 |
| Temperature (°F) | 1,026 | 1,041 | 1,064 |
| Emission rate (lb/hr)- calculated | 2.6 | 2.5 | 2.3 |
| (lb/hr)- provided | 2.8 | 2.6 | 2.5 |
| (TPY) | 5.2 | 5.0 | 4.6 |
| [Ratio lb/hr provided/calculated] | 1.056 | 1.056 | 1.056 |
| Lead (lb/hr) = NA | | | |
| Emission Rate Basis | NA | NA | NA |
| Emission rate (lb/hr) | NA | NA | NA |
| (TPY) | NA | NA | NA |
| Mercury (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis, lb/$10^{12}$ Btu ( c) | 7.48E-04 | 7.48E-04 | 7.48E-04 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 1.10E-06 | 1.04E-06 | 9.67E-07 |
| (TPY) | 2.06E-06 | 1.95E-06 | 1.81E-06 |
| Sulfuric Acid Mist = Fuel Use (lb/hr) x sulfur (S) content (fraction) x conversion of S to $H_2SO_4$ (%) x MW $H_2SO_4$ /MW S (98/32) | | | |
| SO2 emission rate (lb/hr) | 4.1 | 3.9 | 3.6 |
| lb $H_2SO_4$ /lb $SO_2$ (98/64) | 1.53 | 1.53 | 1.53 |
| Conversion to $H_2SO_4$ (%) (b) | 10 | 10 | 10 |
| Emission Rate (lb/hr) | 0.63 | 0.60 | 0.55 |
| (TPY) | 1.18 | 1.12 | 1.04 |

Source: (a) Siemens-Westinghouse 1999; (b) Golder Associates, 1999; ( c) EPA, 1996

Note: ppmvd = parts per million, volume dry; ppmvw = parts per million, volume wet; O2 = oxygen.

Table A-7. Maximum Emissions for Other Regulated PSD Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 % Load

| Parameter | Ambient/Compressor Inlet Temperature 32 °F Case 6 | 59 °F Case 7 | 95 °F Case 8 |
|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 |
| 2,3,7,8 TCDD Equivalents (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a) , lb/$10^{12}$ Btu | 1.20E-06 | 1.20E-06 | 1.20E-06 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 1.76E-09 | 1.67E-09 | 1.55E-09 |
| (TPY) | 3.30E-09 | 3.14E-09 | 2.91E-09 |
| Beryllium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a) , lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Fluoride (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis, lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Sources: (a) Golder Associates, 1998

Note: No emission factors for hydrogen chloride (HCl) from natural gas-firing.

Table A-8. Maximum Emissions for Hazardous Air Pollutants for the Palmetto Power L.L.C. Project- Simple Cycle Operation
Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 % Load

| Parameter | Ambient/Compressor Inlet Temperature 32 °F Case 6 | 59 °F Case 7 | 95 °F Case 8 |
|---|---|---|---|
| Hours of Operation | 3,750 | 3,750 | 3,750 |
| Antimony (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Benzene (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0.8 | 0.8 | 0.8 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 1.17E-03 | 1.11E-03 | 1.03E-03 |
| (TPY) | 2.20E-03 | 2.09E-03 | 1.94E-03 |
| Cadmium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Chromium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Formaldehyde (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 34 | 34 | 34 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 4.99E-02 | 4.74E-02 | 4.39E-02 |
| (TPY) | 9.36E-02 | 8.88E-02 | 8.24E-02 |
| Cobalt (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Manganese (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Nickel (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Phosphorous (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (b), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Selenium (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 0 | 0 | 0 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| (TPY) | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Toluene (lb/hr) = Basis (lb/$10^{12}$ Btu) x Heat Input (MMBtu/hr) / 1,000,000 MMBtu/$10^{12}$ Btu | | | |
| Basis (a), lb/$10^{12}$ Btu | 10 | 10 | 10 |
| Heat Input Rate (MMBtu/hr) | 1,468 | 1,394 | 1,292 |
| Emission Rate (lb/hr) | 1.47E-02 | 1.39E-02 | 1.29E-02 |
| (TPY) | 2.75E-02 | 2.61E-02 | 2.42E-02 |

Sources: (a) Golder Associates, 1998; (b) EPA, 1996 (AP-42, Table 3.1-4)

APPENDIX B

BEST AVAILABLE CONTROL TECHNOLOGY FOR
THE PROPOSED COMBUSTION TURBINES

## B.1 NEW SOURCE PERFORMANCE STANDARDS

The NSPS regulations (40 CFR, Subpart GG) applicable to gas turbines apply to:

1. Electric utility stationary gas turbines with a heat input at peak load of greater than 100 x $10^6$ Btu/hr [40 CFR 60.332 (b)];
2. Stationary gas turbines with a heat input at peak load between 10 and 100 x $10^6$ Btu/hr [40 CFR 60.332 (c)]; or
3. Stationary gas turbines with a manufacturer's rate base load at ISO conditions of 30 MW or less [40 CFR 60.332 (d)] except as provided in Section 60.322(b) shall comply with paragraph (a)(2) of this section.

The electric utility stationary gas turbine provisions apply to stationary gas turbines constructed for the purpose of supplying more than one-third of their potential electric output capacity for sale to any utility power distribution system [40 CFR 60.331 (q)]. The requirements for electric utility stationary gas turbines are applicable to the 501F class turbines proposed for the project and are the most stringent provision of the NSPS. These requirements are summarized in Table B-1 and were considered in the BACT analysis.

As noted from Table B-1, the NSPS $NO_x$ emission limit can be adjusted upward to allow for fuel-bound nitrogen (FBN). For a fuel-bound nitrogen concentration of 0.015 percent or less, no increase in the NSPS is provided; for a fuel-bound nitrogen concentration of 0.03 percent, the NSPS is increased by 0.0012 percent or 12 parts per million (ppm). The NSPS $NO_x$ emission limit adjustment is not affected by natural gas combustion.

## B.2 BEST AVAILABLE CONTROL TECHNOLOGY

### B.2.1 NITROGEN OXIDES

Advanced dry low-$NO_x$ combustion alone has increasingly been approved by regulatory agencies as BACT and is technically feasible for the proposed project. Available information suggests that "hot" SCR with dry low-$NO_x$ combustor technology or with wet injection is also available for some smaller size turbines. However, this technology has not been commercially demonstrated or made available for the F Class turbine.

**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.

Table B-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. This table was 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.

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 only recently been developed and made available for gas turbines. SCR is a post-combustion control, while advanced dry low-$NO_x$ combustors minimize the formation of $NO_x$ in the combustion process.

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. A majority of projects are for SCR installed in the heat-recovery steam generator (HRSG). Only 3 simple cycle projects with SCR have been constructed. Of these projects that have either installed SCR or have been permitted with SCR, many have been in the Southern California $NO_2$ nonattainment area where SCR was required not as BACT but as LAER, a more stringent requirement. 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).

As noted previously, there are distinct regulatory and policy differences between LAER and BACT.

As discussed in Section 3.0, 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.

All the projects in California have natural gas as the primary fuel, and less than 15 percent of the SCR applications in California have distillate fuel as backup.

The other group of projects with SCR are located in the eastern United States. These projects are located in Vermont, Massachusetts, Connecticut, New Jersey, New York, Rhode Island, and Virginia. A majority of these projects are cogenerators or independent power producers. 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. Also, none of these projects included SCR for CTs with simple cycle operations.

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 are approximately 9 ppm for natural gas firing. However, a few facilities have reported emission limits of about 3.5 ppm.

Wet injection historically has been the primary method of reducing $NO_x$ emissions from CTs. Indeed, 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). Development of improved wet injection combustors reduced $NO_x$ concentrations to 25 ppmvd (corrected to 15 percent $O_2$) when burning natural gas. More recently, however, CT manufacturers have developed dry low-$NO_x$ combustors that can reduce $NO_x$ concentrations to 15 ppmvd (corrected to 15 percent $O_2$) or less when firing natural gas.

**Technology Description and Feasibility**

***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. At this point, operation of the CT becomes inefficient and unreliable, and significant increases in products of incomplete combustion results (i.e., CO and VOC emissions). In "F" Class turbines using wet injection with gas firing, the $NO_x$ emission rates in the 30 ppm range have been demonstrated. However, wet injection is no longer offered for gas firing in "F" Class turbine. Wet injection is the only current feasible means of reducing $NO_x$ emissions in the combustion process when firing oil.

***Dry Low-$NO_x$ Combustor***

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, Kraftwork Union, and ABB, can achieve $NO_x$ concentrations of 25 ppmvd or less when firing natural gas. Westinghouse and GE have offered dry low-$NO_x$ combustors on advanced heavy-duty industrial machines. Thermal

$NO_x$ formation is inhibited by using combustion techniques where the natural gas and combustion air are premixed before ignition. For the CT being considered for the project, the combustion chamber design includes the use of dry low-$NO_x$ combustor technology. The $NO_x$ emission level when firing natural gas at baseload conditions is 15 ppmvd (corrected to 15 percent $O_2$), a level which is guaranteed by the selected vendor (Westinghouse or equivalent) for the project.

### Selective Catalytic Reduction

Selective Catalytic Reduction (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 operating experience, as applied to gas turbines, consists primarily of baseload natural-gas-fired installations either of cogeneration or combined cycle configuration; no 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 primarily limited to combined-cycle facilities that burn natural gas with small amounts of fuel oil, since SCR catalysts are contaminated by sulfur-containing fuels . 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 withstanding temperature ranges up to 1,100°F, have become available commercially only recently in smaller size units. 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.

In the 1990s there are four simple cycle combustion turbine projects that have installed SCR with operating experience. These projects are:

- Redding Municipal Power – 3 GE Frame 5 CTs fired with natural gas. The CTs are operated as a peaking facility.
- SoCal Gas Company – 4 Solar Centaur CTs (4MW equivalent each) fired with natural gas. The CTs are operated in intermediate cycling duty.
- UnoCal Brea Research Center – a single 4 MW CT firing natural gas. The CT operates in intermediate to base load duty.
- Puerto Rico Electric Power Authority (Cambalache Facility) – 3 ABB Type 11 N (83 MW each) firing No. 2 distillate oil.

The SCRs for all these CTs were designed to operate at temperatures less than 1,000°F. Many of the smaller CTs have exhaust temperatures less than 1,000°F. The Cambalache Facility had a once through steam generator in the ductwork leading to SCR used for power augmentation that reduced the catalyst temperature to less than 1,000°F. Experience on these systems has shown significant catalyst deactivation occurs with peaking and intermediate cycling duty while firing natural gas. Under these conditions catalyst deactivation has occurred after operating from 350 to 4,000 hours. For intermediate-base load duty and firing natural gas, catalyst deactivation improved but still occurred after 8,000 hour of operation and well less the catalyst guarantee. When firing distillate oil, catalyst deactivation occurred after 600 hours. Due to the problems with oil firing, the SCR system for the Cambalache Facility has been removed. This experience suggests that SCR for simple cycle CTs while available from vendors has not been demonstrated as feasible.

**$SCONO_x$™ Process**

$SCONO_x$™ 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 $SCONO_x$™ system employs a single catalyst to simultaneously oxidize CO to $CO_2$ and NO to $NO_2$. $NO_2$ formed by the oxidation of NO is subsequently absorbed onto the catalyst surface through the use of a potassium carbonate absorber coating. The $SCONO_x$™ oxidation/absorption cycle reactions are:

$$CO + \frac{1}{2} O_2 \rightarrow CO_2 \quad (1)$$

$$NO + \frac{1}{2} O_2 \rightarrow NO_2 \quad (2)$$

$$2NO_2 + K_2CO_3 \rightarrow CO_2 + KNO_2 + KNO_3 \quad (3)$$

$CO_2$ 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 $SCONO_x$™ regeneration cycle reaction is:

$$KNO_2 + KNO_3 + 4\,H_2 + CO_2 \rightarrow K_2CO_3 + 4\,H_2O_{(g)}) + N_2 \quad (4)$$

Water vapor and elemental nitrogen are released to the atmosphere as part of the CT/HRSG exhaust stream. Following regeneration, the $SCONO_x$™ 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 $SCONO_x$™ 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:

$$CH_4 + \frac{1}{2} O_2 + 1.88\, N_2 \rightarrow CO + 2\, H_2 + 1.88\, N_2 \quad (5)$$

$$CO + 2\, H_2 + H_2O + 1.88\, N2_2 \rightarrow CO_2 + 3\, H_2 + 1.88\, N_2 \quad (6)$$

The $SCONO_x$™ operates at a temperature range of 300 to 700°F and, therefore, must be installed in the appropriate temperature section of a HRSG. For $SCONO_x$™ 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 $SO_2$ 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:

$$CO + \frac{1}{2} O_2 \rightarrow CO_2 \qquad (7)$$

$$SO_2 + \frac{1}{2} O_2 \rightarrow SO_3 \qquad (8)$$

$$SO_3 + SORBER \rightarrow [SO_3 + SORBER] \qquad (9)$$

$$[SO_3 + SORBER] + 4\,H_2 \rightarrow H_2S + 3\,H_2O \qquad (10)$$

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 re-generation 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 (30 MW size) 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.

The $SCONO_x^{TM}$ control technology is not considered to be technically feasible because it has not been commercially demonstrated on large CTs. The CTs planned for the project, Westinghouse 501 F units, each have a nominal generating capacity of 180 MW which are approximately six times larger than the nominal 25-MW GE LM2500 utilized at the Sunlaw Energy Corporation Los Angeles facility. Technical problems associated with scale-up of the SCONO$_x$™ technology given the large differences in machine flow rates are unknown. Additional concerns with the SCONO$_x$™ control technology include process complexity (multiple catalytic oxidation / absorption / regeneration systems), reliance on only one supplier, and the relatively brief (approximately 18 months) operating history of the technology.

**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$_x$. 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:

$$CO(NH_2)_2 + 2NO + \frac{1}{2} O_2 \rightarrow 2N_2 + CO_2 + 2H_2O$$

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:

1. Low capital and operating costs as a result of use of urea injection, and
2. The proprietary catalysts used are nontoxic and nonhazardous, thus eliminating potential disposal problems.

Disadvantages of the system are as follows:

1. Formation of ammonia from excess urea treatment rates and/or improper use of reagent catalysts, and
2. 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 $NO_xOUT$ system is limited and the $NO_xOUT$ system has not been demonstrated on any combustion turbine/HRSG unit.

The $NO_xOUT$ process is not technically feasible for the proposed project because of the high application temperature of 1,600°F to 1,950°F. The maximum exhaust gas temperature of the 501F CT is about 1,000°F. Raising the exhaust temperature the required amount essentially would require installation of a heater. 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 $NO_x$.

**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 will not be considered for the proposed project since its high application temperature makes it technically infeasible. The maximum exhaust gas temperature of a 501 F combustion turbine is typically 1,100°F; the cost to raise the exhaust gas to such a high temperature is prohibitively expensive.

**Nonselective Catalytic Reduction**

Certain manufacturers, such as Engelhard, market a nonselective catalytic reduction system (NSCR) for $NO_x$ control on reciprocating engines. 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. 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.

**Technology Demonstration and Feasibility**

The technical evaluation of post-combustion gas controls that include $NO_x$OUT, Thermal De$NO_x$, NSCR, and SCONO™ indicate that these processes have not been applied to simple-cycle turbines and are technically infeasible for the project because of process constraints (e.g., temperature). While high-temperature SCR is feasible, it has not been demonstrated on simple-cycle "F" class turbines in peaking service. Wet injection cannot achieve emission rates lower than 25 ppm when firing natural gas in an "F" Class machine and is not offered by the preferred vendor.

For the BACT analysis, dry low-$NO_x$ combustion technology is technically feasible when firing natural gas and SCR in combination with combustion controls is a potentially feasible alternative that can achieve a maximum degree of emission reduction. The advanced dry low-$NO_x$ combustor alone can achieve 15 ppm (corrected) and the SCR with dry low-$NO_x$ combustor is capable of achieving a $NO_x$ emission level of 9 ppm when firing natural gas (corrected to 15 percent $O_2$ dry conditions).

Below is a summary of the technical demonstration and feasibility for the proposed Palmetto Power project.

| Technology | Simple Cycle |
|---|---|
| Dry Low-$NO_x$ Combustors | Demonstrated and Feasible – Gas Firing |
| Wet Injection | Not Feasible/Available – Gas Firing |
| Selective Catalytic Reduction | Not Demonstrated on "F" Class turbines in peaking service |
| Thermal De $NO_x$ | Not Feasible |
| $NO_x$ Out | Not Feasible |
| SCO $NO_x$ | Not Feasible |
| NSCR | Not Feasible |

**SCR Cost Estimates**

Tables B-3 and B-4 present the total capital and annualized cost for SCR applied to simple cycle operation, respectively. The costs were developed using EPA Cost Control Manual (EPA, 1990 & 1993). Vendor based estimates were used for the SCR system. Standard EPA recommended cost factors were used. A capital recovery period of 15 years was used for the capital costs and 3 years for the reoccurring capital costs (i.e., catalyst). SCR system in simple-cycle operation would be subjected to temperatures exceeding 1,000°F where considerable wear can take place resulting in lower life of equipment. Capital recovery periods in this case may be much lower.

**B.2.2 Carbon Monoxide**

**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 viable for the project. Table B-5 presents a listing of LAER/BACT decisions for CO emissions from combustion turbines. Combustion design is the more common control technique used in CTs. Sufficient time, temperature, and turbulence is required within the combustion zone to maximize combustion efficiency and minimize the emissions of CO. Combustion efficiency is dependent upon combustor design. For the CTs being evaluated, CO emissions will not exceed 25 ppmvd, corrected to 15 percent $O_2$, dry conditions when firing natural gas under full load conditions.

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 wet injection. These installations have been required to use LAER technology and typically have CO limits in the 10 ppm range (corrected to dry conditions).

**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, the oxidation catalyst can be located directly after the CT. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency. The existing oxidation catalyst applications primarily have been limited to smaller cogeneration facilities burning natural gas. Oxidation catalysts have not been used on fuel-oil-fired CTs or combined cycle facilities. 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 units likely will require numerous startups, during simple-cycle operation, variations in exhaust conditions will influence catalyst life and performance. Very little technical data exist to demonstrate the effect of such cycling.

**Oxidation Catalyst Costs**

Tables B-6 and B-7 present the capital and annualized cost for an oxidation catalyst applied to simple cycle operation. The maximum CO impacts are less than 0.1 percent of the applicable ambient air quality standards. There would also be no secondary benefits, such as reducing acidic deposition, to reducing CO.

Table B-1. Federal NSPS for Electric Utility Stationary Gas Turbines

| Pollutant | Emission Limitation[a] |
|---|---|
| Nitrogen Oxides[b] | 0.0075 percent by volume (75 ppm) at 15 percent $O_2$ on a dry basis adjusted for heat rate and fuel nitrogen |

[a] Applicable to electric utility gas turbines with a heat input at peak load of greater than 100 x $10^6$ Btu/hr.

[b] Standard is multiplied by 14.4/Y; where Y is the manufacturer's rated heat rate in kilojoules per watt at rated load or actual measured heat rate based on the lower heating value of fuel measured at actual peak load; Y cannot be greater than 14.4. Standard is adjusted upward (additive) by the percent of nitrogen in the fuel:

| Fuel-Bound Nitrogen (percent by weight) | Allowed Increase $NO_x$ Percent by Volume |
|---|---|
| $N \leq 0.015$ | 0 |
| $0.015 < N \leq 0.1$ | 0.04(N) |
| $0.1 < N \leq 0.25$ | 0.004+0.0067(N-0.1) |
| $N > 0.25$ | 0.005 |

where: N = the nitrogen content of the fuel (percent by weight).

Source: 40 CFR 60 Subpart GG.

Table B-2. 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 |
|---|---|---|---|---|---|---|---|---|
| WYANDOTTE ENERGY | MI | Feb-99 | TURBINE, COMBINED CYCLE, POWER PLANT | 500 MW | 4.5 PPM | SCR | 70 | BACT |
| MOBILE ENERGY LLC | AL | Jan-99 | TURBINE, GAS, COMBINED CYCLE | 168 MW | 0.019 LB/MMBTU | SCR & DLN COMBUSTORS DURING GAS FIRING. STEAM/WATER INJECTION DURING OIL FIRING | 0 | BACT-PSD |
| COLORADO SPRINGS UTILITIES | CO | Jan-99 | TURBINE, COMBINE, NATURAL GAS FIRED | 30 MW EACH | 15 PPMVD ABOVE 70% LOAD | POLLUTION PREVENTION BUILT INTO EQUIPMENT. | 0 | BACT-PSD |
| TENUSKA GEORGIA PARTNERS, L.P. | GA | Dec-98 | TURBINE, COMBUSTION, SIMPLE CYCLE, 6 | 160 MW EA | 15 PPMVD @ 15% O2 | USING 15% EXCESS AIR. NOX EMISSION IS BECAUSE OF NAT. GAS. | 0 | BACT-PSD |
| TENUSKA GEORGIA PARTNERS, L.P. | GA | Dec-98 | TURBINE, COMBUSTION, SIMPLE CYCLE, 6 | 160 MW EA | 42 PPMVD @ 15% O2 | USING 15% EXCESS AIR. NOX EMISSION IS BECAUSE OF FUEL OIL. | 0 | BACT-PSD |
| SANTA ROSA ENERGY LLC | FL | Dec-98 | TURBINE, COMBUSTION, NATURAL GAS | 241 MW | 9.8 PPM@15%O2 DB ON | DRY LOW NOX BURNER | 0 | BACT-PSD |
| CITY OF LOMPOC (PORTABLE TUBGRINDER IC ENGINE) | CA | Dec-98 | IC ENGINE, DIESEL-FIRED, PORTABLE 460 BHP, CATERPI | 460 BHP | 560 PPMVD @ 15% O2 | DIRECT INJECTION, TURBOCHARGED, INTAKE INTERCOOLER | 0 | BACT-OTHER |
| LSP - COTTAGE GROVE, L.P. | MN | Nov-98 | ENGINE, DIESEL, EMERGENCY FIRE PUMP | 2.7 MMBTU/H | 1.65 LB/MMBTU | LIMITED TO BURN DIESEL 150 H/YR. | 0 | BACT-PSD |
| LSP - COTTAGE GROVE, L.P. | MN | Nov-98 | GENERATOR, COMBUSTION TURBINE & DUCT BURNER | 1988 MMBTU/H (CTG) | 4.5 PPMDV @ 15%O2 (NG) | SELECTIVE CATALYTIC REDUCTION (SCR) WITH A NOX CEM AND PEM. | 0 | BACT-PSD |
| WESTERN GAS RESOURCES - HILIGHT GAS PLANT | WY | Oct-98 | ENGINES, COMPRESSOR, 2 EA | 1650 HP | 1 G/HP-H | 3 - WAY CATALYST SYSTEM AND AIR/FUEL RATIO CONTRO-LLER. | 0 | BACT-PSD |
| SABA PETROLEUM, INC. (BELL COMPRESSOR PLANT) | CA | Oct-98 | IC ENGINE, COMPRESSOR, NATURAL GAS-FIRED | 747 BHP | 0.15 G/B-HP-H | 3-WAY CATALYTIC CONVERTER. MFGR: DCLI, INC; MODEL:DC67/77-10 WITH ELECTRONIC AIR/FUEL RATIO CONTROLLER | 0 | BACT-OTHER |
| CHAMPION INTERNATL CORP. & CHAMP. CLEAN ENERGY | ME | Sep-98 | TURBINE, COMBINED CYCLE, NATURAL GAS | 175 MW | 9 PPMVD @ 15% O2 GAS | DRY LOW NOX BURNER-1 OPTION IS CONSIDERED FOR OIL AND IS SELECTED. | 0 | BACT-OTHER |
| TNP TECHN, LLC (FORMERLY TX-NM POWER CO.) | NM | Aug-98 | GAS TURBINES | 375 MMBTU/H | 15 PPM | WATER INJECTION FOLLOWED BY SELECTIVE CATALYTIC REDUCTION | 95 | BACT-PSD |
| CASCO RAY ENERGY CO | ME | Jul-98 | TURBINE, COMBINED CYCLE, NATURAL GAS, TWO | 170 MW EACH | 3.5 PPM @15% O2 | SELECTIVE CATALYTIC REDUCTION | 0 | BACT-PSD |
| CITY OF LAKELAND ELECTRIC AND WATER UTILITIES | FL | Jul-98 | TURBINE, COMBUSTION, GAS FIRED W/ FUEL OIL ALSO | 2174 MMBTU/H | 25 PPM @ 15% O2 | DRY LOW NOX BURNERS FOR SIMPLE CYCLE, SCR WHEN COMBINED CYCLE | 0 | BACT-PSD |
| COLORADO SPRINGS UTILITIES-NIXON POWER PLANT | CO | Jun-98 | SIMPLE CYCLE TURBINE, NATURAL GAS | 1122 MM BTU/HR | 25 PPM @ 15% O2 | DRY LOW NOX COMBUSTION | 0 | BACT-PSD |
| BRIDGEPORT ENERGY, LLC | CT | Jun-98 | TURBINES, COMBUSTION MODEL V84.3A, 2 SIEMES | 260 MW/HRSG PER TURBINE | 6 PPM NAT. GAS | DRY LOW NOX BURNER WITH SCR | 80 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINE, COMPRESSOR, 9 EA | 3200 HP | 0.5 G/HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINES, COMPRESSOR, 2 EA | 1200 HP | 0.9 G/B-HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINES, COMPRESSOR, 9 EA | 3200 HP | 0.9 G/B-HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY. | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | COMPRESSOR, ENGINES, 2 EA | 1200 HP | 0.9 G/HP-H | ULTRA LOW NOX LEAN BURNTECHNOLOGY. | 0 | BACT-PSD |
| RUMFORD POWER ASSOCIATES | ME | May-98 | TURBINE GENERATOR, COMBUSTION, NATURAL GAS | 1906 MMBTU/H | 3.5 PPM @ 15% O2 | SCR AMMONIA INJECTION SYSTEM AND CATALYTIC REACTORTO REDUCE NOX. | 65 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | Mar-98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675 MMBTU/H TURBINE | 6 PPM @ 15% O2 NG | LOW NOX BURNERS. LOW NOX COMBUSTORS. SCR DURING GAS FIRING ONLY. | 65 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | Mar-98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675 MMBTU/H TURBINE | 42 PPM @ 15% O2 NG OIL | LOW NOX COMBUSTORS, LOW NOX BURNERS, WATER INJECTION DURING OIL FIRING. | 65 | BACT-PSD |
| TWO ELK GENERATION PARTNERS, LIMITED PARTNERSHIP | WY | 2/27/98 | TURBINE, STATIONARY | 33.3 MW | 25 PPM @ 15% O2 | DRY LOW NOX BURNERS | 40 | BACT-PSD |
| AIR LIQUIDE AMERICA CORPORATION | LA | 2/13/98 | TURBINE GAS, GE, 7ME 7 | 966 MMBTU/H | 9 PPMV | DRY LOW NOX TO LIMIT NOX EMISSION TO 9PPMV | 0 | BACT-PSD |
| MILLENNIUM POWER PARTNER, LP | MA | 2/2/98 | TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G | 2534 MMBTU/H | 0.013 LB/MMBTU | DRY LOW-NOX COMBUSTION TECHNOLOGY IN CONJUNCTION WITH SCR ADD-ON NOX CONTROLS. | 0 | BACT-PSD |
| MINNESOTA METHANE TAJIUAS CORPORATION | CA | 1/9/98 | EQUIPMENT, LANDFILL GAS TO ENERGY PRODUCTION | 43.68 MMBTU/H | 0.59 G/B-HP-H | LEAN BURN, EXHAUST ROUTED THROUGH AFTERBURNER TO FURTHER COMBUST ENGINE CO AND UNBURNED HYDROCARBONS | 0 | BACT |
| BASF CORPORATION | LA | 12/30/97 | TURBINE, COGEN UNIT 2, GE FRAME 6 | 42.4 MW | 6 PPMV NAT. GAS | STEAM INJECTION AND SCR TO LIMIT NOX TO 6 PPM FOR NATURAL GAS AND 25 PPM FOR WASTE GAS (60% H2) | 0 | BACT-PSD |
| ARCHIE CRIPPEN | CA | 12/9/97 | IC ENGINE, DETROIT DIESEL MODEL 6V-92TA | 500 BHP | 6.2 G/B-HP-H | NO CONTROL | 0 | BACT |
| WILLIAMS FIELD SERVICES--MIDDLE MESA CDP | NM | 12/3/97 | NATURAL GAS COMPRESSOR STATION, 14 ENGINES | 1478 HP, EACH | 4.51 LB/HR EACH ENGINE | CLEAN/LEAN BURN COMBUSTION | 0 | BACT-PSD |
| 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 MS3002G 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 | 60 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 | 9,180 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 | 118 MW | 20 PPMVD | WATER INJECTION WITH SCR | 0 | BACT-PSD |
| MID-GEORGIA COGEN. | GA | Apr-96 | COMBUSTION TURBINE (2), NATURAL GAS | 118 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-96 | 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 (NC | 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 |

Table B-2. 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 |
|---|---|---|---|---|---|---|---|---|
| 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 V84.3 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 | 62 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 | 365 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 | 62 | 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 | 80 | 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 INJECTION | 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 |
| 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 | 926 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 | 0.06 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 | 63 | BACT-OTHER |
| OKLAHOMA MUNICIPAL POWER AUTHORITY | OK | Dec-92 | TURBINE, COMBUSTION | 58 MW | 25 PPM @ 15% O2 (GAS) | COMBUSTION CONTROLS | 63 | 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. | 86 | 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 | 69.7 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) | 75 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINE FACILITY, GAS | 7.4 X10(7) 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 | 86 LBS/HR/UNIT | WATER INJECTION AND SCR | 80 | BACT-PSD |
| GORDONSVILLE ENERGY L.P. | VA | Sep-92 | TURBINE FACILITY, GAS | 1,331 X10(7) 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% O2 | 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) | 1,640 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 |

Table B-2. 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 |
|---|---|---|---|---|---|---|---|---|
| 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 | 80 | 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 | 65.1 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 0.67 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 |
| 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 | 65 | 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 (OI | 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 (OI | WATER INJECTION | 0 | BACT-PSD |
| NEVADA COGENERATION ASSOCIATES #2 | NV | Jan-91 | COMBINED-CYCLE POWER GENERATION | 85 MW POWER OUTPUT | 81.3 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 | 81.3 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 | 80 | 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 | 80 | BACT |

Note: PSD= Prevention of Significant Deterioration
BACT= Best Available Control Technology
LAER= Lowest Achievable Emission Rate

Table B-3. Capital Cost for Selective Catalytic Reduction for Westingouse Frame 501F Simple Cycle Combustion Turbine

| Cost Component | Costs | Basis of Cost Component |
|---|---|---|
| Direct Capital Costs | | |
| SCR Associated Equipment | $891,372 | Vendor Based Estimate |
| Ammonia Storage Tank | $128,156 | $35 per 1,000 lb mass flow developed from vendor quotes |
| Flue Gas Cooling | $260,000 | Vendor Based Estimate (110,000acfm) |
| Instrumentation | $89,137 | 10% of SCR Associated Equipment |
| Taxes | $131,275 | 6% of SCR Associated Equipment and Catalyst |
| Freight | $109,396 | 5% of SCR Associated Equipment |
| **Total Direct Capital Costs (TDCC)** | $1,609,336 | |
| Direct Installation Costs | | |
| Foundation and supports | $232,470 | 8% of TDCC and RCC;OAQPS Cost Control Manual |
| Handling & Erection | $406,823 | 14% of TDCC and RCC;OAQPS Cost Control Manual |
| Electrical | $116,235 | 4% of TDCC and RCC;OAQPS Cost Control Manual |
| Piping | $58,118 | 2% of TDCC and RCC;OAQPS Cost Control Manual |
| Insulation for ductwork | $29,059 | 1% of TDCC and RCC;OAQPS Cost Control Manual |
| Painting | $29,059 | 1% of TDCC and RCC;OAQPS Cost Control Manual |
| Site Preparation | $5,000 | Engineering Estimate |
| Buildings | $15,000 | Engineering Estimate |
| **Total Direct Installation Costs (TDIC)** | $891,763 | |
| **Recurring Capital Costs (RCC)** | $1,296,542 | Catalyst; Vendor Based Estimate |
| **Total Capital Costs (TCC)** | $3,797,641 | Sum of TDCC, TDIC and RCC |
| Indirect Costs | | |
| Engineering | $379,764 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| PSM/RMP Plan | $50,000 | Engineering Estimate |
| Construction and Field Expense | $189,882 | 5% of Total Capital Costs; OAQPS Cost Control Manual |
| Contractor Fees | $379,764 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| Start-up | $75,953 | 2% of Total Capital Costs; OAQPS Cost Control Manual |
| Performance Tests | $37,976 | 1% of Total Capital Costs; OAQPS Cost Control Manual |
| Contingencies | $379,764 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| **Total Indirect Capital Cost (TInCC)** | $1,493,104 | |
| **Total Direct, Indirect and Recurring Capital Costs (TDIRCC)** | $5,290,745 | Sum of TCC and TInCC |

| | | |
|---|---|---|
| Mass Flow of Combustion Turbine | 4,518,595 lb/hr | "G" |
| | 3,661,592 lb/hr | "F" |

Table B-4. Annualized Cost for Selective Catalytic Reduction for Westinghouse Frame 501F Simple Cycle Operation

| Cost Component | Costs | Basis of Cost Component |
|---|---|---|
| Direct Annual Costs | | |
| Operating Personnel | 18,720 | 24 hours/week at $15/hr |
| Supervision | 2,808 | 15% of Operating Personnel;OAQPS Cost Control Manual |
| Ammonia | 61,054 | $300 per ton for Aqueous $NH_3$ |
| PSM/RMP Update | 15,000 | Engineering Estimate |
| Inventory Cost | 47,453 | Capital Recovery (10.98%) for 1/3 catalyst |
| Catalyst Disposal Cost | 34,175 | $28/1,000 lb/hr mass flow over 3 years; developed from vendor quotes |
| Contingency | 17,921 | 10% of Direct Annual Costs |
| **Total Direct Annual Costs (TDAC)** | 197,132 | |
| Energy Costs | | |
| Electrical | 42,000 | 80kW/h for SCR 200kW/h for cooling fan @ $0.04/kWh times Capacity Factor |
| MW Loss and Heat Rate Penalty | 246,833 | 0.5% of MW output; EPA, 1993 (Page 6-20) |
| Capacity Loss | 42,922 | 3 days outage each 3 years; Capacity penalty of $240,000 per % per year. |
| Fuel Escalation | 9,953 | Escalation of fuel over inflation; 3% of energy costs |
| Contingency | 34,171 | 10% of Energy Costs |
| **Total Energy Costs (TEC)** | 375,878 | |
| Indirect Annual Costs | | |
| Overhead | $49,549 | 60% of Operating/Supervision Labor and Ammonia |
| Property Taxes | $52,907 | 1% of Total Capital Costs |
| Insurance | $52,907 | 1% of Total Capital Costs |
| Annualized Total Direct Capital | $438,563 | 10.98% Capital Recovery Factor of 7% over 15 years times sum of TDCC, TDIC and TInCC |
| Annualized Total Direct Recurring | $494,112 | 38.11% Capital Recovery Factor of 7% over 3 years times RCC |
| **Total Indirect Annual Costs (TIAC)** | $1,088,040 | |
| **Total Annualized Costs** | $1,661,050 | Sum of TDAC, TEC and TIAC |
| **Cost Effectiveness** | $11,850 | $NO_x$ Reduction Only |
| | $18,381 | Net Emission Reduction |

Table B-5. 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 |
|---|---|---|---|---|---|---|---|---|
| PDC EL PASO MILFORD LLC | CT | Apr-99 | TURBINE, COMBUSTION, ABB GT-24E,#2 WITH 2 CHILLERS | 1.97 MMCF/H | 13 LB/H NAT GAS | OXIDATION CATALYST | 0 | BACT-PSD |
| PDC EL PASO MILFORD LLC | CT | Apr-99 | TURBINE, COMBUSTION, ABB GT-24, #1 WITH 2 CHILLERS | 1.97 MMCF/H | 13 LB/H NAT GAS | OXIDATION CATALYST | 0 | BACT-PSD |
| ALABAMA POWER COMPANY - THEODORE COGENERATION | AL | Mar-99 | TURBINE, WITH DUCT BURNER | 170 MW | 0.086 LB/MMBTU | EFFICIENT COMBUSTION | 0 | BACT-PSD |
| MOBILE ENERGY LLC | AL | Jan-99 | TURBINE, GAS, COMBINED CYCLE | 168 MW | 0.04 LB/MMBTU | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| TENASKA GEORGIA PARTNERS, L.P. | GA | Dec-98 | TURBINE, COMBUSTION, SIMPLE CYCLE, 6 | 160 MW EA | 15 PPMVD @ 15% O2 | USING 15% EXCESS AIR. CO EMISSION IS BECAUSE OFNATURAL GAS. | 0 | BACT-PSD |
| TENUSKA GEORGIA PARTNERS, L.P. | GA | Dec-98 | TURBINE, COMBUSTION, SIMPLE CYCLE, 6 | 160 MW EA | 33 PPMVD | CO EMISSION IS BECAUSE OF FUEL OIL WHEN DUTPUT ISBELOW 123 MW LIMIT IS 33 PPMVD AND ABOVE 123 MW LIMIT IS 20 PPMVD. | 0 | BACT-PSD |
| WESTBROOK POWER LLC | ME | Dec-98 | TURBINE, COMBINED CYCLE, TWO | 528 MW TOTAL | 15 PPM @15% O2 | USING 15 % EXCESS AIR. | 0 | BACT-PSD |
| SANTA ROSA ENERGY LLC | FL | Dec-98 | TURBINE, COMBUSTION, NATURAL GAS | 241 MW | 0 | DRY LOW NOX BURNER GOOD COMBUSTION PRACTICE | 0 | BACT-PSD |
| GORHAM ENERGY LIMITED PARTNERSHIP | ME | Dec-98 | TURBINE, COMBINED CYCLE | 900 MW TOTAL | 5 PPM @ 15% O2 (NAT G) | 0.05% SULFUR DISTILLATE OIL #2 IS USED. EMISSION IS FROM EACH 300 MW SYSTEM. | 0 | BACT-PSO |
| WESTERN GAS RESOURCES - HILIGHT GAS PLANT | WY | Oct-98 | ENGINES, COMPRESSOR, 2 EA | 1650 HP | 2 G/HP-H | 3 - WAY CATALYST SYSTEM AND AIR/FUEL RATIO CONTRO-LLER. | 0 | BACT-PSD |
| WILLIAMS FIELO SERVICES | NM | Sep-98 | IC ENGINE, COMPRESSOR | 27240 HP | 2.65 G/B-HP-H | LEAN-BURN ENGINE DESIGN | 0 | BACT-PSD |
| CHAMPION INTERNATL CORP. & CHAMP. CLEAN ENERGY | ME | Sep-98 | TURBINE, COMBINED CYCLE, NATURAL GAS | 175 MW | 9 PPMVD @ 15% O2 GAS | | 0 | BACT-OTHER |
| TNP TECHN, LLC (FORMERLY TX-NM POWER CO.) | NM | Aug-98 | GAS TURBINES | 375 MMBTU/H | 18 PPM | GOOD COMBUSTION PRACTICES | 0 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | Jul-98 | RECIPROCATING ENGINE, NAT. GAS | 1375 HP | 2.65 G/B-HP-H | CLEAN BURN COMBUSTION TECHNOLOGY | 0 | BACT-PSD |
| CASCO RAY ENERGY CO | ME | Jul-98 | TURBINE, COMBINED CYCLE, NATURAL GAS, TWO | 170 MW EACH | 20 PPM @ 15% O2 | 15% EXCESS AIR | 0 | BACT-PSD |
| CITY OF LAKELAND ELECTRIC AND WATER UTILITIES | FL | Jul-98 | TURBINE, COMBUSTION, GAS FIRED W/ FUEL OIL ALSO | 2174 MMBTU/H | 25 PPM | GOOD COMBUSTION WITH DRY LOW NOX BURNERS OXIDATION CATALYST MAY BE USED | 0 | BACT-PSD |
| COLORADO SPRINGS UTILITIES-NIXON POWER PLANT | CO | Jun-98 | SIMPLE CYCLE TURBINE, NATURAL GAS | 1122 MM BTU/HR | 0.8 DRE | CATALYTIC OXIDATION | 80 | BACT-PSD |
| BRIDGEPORT ENERGY, LLC | CT | Jun-98 | TURBINES, COMBUSTION MODEL V84.3A, 2 SIEMES | 260 MW/HRSG PER TURBINE | 10 PPM GAS & OIL | PRE-MIX FUEL FAIR TO OPTIMIZE EFFICIENCY ACTUAL EMISSIONS EXPECTEO BETWEEN 5-7PPM | 0 | BACT-PSD |
| WILLIAMS FIELO SERVICES CO. | NM | Jun-98 | RECIPROCATING ENGINES, NAT. GAS | 21920 HP | 2.65 G/B-HP-H | LEAN BURN ENGINE DESIGN | 0 | BACT-PSD |
| ENCOGEN HAWAII, L.P. | HI | Jun-98 | TURBINES, COMBUSTION, 2 EA | 23 MW | 57.5 PPMVD @ 15% O2 | GOOD COMBUSTION DESIGN AND OPERATION. | 0 | BACT-PSD |
| GENERAL ELECTRIC PLASTICS | AL | May-98 | COMBINED CYCLE (TURBINE AND DUCT BURNER) | 0 | 0.06 LBS/MMBTU | PROPER COMBUSTION | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINES, COMPRESSOR, 2 EA | 1200 HP | 2.8 G/B-HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY. | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINE, COMPRESSOR, 9 EA | 3200 HP | 0.5 G/HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY AND CATALYTIC CRACKING. | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | ENGINES, COMPRESSOR, 9 EA | 3200 HP | 0.5 G/B-HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY. CATALYTIC CONVERTER. | 0 | BACT-PSD |
| UNION PACIFIC RESOURCES - PATRICK DRAW GAS PLANT | WY | May-98 | COMPRESSOR, ENGINES, 2 EA | 1200 HP | 2.8 G/HP-H | ULTRA LOW NOX LEAN BURN TECHNOLOGY. | 0 | BACT-PSD |
| RUMFORD POWER ASSOCIATES | ME | May-98 | TURBINE GENERATOR, COMBUSTION, NATURAL GAS | 1906 MMBTU/H | 15 PPM @ 15% O2 | GE DRY LOW-NOX COMBUSTOR DESIGN. GOOD COMBUSTION CNTRL | 0 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | Apr-98 | NATURAL GAS RECIPROCATING ENGINE | 1478 HP | 2.65 G/B-HP-H | LEAN BURN DESIGN | 0 | BACT-PSD |
| WILLIAMS FIELD SERVICES CO. | NM | Apr-98 | ENGINE, IC RECIPROCATING, NAT. GAS | 1374 HP | 2.65 G/B-HP-H | CLEAN BURN COMBUSTION TECHNOLOGY | 0 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | Mar-98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675 MMBTU/H TURBINE | 74.21 LB/H NG | CATALYTIC OXIDATION, GOOD COMBUSTION PRACTICES. | 0 | BACT-PSD |
| ANDROSCOGGIN ENERGY LIMITED | ME | Mar-98 | GAS TURBINES, COGEN, W/DUCT BURNERS | 675 MMBTU/H TURBINE | 43.73 LB/H NG OIL | CATALYTIC OXIDATION, GOOD COMBUSTION PRACTICES. | 0 | BACT-PSD |
| TIVERTON POWER ASSOCIATES | RI | Feb-98 | COMBUSTION TURBINE, NATURAL GAS | 265 MW | 12 PPM @ 15% O2 | GOOO COMBUSTION | 0 | BACT-PSD |
| AIR LIQUIDE AMERICA CORPORATION | LA | Feb-98 | TURBINE GAS, GE, 7ME 7 | 966 MMBTU/H | 25 PPMV | GOOD EQUIPMENT DESIGN, PROPER COMBUSTION TECHNIQUEAND MIN. 2% EXCESS O2 | 0 | BACT-PSD |
| MILLENNIUM POWER PARTNER, LP | MA | Feb-98 | TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G | 2534 MMBTU/H | 0.07 LB/MMBTU | DRY LOW NOX COMBUSTION TECHNOLOGY IN CONJUNCTION WITH SCR ADD-ON NOX CONTROL | 0 | BACT-PSD |
| MAUI ELECTRIC COMPANY | HI | Jan-98 | TURBINE, COMBUSTION, 2 EA | 20 MW | 44 PPMVD @ 15% O2 | GOOD COMBUSTION DESIGN AND OPERATION. | 0 | BACT-PSD |
| BASF CORPORATION | LA | Dec-97 | TURBINE, COGEN UNIT 2, GE FRAME 6 | 42.4 MW | 63.93 LB/MMBTU | GOOD DESIGN, PROPER COMBUSTION TECHNIQUES, 2% EXCESS O2 | 0 | BACT-PSD |
| ARCHIE CRIPPEN | CA | Dec-97 | IC ENGINE, DETROIT DIESEL MODEL 8V-92TA | 500 BHP | 0.51 G/B-HP-H | NO CONTROL | 0 | BACT |
| WILLIAMS FIELD SERVICES--MIDDLE MESA CDP | NM | Dec-97 | NATURAL GAS COMPRESSOR STATION, 14 ENGINES | 1478 HP, EACH | 8 LB/HR EACH ENGINE | CLEAN/LEAN BURN TECHNOLOGY | 0 | BACT-PSD |
| 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 | COMBINEO 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 18 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) | 8,000 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 | 1,906 MMBTU/HR | 81 LB/HR | COMBUSTION CONTROL | 0 | BACT-PSD |
| CAROLINA POWER & LIGHT | NC | Apr-96 | COMBUSTION TURBINE, 4 EACH | 1,906 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 FIREO | 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-98 | 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 V84.3 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-PSO |
| 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 | 365 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 |

Table B-5. 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 |
|---|---|---|---|---|---|---|---|---|
| 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 | 168 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 | 28 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) | 1.6 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 | 16 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 |
| 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 | 66 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)* | 6.5 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) | 6,500 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) | 1,600 MM BTU/HR (EACH) | 76 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 | 600 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 | 46 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% O2 | 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 | 60 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 |

Table B-6. 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 |
|---|---|---|---|---|---|---|---|---|
| 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 | 0.0065 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 B-6. Direct and Indirect Capital Costs for CO Catalyst, Simple Cycle Mode

| Cost Component | Costs | Basis of Cost Component |
|---|---|---|
| Direct Capital Costs | | |
| CO Associated Equipment and Stack | $235,000 | Vendor Based Quote, Stack modifications |
| Instrumentation | $23,500 | 10% of SCR Associated Equipment |
| Sales Tax | | 6% of SCR Associated Equipment/Catalyst |
| Freight | $45,176 | 5% of SCR Associated Equipment/Catalyst |
| **Total Direct Capital Costs (TDCC)** | $303,676 | |
| Direct Installation Costs | | |
| Foundation and supports | $77,776 | 8% of TDCC and RCC;OAQPS Cost Control Manual |
| Handling & Erection | $136,109 | 14% of TDCC and RCC;OAQPS Cost Control Manual |
| Electrical | $38,888 | 4% of TDCC and RCC;OAQPS Cost Control Manual |
| Piping | $19,444 | 2% of TDCC and RCC;OAQPS Cost Control Manual |
| Insulation for ductwork | $9,722 | 1% of TDCC and RCC;OAQPS Cost Control Manual |
| Painting | $9,722 | 1% of TDCC and RCC;OAQPS Cost Control Manual |
| Site Preparation | $5,000 | Engineering Estimate |
| Buildings | $0 | |
| **Total Direct Installation Costs (TDIC)** | $296,662 | |
| **Recurring Capital Costs (RCC)** | $668,529 | Catalyst; Vendor Based Estimate |
| **Total Capital Costs** | $1,268,868 | Sum of TDCC, TDIC and RCC |
| Indirect Costs | | |
| Engineering | $126,887 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| Construction and Field Expense | $63,443 | 5% of Total Capital Costs; OAQPS Cost Control Manual |
| Contractor Fees | $126,887 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| Start-up | $25,377 | 2% of Total Capital Costs; OAQPS Cost Control Manual |
| Performance Tests | $12,689 | 1% of Total Capital Costs; OAQPS Cost Control Manual |
| Contingencies | $126,887 | 10% of Total Capital Costs; OAQPS Cost Control Manual |
| **Total Indirect Capital Cost (TInDC)** | $482,170 | |
| **Total Direct, Indirect and Recurring Capital Costs (TDIRCC)** | $1,751,037 | Sum of TCC and TInCC |
| Mass Flow of Combustion Turbine | 4,518,595 lb/hr | "G" |
| | 3,661,592 lb/hr | "F" |

Table B-7. Annualized Cost for CO Catalyst, Simple Cycle Mode

| Cost Component | Cost | Basis of Cost Estimate |
|---|---|---|
| Diirect Annual Costs | | |
| Operating Personnel | $6,240 | 8 hours/week at $15/hr |
| Supervision | $936 | 15% of Operating Personnel;OAQPS Cost Control Manual |
| Inventory Cost | $24,468 | Capital Recovery (10.98%) for 1/3 catalyst |
| Catalyst Disposal Cost | $34,175 | $28/1,000 lb/hr mass flow over 3 yrs; developed from vendor quotes |
| Contingency | $6,582 | 10% of Direct Annual Costs |
| **Total Direct Annual Costs (TDAC)** | | |
| Energy Costs | | |
| Heat Rate Penalty | $98,733 | 0.2% of MW output; EPA, 1993 (Page 6-20) and $3/mmBtu addl fuel costs |
| MW Loss Penalty | $44,750 | 2 days replacement energy costs @ $0.01 kWh each three period |
| Fuel Escalation | $4,305 | Escalation of fuel over inflation; 3% of energy costs |
| Contingency | $14,779 | 10% of Energy Costs |
| **Total Energy Costs (TDEC)** | $162,567 | |
| Indirect Annual Costs | | |
| Overhead | $4,306 | 60% of Operating/Supervision Labor and Ammonia |
| Property Taxes | $17,510 | 1% of Total Capital Costs |
| Insurance | $17,510 | 1% of Total Capital Costs |
| Annualized Total Direct Capital | $118,859 | 10.98% Capital Recy Factor of 7% over 15 yrs times sum of TDCC, TDIC,& TInCC |
| Annualized Total Direct Recurring | $254,777 | 38.11% Capital Recovery Factor of 7% over 3 years times RCC |
| **Total Indirect Annual Costs** | $412,962 | |
| **Total Annualized Costs** | $575,529 | Sum of TDAC, TEC and TIAC |
| **Cost Effectiveness** | $4,151 | Simple CycleCombustion Turbine |
| | $4,294 | Net Emission Reduction |

# APPENDIX C

# AIR QUALITY MODELING PROTOCOL DOCUMENTS

"Chris Carlson TAL 850/921-9537" <Chris.Carlson@dep.state.fl.us> on 08/09/99 12:53:40 PM

To: Starla S Lacy/NGCCorp@NGCCorp
cc: Alvaro Linero TAL <Alvaro.Linero@dep.state.fl.us>, Cleve Holladay TAL <Cleve.Holladay@dep.state.fl.us>

Subject:

---

Dear Ms. Lacy,

I am writing this e-mail to inform you that I have completed my review of the modeling protocol for the Palmetto Power Project in Osceola County, Florida. The protocol appears to be complete, and I do not have any additional requests at this time. Also, I forwarded a copy of the protocol to the National Park Service, and they stated that a Class I Impact Analysis would not be required for this project. Please contact me if you have any further questions about the dispersion modeling requirements for this project.

Sincerely,

Chris Carlson
Meteorologist
Florida Dept. of Environmental Protection
Division of Air Resources Management
2600 Blair Stone Road
MS # 5505
Tallahassee, FL 32399-2400
phone: (850)921-9537
fax: (850)922-6979
Chris.Carlson@dep.state.fl.us

Dynegy Inc.
1000 Louisiana Street, Suite 5800
Houston, Texas 77002
Phone 713.507.6400
www.dynegy.com

DYNEGY

July 26, 1999

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Mr. A.A. Linero, P.E.

RE: DYNEGY INC.
AIR DISPERSION MODELING PROTOCOL FOR PREVENTION OF SIGNIFICANT DETERIORATION APPLICATION
PALMETTO POWER PROJECT, OSCEOLA COUNTY, FLORIDA

Dear Mr. Linero:

Dynegy Inc. is proposing to construct and operate an independent power production facility capable of generating a nominal net electrical output of 540 megawatts (MW) in Osceola County, Florida. The proposed project, named Palmetto Power L.L.C., will consist of three combustion turbines (generating approximately 180 MW each) operating in simple cycle mode only. Each combustion turbine will be fired by natural gas only. This project is scheduled for second quarter 2002 completion. The facility will be designed for peaking service with up to 3,000 hours per year of operation.

Under new source review requirements for Prevention of Significant Deterioration (PSD), the proposed project will be considered a major source for nitrogen oxides ($NO_x$), total particulate matter (PM), particulate matter with aerodynamic diameters less than 10 microns ($PM_{10}$), and carbon monoxide (CO).

This protocol presents the air dispersion modeling methodology to be used for the PSD analysis, including a discussion of the site geography; air dispersion model to be used; meteorological data; emissions, stack, and building data; receptor locations; and additional impact analyses.

**Air Dispersion Model**
The air dispersion modeling analysis will be conducted in accordance with air modeling guidelines recommended by the Florida Department of Environmental Protection (DEP). Based on the types of sources for the project, the Industrial Source Complex Short-term (ISCST3, Version 98356) will be used to predict air quality impacts in all areas that are

beyond the project's property boundary. This is latest version of the ISCST3 model available from EPA. All modeling analyses will use the EPA default regulatory options.

**Site Geography**

The project site is approximately12 kilometers (km) west of Cocoa. The site is about 20 ft above mean sea level (msl). Around the site, the terrain is flat with elevations at or less than 20 ft above msl.

Since the proposed stack heights for the combustion turbines will be 50 ft, the surrounding terrain is well below the proposed stack top heights. Therefore, the surrounding terrain can be considered as simple (i.e., less than stack top); the simple terrain option will be assumed for the air modeling analysis.

Based on topographical maps of the project site, the land use within a 3-km radius of the site can be classified as rural. As a result, the rural option will be selected in the model.

**Meteorological Data**

Meteorological data will consist of a 5-year record of hourly surface data from Orlando and upper air observations from Ruskin for the years 1987 to 1991. These data are assumed to be representative of the project site because both the project site and the weather station from Orlando are located in rural areas and are situated in central Florida to experience similar weather conditions, such as frontal passages. These data have been accepted for use by the DEP in other PSD permit applications to address air quality impacts for other proposed sources locating in this county and adjacent counties.

**Significant Impact Analysis**

Based on air modeling results for similar projects, the project's impacts are expected to be below the EPA Class II significant impact levels (SIL) for all pollutants. Therefore, PSD incremental and NAAQS analyses would not be required. If more detailed modeling indicates that the proposed project's emissions result in predicted ambient air quality impacts above the EPA Class II SIL, discussions will be held with the DEP and emission inventory data of background sources will be obtained as needed.

The nearest PSD Class I areas to the project site are the Chassahowitzka National Wilderness Area (NWA) and the Everglades National Park which are located about 170 and 220 km, respectively, from the site. Other PSD Class I areas are located more than 250 km away from the project site.

Since the project site is more than 150 km away from the Class I areas, it is not expected that the project's emissions will have a significant impact on these Class I areas. Discussions will be held with the DEP and National Park Service to determine if an air modeling analysis will be required.

**Building Data Processing**

Building dimensions for the project's structures will be entered into the EPA's Building Profile Input Program (BPIP, Version 95086) for the purpose of obtaining direction-specific building heights and widths for all downwash-affected sources. The direction-specific building dimensions will be input to the ISCST3 model for processing.

**Additional Impact Analysis**

In addition to the air quality impact analyses, additional analyses will evaluate impairment to visibility and the impact of the proposed project on soils and vegetation. Impacts as a result of general commercial, residential, industrial, and other growth associated with the proposed project will also be addressed.

Please call me at (713) 767-8961 or Bob McCann at Golder Associates Inc. at (352) 336-5600 if you have any questions or comments on the protocol. Dynegy Inc. greatly appreciates the assistance of the DEP on this important project.

Very truly yours,

DYNEGY INC.

Starla Lacy
Environmental Specialist

cc: R.C.McCann, Golder
File

# APPENDIX D

# BUILDING DOWNWASH INFORMATION FROM BPIP

# APPENDIX E

# DETAILED SUMMARY OF ISCST MODEL RESULTS

# APPENDIX C

# AIR QUALITY MODELING PROTOCOL DOCUMENTS

**"Chris Carlson TAL 850/921-9537" <Chris.Carlson@dep.state.fl.us> on 08/09/99 12:53:40 PM**

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DYNEGY

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Very truly yours,

DYNEGY INC.

Starla Lacy
Environmental Specialist

cc: R.C.McCann, Golder
File

APPENDIX D

BUILDING DOWNWASH INFORMATION FROM BPIP

```
'DYNEGY PALMETTO OSCEOLA SC- PN, TN IS 0 DEG FROM PN  9/9/99'
'ST'
'FEET' 0.3048
'UTMN'  0.
6
'CT1 AIR INLET'  1 0.0
4 40.0
 -90   -40
 -90     0
 -50     0
 -50   -40
'CT2 AIR INLET'  1 0.0
4 40.0
  40   -40
  40     0
  90     0
  90   -40
'CT3 AIR INLET'  1 0.0
4 40.0
 170   -40
 170     0
 210     0
 210   -40
'CT1 GEN BLDG'  1 0.0
4 28.0
 -40  -120
 -40   -60
 -20   -60
 -20  -120
'CT2 GEN BLDG'  1 0.0
4 28.0
 -10  -120
 -10   -60
  10   -60
  10  -120
'CT3 GEN BLDG'  1 0.0
4 28.0
 120  -120
 120   -60
 140   -60
 140  -120
3
'CT1'     0.0   50. -130.     0.
'CT2'     0.0   50.    0.     0.
'CT3'     0.0   50.  130.     0.
0
```

BPIP (Dated: 95086)

DATE : 09/09/99
TIME : 16:21:59
DYNEGY PALMETTO OSCEOLA SC- PN, TN IS 0 DEG FROM PN 9/9/99

============================
BPIP PROCESSING INFORMATION:
============================

The ST flag has been set for processing for an ISCST2 run.

Inputs entered in FEET will be converted to meters using a conversion factor of 0.3048. Output will be in meters.

UTMP is set to UTMN. The input is assumed to be in a local X-Y coordinate system as opposed to a UTM coordinate system. True North is in the positive Y direction.

Plant north is set to 0.00 degrees with respect to True North.

DYNEGY PALMETTO OSCEOLA SC- PN, TN IS 0 DEG FROM PN 9/9/99

PRELIMINARY* GEP STACK HEIGHT RESULTS TABLE
(Output Units: meters)

| Stack Name | Stack Height | Stack-Building Base Elevation Differences | GEP** EQN1 | Preliminary* GEP Stack Height Value |
|---|---|---|---|---|
| CT1 | 15.24 | 0.00 | 30.48 | 65.00 |
| CT2 | 15.24 | 0.00 | 30.48 | 65.00 |
| CT3 | 15.24 | 0.00 | 30.48 | 65.00 |

* Results are based on Determinants 1 & 2 on pages 1 & 2 of the GEP Technical Support Document. Determinant 3 may be investigated for additional stack height credit. Final values result after Determinant 3 has been taken into consideration.

** Results were derived from Equation 1 on page 6 of GEP Technical Support Document. Values have been adjusted for any stack-building base elevation differences.

Note: Criteria for determining stack heights for modeling emission limitations for a source can be found in Table 3.1 of the GEP Technical Support Document.

BPIP (Dated: 95086)

DATE : 09/09/99
TIME : 16:21:59

DYNEGY PALMETTO OSCEOLA SC- PN, TN IS 0 DEG FROM PN 9/9/99

BPIP output is in meters

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SO BUILDHGT | CT1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.19 |
| SO BUILDHGT | CT1 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT1 | 12.19 | 12.19 | 12.19 | 0.00 | 0.00 | 0.00 |
| SO BUILDHGT | CT1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.19 |
| SO BUILDHGT | CT1 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT1 | 12.19 | 12.19 | 12.19 | 0.00 | 0.00 | 0.00 |
| SO BUILDWID | CT1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.65 |
| SO BUILDWID | CT1 | 15.63 | 14.12 | 12.19 | 14.12 | 15.63 | 16.65 |
| SO BUILDWID | CT1 | 17.18 | 17.18 | 16.65 | 0.00 | 0.00 | 0.00 |
| SO BUILDWID | CT1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.65 |
| SO BUILDWID | CT1 | 15.63 | 14.12 | 12.19 | 14.12 | 15.63 | 16.65 |
| SO BUILDWID | CT1 | 17.18 | 17.18 | 16.65 | 0.00 | 0.00 | 0.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SO BUILDHGT | CT2 | 8.53 | 8.53 | 8.53 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT2 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT2 | 12.19 | 12.19 | 12.19 | 8.53 | 8.53 | 8.53 |
| SO BUILDHGT | CT2 | 8.53 | 8.53 | 8.53 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT2 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 | 12.19 |
| SO BUILDHGT | CT2 | 12.19 | 12.19 | 12.19 | 8.53 | 8.53 | 8.53 |

```
     SO BUILDWID CT2          9.18   11.98   14.42   17.18   17.18   16.65
     SO BUILDWID CT2         15.63   14.12   12.19   14.12   15.63   18.18
     SO BUILDWID CT2         19.14   19.51   19.29   11.98   18.18   30.48
     SO BUILDWID CT2         27.36   11.98   22.34   17.18   17.18   16.65
     SO BUILDWID CT2         15.63   14.12   12.19   14.12   15.63   18.18
     SO BUILDWID CT2         19.14   19.51   19.29   11.98    9.18   15.24

     SO BUILDHGT CT3          8.53    8.53   12.19   12.19   12.19   12.19
     SO BUILDHGT CT3         12.19   12.19   12.19   12.19   12.19   12.19
     SO BUILDHGT CT3         12.19   12.19   12.19    8.53    0.00    0.00
     SO BUILDHGT CT3          0.00    8.53   12.19   12.19   12.19   12.19
     SO BUILDHGT CT3         12.19   12.19   12.19   12.19   12.19   12.19
     SO BUILDHGT CT3         12.19   12.19   12.19    8.53    8.53    8.53
     SO BUILDWID CT3          9.18   11.98   19.29   19.51   19.14   16.65
     SO BUILDWID CT3         15.63   14.12   12.19   14.12   15.63   16.65
     SO BUILDWID CT3         17.18   17.18   16.65   11.98    0.00    0.00
     SO BUILDWID CT3          0.00   11.98   19.29   19.51   19.14   16.65
     SO BUILDWID CT3         15.63   14.12   12.19   14.12   15.63   16.65
     SO BUILDWID CT3         17.18   17.18   16.65   11.98    9.18    6.10
```

APPENDIX E

DETAILED SUMMARY OF ISCST MODEL RESULTS

ISCBOB3 RELEASE 98056

ISCST3 OUTPUT FILE NUMBER 1 :PALSC1.087
ISCST3 OUTPUT FILE NUMBER 2 :PALSC1.088
ISCST3 OUTPUT FILE NUMBER 3 :PALSC1.089
ISCST3 OUTPUT FILE NUMBER 4 :PALSC1.090
ISCST3 OUTPUT FILE NUMBER 5 :PALSC1.091
First title for last output file is: 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 10/4/99
Second title for last output file is: GENERIC SIGNIFICANT IMPACT ANALYSIS- 3 x SC CT 50 FT STKS

| AVERAGING TIME | YEAR | CONC (ug/m3) | DIR (deg) or X (m) | DIST (m) or Y (m) | PERIOD ENDING (YYMMDDHH) |
|---|---|---|---|---|---|
| SOURCE GROUP ID: | BASE95 | | | | |
| Annual | | | | | |
| | 1987 | 0.01324 | 240. | 15000. | 87123124 |
| | 1988 | 0.01456 | 230. | 200. | 88123124 |
| | 1989 | 0.01482 | 230. | 200. | 89123124 |
| | 1990 | 0.01378 | 240. | 15000. | 90123124 |
| | 1991 | 0.01069 | 360. | 12000. | 91123124 |
| HIGH 1-Hour | | | | | |
| | 1987 | 2.05139 | 90. | 1600. | 87041113 |
| | 1988 | 2.07672 | 240. | 1600. | 88051611 |
| | 1989 | 2.00431 | 240. | 1600. | 89072614 |
| | 1990 | 1.91196 | 260. | 1600. | 90082913 |
| | 1991 | 2.07700 | 270. | 1600. | 91050314 |
| HIGH 3-Hour | | | | | |
| | 1987 | 0.83776 | 180. | 20000. | 87110703 |
| | 1988 | 0.93695 | 250. | 22500. | 88010124 |
| | 1989 | 0.72930 | 90. | 20000. | 89112103 |
| | 1990 | 0.79469 | 300. | 20000. | 90090821 |
| | 1991 | 0.91371 | 360. | 20000. | 91032806 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.39627 | 360. | 20000. | 87072924 |
| | 1988 | 0.43843 | 300. | 1800. | 88061816 |
| | 1989 | 0.38840 | 290. | 20000. | 89101724 |
| | 1990 | 0.51623 | 180. | 20000. | 90122508 |
| | 1991 | 0.50485 | 300. | 20000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.17612 | 160. | 15000. | 87101424 |
| | 1988 | 0.16708 | 300. | 1800. | 88061824 |
| | 1989 | 0.14514 | 120. | 15000. | 89122524 |
| | 1990 | 0.17228 | 180. | 20000. | 90122524 |
| | 1991 | 0.19659 | 300. | 20000. | 91021924 |
| SOURCE GROUP ID: | BASE59 | | | | |
| Annual | | | | | |
| | 1987 | 0.01232 | 240. | 15000. | 87123124 |
| | 1988 | 0.01441 | 230. | 200. | 88123124 |
| | 1989 | 0.01467 | 230. | 200. | 89123124 |
| | 1990 | 0.01299 | 240. | 15000. | 90123124 |
| | 1991 | 0.01009 | 360. | 12000. | 91123124 |
| HIGH 1-Hour | | | | | |
| | 1987 | 1.97100 | 160. | 1600. | 87082013 |
| | 1988 | 1.94593 | 40. | 1600. | 88080913 |
| | 1989 | 1.98936 | 240. | 1600. | 89072614 |
| | 1990 | 1.89759 | 260. | 1600. | 90082913 |
| | 1991 | 2.00210 | 200. | 1600. | 91070713 |
| HIGH 3-Hour | | | | | |
| | 1987 | 0.80243 | 180. | 20000. | 87110703 |
| | 1988 | 0.89097 | 250. | 25000. | 88010124 |
| | 1989 | 0.69746 | 90. | 20000. | 89112103 |
| | 1990 | 0.76058 | 300. | 20000. | 90090821 |
| | 1991 | 0.87072 | 360. | 20000. | 91032806 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.37864 | 360. | 20000. | 87072924 |
| | 1988 | 0.39200 | 160. | 20000. | 88121808 |
| | 1989 | 0.36970 | 290. | 20000. | 89101724 |
| | 1990 | 0.49361 | 180. | 20000. | 90122508 |
| | 1991 | 0.48245 | 300. | 20000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.16893 | 160. | 17000. | 87101424 |
| | 1988 | 0.15078 | 240. | 13000. | 88052924 |
| | 1989 | 0.13878 | 120. | 17000. | 89122524 |
| | 1990 | 0.16586 | 230. | 1800. | 90082024 |
| | 1991 | 0.18765 | 300. | 20000. | 91021924 |
| SOURCE GROUP ID: | BASE32 | | | | |
| Annual | | | | | |
| | 1987 | 0.01201 | 240. | 15000. | 87123124 |
| | 1988 | 0.01435 | 230. | 200. | 88123124 |
| | 1989 | 0.01461 | 230. | 200. | 89123124 |
| | 1990 | 0.01268 | 240. | 15000. | 90123124 |
| | 1991 | 0.00977 | 360. | 12000. | 91123124 |

| | | | | | |
|---|---|---|---|---|---|
| HIGH 1-Hour | | | | | |
| | 1987 | 1.96448 | 160. | 1600. | 87082013 |
| | 1988 | 1.83193 | 60. | 1800. | 88041413 |
| | 1989 | 1.87740 | 130. | 1600. | 89062714 |
| | 1990 | 1.89159 | 260. | 1600. | 90082913 |
| | 1991 | 1.87139 | 140. | 1600. | 91061312 |
| HIGH 3-Hour | | | | | |
| | 1987 | 0.78702 | 180. | 20000. | 87110703 |
| | 1988 | 0.87125 | 250. | 25000. | 88010124 |
| | 1989 | 0.69441 | 320. | 7000. | 89061715 |
| | 1990 | 0.74571 | 300. | 20000. | 90090821 |
| | 1991 | 0.85208 | 360. | 20000. | 91032806 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.37097 | 360. | 20000. | 87072924 |
| | 1988 | 0.38406 | 160. | 20000. | 88121808 |
| | 1989 | 0.36160 | 290. | 20000. | 89101724 |
| | 1990 | 0.48378 | 180. | 20000. | 90122508 |
| | 1991 | 0.47272 | 300. | 20000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.14734 | 160. | 20000. | 87101424 |
| | 1988 | 0.14841 | 240. | 12000. | 88052924 |
| | 1989 | 0.13608 | 120. | 17000. | 89122524 |
| | 1990 | 0.16500 | 230. | 1800. | 90082024 |
| | 1991 | 0.18377 | 300. | 20000. | 91021924 |
| SOURCE GROUP ID: | LD7095 | | | | |
| Annual | | | | | |
| | 1987 | 0.01719 | 240. | 13000. | 87123124 |
| | 1988 | 0.01799 | 240. | 15000. | 88123124 |
| | 1989 | 0.01546 | 230. | 200. | 89123124 |
| | 1990 | 0.01779 | 240. | 12000. | 90123124 |
| | 1991 | 0.01475 | 360. | 10000. | 91123124 |
| HIGH 1-Hour | | | | | |
| | 1987 | 2.47485 | 100. | 1600. | 87043014 |
| | 1988 | 2.42657 | 230. | 1600. | 88041412 |
| | 1989 | 2.40193 | 120. | 1600. | 89071112 |
| | 1990 | 2.58830 | 290. | 1600. | 90050211 |
| | 1991 | 2.59113 | 110. | 1600. | 91062713 |
| HIGH 3-Hour | | | | | |
| | 1987 | 1.25101 | 250. | 1600. | 87071015 |
| | 1988 | 1.19097 | 250. | 20000. | 88010124 |
| | 1989 | 0.90195 | 90. | 17000. | 89112103 |
| | 1990 | 1.33751 | 160. | 1600. | 90052315 |
| | 1991 | 1.23872 | 140. | 1800. | 91052915 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.48998 | 360. | 20000. | 87072924 |
| | 1988 | 0.50319 | 160. | 20000. | 88121808 |
| | 1989 | 0.48886 | 290. | 20000. | 89101724 |
| | 1990 | 0.63153 | 180. | 17000. | 90122508 |
| | 1991 | 0.62701 | 300. | 17000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.21520 | 160. | 15000. | 87101424 |
| | 1988 | 0.18879 | 240. | 15000. | 88052924 |
| | 1989 | 0.21458 | 340. | 1800. | 89042324 |
| | 1990 | 0.21285 | 230. | 1800. | 90041624 |
| | 1991 | 0.24580 | 300. | 17000. | 91021924 |
| SOURCE GROUP ID: | LD7059 | | | | |
| Annual | | | | | |
| | 1987 | 0.01686 | 240. | 13000. | 87123124 |
| | 1988 | 0.01746 | 240. | 15000. | 88123124 |
| | 1989 | 0.01540 | 230. | 200. | 89123124 |
| | 1990 | 0.01750 | 240. | 12000. | 90123124 |
| | 1991 | 0.01411 | 360. | 10000. | 91123124 |
| HIGH 1-Hour | | | | | |
| | 1987 | 2.46643 | 100. | 1600. | 87043014 |
| | 1988 | 2.41761 | 230. | 1600. | 88041412 |
| | 1989 | 2.39392 | 120. | 1600. | 89071112 |
| | 1990 | 2.42381 | 220. | 1600. | 90041612 |
| | 1991 | 2.54010 | 180. | 1600. | 91070712 |
| HIGH 3-Hour | | | | | |
| | 1987 | 1.24486 | 250. | 1600. | 87071015 |
| | 1988 | 1.16126 | 250. | 20000. | 88010124 |
| | 1989 | 0.88183 | 90. | 17000. | 89112103 |
| | 1990 | 1.33254 | 160. | 1600. | 90052315 |
| | 1991 | 1.23291 | 140. | 1800. | 91052915 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.47965 | 360. | 20000. | 87072924 |
| | 1988 | 0.49247 | 160. | 20000. | 88121808 |
| | 1989 | 0.48031 | 340. | 1800. | 89042316 |
| | 1990 | 0.61833 | 180. | 20000. | 90122508 |
| | 1991 | 0.61287 | 300. | 17000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.21073 | 160. | 15000. | 87101424 |
| | 1988 | 0.18493 | 240. | 15000. | 88052924 |

| | | | | | |
|---|---|---|---|---|---|
| | 1989 | 0.21362 | 340. | 1800. | 89042324 |
| | 1990 | 0.21097 | 230. | 1800. | 90041624 |
| | 1991 | 0.24011 | 300. | 17000. | 91021924 |
| SOURCE GROUP ID: | LD7032 | | | | |
| Annual | | | | | |
| | 1987 | 0.01634 | 240. | 13000. | 87123124 |
| | 1988 | 0.01713 | 240. | 15000. | 88123124 |
| | 1989 | 0.01534 | 230. | 200. | 89123124 |
| | 1990 | 0.01697 | 240. | 13000. | 90123124 |
| | 1991 | 0.01378 | 360. | 10000. | 91123124 |
| HIGH 1-Hour | | | | | |
| | 1987 | 2.45957 | 100. | 1600. | 87043014 |
| | 1988 | 2.41033 | 230. | 1600. | 88041412 |
| | 1989 | 2.38739 | 120. | 1600. | 89071112 |
| | 1990 | 2.41660 | 220. | 1600. | 90041612 |
| | 1991 | 2.40005 | 130. | 1600. | 91051612 |
| HIGH 3-Hour | | | | | |
| | 1987 | 1.23987 | 250. | 1600. | 87071015 |
| | 1988 | 1.15330 | 290. | 1600. | 88071215 |
| | 1989 | 0.86554 | 90. | 17000. | 89112103 |
| | 1990 | 0.94135 | 300. | 17000. | 90090821 |
| | 1991 | 1.22817 | 140. | 1800. | 91052915 |
| HIGH 8-Hour | | | | | |
| | 1987 | 0.47126 | 360. | 20000. | 87072924 |
| | 1988 | 0.48379 | 160. | 20000. | 88121808 |
| | 1989 | 0.47857 | 340. | 1800. | 89042316 |
| | 1990 | 0.60765 | 180. | 20000. | 90122508 |
| | 1991 | 0.60142 | 300. | 17000. | 91021924 |
| HIGH 24-Hour | | | | | |
| | 1987 | 0.20712 | 160. | 15000. | 87101424 |
| | 1988 | 0.18184 | 240. | 15000. | 88052924 |
| | 1989 | 0.21283 | 340. | 1800. | 89042324 |
| | 1990 | 0.20948 | 230. | 1800. | 90041624 |
| | 1991 | 0.23551 | 300. | 17000. | 91021924 |

All receptor computations reported with respect to a user-specified origin

| | | |
|---|---|---|
| GRID | 0.00 | 0.00 |
| DISCRETE | 0.00 | 0.00 |

```
CO STARTING
CO TITLEONE  1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS          10/4/99
CO TITLETWO  GENERIC SIGNIFICANT IMPACT ANALYSIS- 3 x SC CT 50 FT STKS
CO MODELOPT  DFAULT CONC   RURAL
CO AVERTIME  1 3 8 24 PERIOD
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - 1OCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00      0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0      500.0     30.00    10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**         SRCID SRCTYP          XS          YS          ZS
**   UTM                         (m)         (m)         (m)
SO LOCATION  BASE95A  POINT   -39.6        0.0         0.0
SO LOCATION  BASE95B  POINT     0.0        0.0         0.0
SO LOCATION  BASE95C  POINT    39.6        0.0         0.0

SO LOCATION  BASE59A  POINT   -39.6        0.0         0.0
SO LOCATION  BASE59B  POINT     0.0        0.0         0.0
SO LOCATION  BASE59C  POINT    39.6        0.0         0.0

SO LOCATION  BASE32A  POINT   -39.6        0.0         0.0
SO LOCATION  BASE32B  POINT     0.0        0.0         0.0
SO LOCATION  BASE32C  POINT    39.6        0.0         0.0

SO LOCATION  LD7095A  POINT   -39.6        0.0         0.0
SO LOCATION  LD7095B  POINT     0.0        0.0         0.0
SO LOCATION  LD7095C  POINT    39.6        0.0         0.0

SO LOCATION  LD7059A  POINT   -39.6        0.0         0.0
SO LOCATION  LD7059B  POINT     0.0        0.0         0.0
SO LOCATION  LD7059C  POINT    39.6        0.0         0.0

SO LOCATION  LD7032A  POINT   -39.6        0.0         0.0
SO LOCATION  LD7032B  POINT     0.0        0.0         0.0
SO LOCATION  LD7032C  POINT    39.6        0.0         0.0

** Source Parameter Cards:
** 50 ft CT stack
** POINT:   SRCID             QS     HS        TS        VS        DS
**                           (g/s)   (m)       (K)      (m/s)      (m)
SO SRCPARAM   BASE95A       3.333  15.2      879.0      41.4      5.8
SO SRCPARAM   BASE95B       3.333  15.2      879.0      41.4      5.8
SO SRCPARAM   BASE95C       3.334  15.2      879.0      41.4      5.8

SO SRCPARAM   BASE59A       3.333  15.2      864.0      43.8      5.8
SO SRCPARAM   BASE59B       3.333  15.2      864.0      43.8      5.8
SO SRCPARAM   BASE59C       3.334  15.2      864.0      43.8      5.8

SO SRCPARAM   BASE32A       3.333  15.2      858.0      44.9      5.8
SO SRCPARAM   BASE32B       3.333  15.2      858.0      44.9      5.8
SO SRCPARAM   BASE32C       3.334  15.2      858.0      44.9      5.8

SO SRCPARAM   LD7095A       3.333  15.2      847.0      33.6      5.8
SO SRCPARAM   LD7095B       3.333  15.2      847.0      33.6      5.8
SO SRCPARAM   LD7095C       3.334  15.2      847.0      33.6      5.8

SO SRCPARAM   LD7059A       3.333  15.2      834.0      34.7      5.8
SO SRCPARAM   LD7059B       3.333  15.2      834.0      34.7      5.8
SO SRCPARAM   LD7059C       3.334  15.2      834.0      34.7      5.8

SO SRCPARAM   LD7032A       3.333  15.2      825.0      35.6      5.8
SO SRCPARAM   LD7032B       3.333  15.2      825.0      35.6      5.8
SO SRCPARAM   LD7032C       3.334  15.2      825.0      35.6      5.8

SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
```

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SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32B-BASE95B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID BASE32B-BASE95B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT BASE32C-BASE95C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT BASE32C-BASE95C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32C-BASE95C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID BASE32C-BASE95C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     9.18     6.10

SO BUILDHGT LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID LD7032A-LD7095A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032A-LD7095A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID LD7032A-LD7095A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032A-LD7095A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT LD7032B-LD7095B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT LD7032B-LD7095B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID LD7032B-LD7095B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID LD7032B-LD7095B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID LD7032B-LD7095B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID LD7032B-LD7095B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID LD7032B-LD7095B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID LD7032B-LD7095B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT LD7032C-LD7095C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT LD7032C-LD7095C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID LD7032C-LD7095C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID LD7032C-LD7095C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032C-LD7095C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID LD7032C-LD7095C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID LD7032C-LD7095C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032C-LD7095C   17.18    17.18    16.65    11.98     9.18     6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)         (MICROGRAMS/CUBIC-METER)

SO SRCGROUP BASE95   BASE95A BASE95B BASE95C
SO SRCGROUP BASE59   BASE59A BASE59B BASE59C
SO SRCGROUP BASE32   BASE32A BASE32B BASE32C
SO SRCGROUP LD7095   LD7095A LD7095B LD7095C
SO SRCGROUP LD7059   LD7059A LD7059B LD7059C
SO SRCGROUP LD7032   LD7032A LD7032B LD7032C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
```

```
RE GRIDPOLR POL ORIG    0.0    0.0
RE GRIDPOLR POL DIST  200  400  600   800  1000  1200  1400  1600
RE GRIDPOLR POL DIST 1800 2000 2250  2500  2750  3000  3500  4000  4500
RE GRIDPOLR POL DIST 5000 6000 7000  8000  9000 10000 12000 13000 15000
RE GRIDPOLR POL DIST 17000 20000 22500 25000
RE GRIDPOLR POL GDIR   36  10.00   10.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL87D.MET
ME ANEMHGHT   10.100 METERS
ME SURFDATA  12815  1987            ORLANDO
ME UAIRDATA  12842  1987            WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED
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CO STARTING
CO TITLEONE  1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS                 9/9/99
CO TITLETWO  PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M
CO MODELOPT  DFAULT CONC    RURAL
CO AVERTIME  PERIOD
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - 1OCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00       0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0       500.0     30.00     10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**         SRCID SRCTYP        XS         YS         ZS
**   UTM                       (m)        (m)        (m)
SO LOCATION  BASE32A  POINT   -39.6       0.0        0.0
SO LOCATION  BASE32B  POINT     0.0       0.0        0.0
SO LOCATION  BASE32C  POINT    39.6       0.0        0.0
** Source Parameter Cards:
** 50 ft CT stack
** POINT:    SRCID            QS      HS        TS         VS         DS
**                           (g/s)    (m)       (K)       (m/s)       (m)
SO SRCPARAM   BASE32A       1.08    15.2      858.0       44.9        5.8
SO SRCPARAM   BASE32B       1.08    15.2      858.0       44.9        5.8
SO SRCPARAM   BASE32C       1.08    15.2      858.0       44.9        5.8

SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32B-BASE95B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID BASE32B-BASE95B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT BASE32C-BASE95C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT BASE32C-BASE95C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32C-BASE95C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID BASE32C-BASE95C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     9.18     6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

SO SRCGROUP BASE32  BASE32A BASE32B BASE32C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG    0.0    0.0
```

```
RE GRIDPOLR POL DIST  200  300 400
RE GRIDPOLR POL GDIR    9  222 2.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL89D.MET
ME ANEMHGHT   10.100 METERS
ME SURFDATA  12815  1989           ORLANDO
ME UAIRDATA  12842  1989           WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED


 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************

  *** ISCST3 - VERSION 99155 ***    ***  1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS              9/9/99    ***
                                   ***  PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M                      ***
**MODELOPTs:
CONC                            RURAL  FLAT          DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates PERIOD Averages Only

**This Run Includes:     4 Source(s);      1 Source Group(s); and      27 Receptor(s)

**The Model Assumes A Pollutant Type of:  GENERIC

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
```

Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.10 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10
Output Units = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model = 1.2 MB of RAM.

**Input Runstream File: REFPMAN.I89
**Output Print File: REFPMAN.O90
*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

| SOURCE ID | NUMBER PART. CATS. | EMISSION RATE (USER UNITS) | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | STACK HEIGHT (METERS) | STACK TEMP. (DEG.K) | STACK EXIT VEL. (M/SEC) | STACK DIAMETER (METERS) | BUILDING EXISTS | EMISS SCAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIGIN | 0 | 0.00000E+00 | 0.0 | 0.0 | 0.0 | 10.00 | 500.00 | 30.00 | 10.00 | NO | |
| BASE32A | 0 | 0.10800E+01 | -39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32B | 0 | 0.10800E+01 | 0.0 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32C | 0 | 0.10800E+01 | 39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

| GROUP ID | SOURCE IDs |
|---|---|
| BASE32 | BASE32A , BASE32B , BASE32C , |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: BASE32A

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0, | 0.0, | 0 | 2 | 0.0, | 0.0, | 0 | 3 | 0.0, | 0.0, | 0 | 4 | 0.0, | 0.0, | 0 | 5 | 0.0, | 0.0, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 0.0, | 0.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 0.0, | 0.0, | 0 | 21 | 0.0, | 0.0, | 0 | 22 | 0.0, | 0.0, | 0 | 23 | 0.0, | 0.0, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 17.2, | 0 | 32 | 12.2, | 17.2, | 0 | 33 | 12.2, | 16.6, | 0 | 34 | 0.0, | 0.0, | 0 | 35 | 0.0, | 0.0, | 0 | |

SOURCE ID: BASE32B

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 8.5, | 14.4, | 0 | 4 | 12.2, | 17.2, | 0 | 5 | 12.2, | 17.2, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 19.1, | 0 | 14 | 12.2, | 19.5, | 0 | 15 | 12.2, | 19.3, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 8.5, | 18.2, | 0 | |
| 19 | 8.5, | 27.4, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 8.5, | 22.3, | 0 | 22 | 12.2, | 17.2, | 0 | 23 | 12.2, | 17.2, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 19.1, | 0 | 32 | 12.2, | 19.5, | 0 | 33 | 12.2, | 19.3, | 0 | 34 | 8.5, | 12.0, | 0 | 35 | 8.5, | 9.2, | 0 | |

SOURCE ID: BASE32C

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 12.2, | 19.3, | 0 | 4 | 12.2, | 19.5, | 0 | 5 | 12.2, | 19.1, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 12.2, | 19.3, | 0 | 22 | 12.2, | 19.5, | 0 | 23 | 12.2, | 19.1, | 0 | |

25 12.2, 15.6, 0 26 12.2, 14.1, 0 27 12.2, 12.2, 0 28 12.2, 14.1, 0 29 12.2, 15.6, 0
31 12.2, 17.2, 0 32 12.2, 17.2, 0 33 12.2, 16.6, 0 34 8.5, 12.0, 0 35 8.5, 9.2, 0

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

200.0, 300.0, 400.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

222.0, 224.0, 226.0, 228.0, 230.0, 232.0, 234.0, 236.0, 238.0,

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FI

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

| STABILITY | WIND SPEED CATEGORY | | | | | |
|---|---|---|---|---|---|---|
| CATEGORY | 1 | 2 | 3 | 4 | 5 | 6 |
| A | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| B | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| C | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+ |
| D | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+ |
| E | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+ |
| F | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+ |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY | WIND SPEED CATEGORY | | | | | |
|---|---|---|---|---|---|---|
| CATEGORY | 1 | 2 | 3 | 4 | 5 | 6 |
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E- |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E- |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\MET\ORL89D.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 12815 UPPER AIR STATION NO.: 12842
NAME: ORLANDO NAME: WPB
YEAR: 1989 YEAR: 1989

| YR | MN | DY | HR | FLOW VECTOR | SPEED (M/S) | TEMP (K) | STAB CLASS | MIXING HEIGHT (M) RURAL | MIXING HEIGHT (M) URBAN | USTAR (M/S) | M-O LENGTH (M) | Z-0 (M) | IPCODE | PRATE (mm/HR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | 01 | 01 | 01 | 21.0 | 1.54 | 291.5 | 7 | 999.5 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 02 | 8.0 | 2.06 | 290.4 | 6 | 999.1 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 03 | 34.0 | 2.06 | 290.4 | 6 | 998.8 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 04 | 33.0 | 2.06 | 289.8 | 6 | 998.4 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 05 | 43.0 | 2.06 | 290.4 | 6 | 998.1 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 06 | 22.0 | 2.06 | 289.8 | 6 | 997.7 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 07 | 45.0 | 2.06 | 289.3 | 6 | 997.4 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 08 | 33.0 | 3.09 | 290.4 | 5 | 100.0 | 628.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 09 | 27.0 | 3.09 | 292.6 | 4 | 244.9 | 689.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 10 | 21.0 | 4.63 | 295.4 | 3 | 394.9 | 750.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 11 | 14.0 | 4.12 | 297.6 | 3 | 544.9 | 811.8 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 12 | 56.0 | 4.63 | 298.2 | 3 | 695.0 | 872.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 13 | 43.0 | 5.14 | 299.8 | 3 | 845.0 | 933.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 14 | 59.0 | 4.12 | 300.9 | 3 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 15 | 32.0 | 6.17 | 301.5 | 4 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 16 | 44.0 | 4.63 | 300.9 | 3 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 17 | 61.0 | 3.60 | 299.8 | 4 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 18 | 37.0 | 3.09 | 298.2 | 5 | 993.6 | 990.5 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 19 | 54.0 | 3.09 | 297.0 | 6 | 990.2 | 979.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 20 | 67.0 | 3.60 | 295.9 | 5 | 986.7 | 968.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 21 | 150.0 | 2.06 | 295.4 | 6 | 983.3 | 957.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 22 | 132.0 | 2.06 | 294.3 | 6 | 979.9 | 946.8 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 23 | 130.0 | 0.00 | 293.2 | 7 | 976.4 | 935.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 24 | 130.0 | 0.00 | 292.6 | 7 | 973.0 | 925.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE PERIOD ( 8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE32
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 200.00 | 300.00 | 400.00 |
|---|---|---|---|
| 222.00 | 0.00472 | 0.00454 | 0.00359 |
| 224.00 | 0.00473 | 0.00458 | 0.00364 |
| 226.00 | 0.00474 | 0.00462 | 0.00368 |
| 228.00 | 0.00474 | 0.00466 | 0.00373 |
| 230.00 | 0.00473 | 0.00468 | 0.00377 |
| 232.00 | 0.00472 | 0.00470 | 0.00381 |
| 234.00 | 0.00470 | 0.00471 | 0.00385 |
| 236.00 | 0.00467 | 0.00471 | 0.00387 |
| 238.00 | 0.00464 | 0.00470 | 0.00388 |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE SUMMARY OF MAXIMUM PERIOD ( 8760 HRS) RESULTS ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| GROUP ID | | AVERAGE CONC | RECEPTOR (XR, YR, ZELEV, ZFLAG) | OF TYPE | NETWORK GRID-ID |
|---|---|---|---|---|---|
| BASE32 | 1ST HIGHEST VALUE IS | 0.00474 AT | ( -143.87, -138.93, 0.00, 0.00) | GP | POL |

```
        2ND HIGHEST VALUE IS       0.00474 AT (    -148.63,      -133.83,       0.00,       0.00)  GP    POL
        3RD HIGHEST VALUE IS       0.00473 AT (    -153.21,      -128.56,       0.00,       0.00)  GP    POL
        4TH HIGHEST VALUE IS     - 0.00473 AT (    -138.93,      -143.87,       0.00,       0.00)  GP    POL
        5TH HIGHEST VALUE IS       0.00472 AT (    -157.60,      -123.13,       0.00,       0.00)  GP    POL
        6TH HIGHEST VALUE IS       0.00472 AT (    -133.83,      -148.63,       0.00,       0.00)  GP    POL
        7TH HIGHEST VALUE IS       0.00471 AT (    -242.71,      -176.34,       0.00,       0.00)  GP    POL
        8TH HIGHEST VALUE IS       0.00471 AT (    -248.71,      -167.76,       0.00,       0.00)  GP    POL
        9TH HIGHEST VALUE IS       0.00470 AT (    -161.80,      -117.56,       0.00,       0.00)  GP    POL
       10TH HIGHEST VALUE IS       0.00470 AT (    -236.40,      -184.70,       0.00,       0.00)  GP    POL

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
  *** ISCST3 - VERSION 99155 ***    ***  1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS                    9/9/99    ***
                                   ***  PM SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M                            ***
**MODELOPTs:
CONC                          RURAL  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of         345 Informational Message(s)

A Total of         345 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
CO STARTING
CO TITLEONE  1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS                9/9/99
CO TITLETWO  PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M
CO MODELOPT  DFAULT CONC   RURAL
CO AVERTIME  24
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - 1OCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00       0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0      500.0     30.00    10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**          SRCID SRCTYP         XS         YS         ZS
**   UTM                         (m)        (m)        (m)
SO LOCATION  LD7032A  POINT    -39.6        0.0        0.0
SO LOCATION  LD7032B  POINT      0.0        0.0        0.0
SO LOCATION  LD7032C  POINT     39.6        0.0        0.0

** Source Parameter Cards:
** 50 ft CT stack
** POINT:    SRCID            QS     HS        TS         VS        DS
**                          (g/s)   (m)       (K)       (m/s)      (m)
SO SRCPARAM   LD7032A       0.90   15.2       825.0      35.6       5.8
SO SRCPARAM   LD7032B       0.90   15.2       825.0      35.6       5.8
SO SRCPARAM   LD7032C       0.90   15.2       825.0      35.6       5.8

SO BUILDHGT LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032A-LD7095A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID LD7032A-LD7095A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032A-LD7095A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID LD7032A-LD7095A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID LD7032A-LD7095A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032A-LD7095A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT LD7032B-LD7095B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT LD7032B-LD7095B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032B-LD7095B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID LD7032B-LD7095B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID LD7032B-LD7095B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID LD7032B-LD7095B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID LD7032B-LD7095B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID LD7032B-LD7095B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID LD7032B-LD7095B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT LD7032C-LD7095C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT LD7032C-LD7095C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT LD7032C-LD7095C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID LD7032C-LD7095C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID LD7032C-LD7095C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032C-LD7095C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID LD7032C-LD7095C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID LD7032C-LD7095C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID LD7032C-LD7095C   17.18    17.18    16.65    11.98     9.18     6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

SO SRCGROUP LD7032   LD7032A LD7032B LD7032C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
```

```
RE GRIDPOLR POL ORIG     0.0    0.0
RE GRIDPOLR POL DIST  16100 16200 16300 16400 16500 16600 16700 16800 16900
RE GRIDPOLR POL DIST  17000 17100 17200 17300 17400 17500 17600 17700 17800
RE GRIDPOLR POL DIST  17900
RE GRIDPOLR POL GDIR     9  292 2.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL91D.MET
ME ANEMHGHT    10.100 METERS
ME SURFDATA  12815  1991           ORLANDO
ME UAIRDATA  12842  1991           WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED


 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter      QS

***********************************
*** SETUP Finishes Successfully ***
***********************************

  *** ISCST3 - VERSION 99155 ***    ***  1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS               9/9/99    ***
                                    ***  PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M                       ***
**MODELOPTs:
CONC                          RURAL  FLAT          DFAULT

                                                  ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:  24-HR

**This Run Includes:     4 Source(s);      1 Source Group(s); and     171 Receptor(s)

**The Model Assumes A Pollutant Type of:  GENERIC

**Model Set To Continue RUNning After the Setup Testing.
```

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.10 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10
Output Units = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model = 1.2 MB of RAM.

**Input Runstream File: REFPM24.I91
**Output Print File: REFPM24.O91
*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

| SOURCE ID | NUMBER PART. CATS. | EMISSION RATE (USER UNITS) | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | STACK HEIGHT (METERS) | STACK TEMP. (DEG.K) | STACK EXIT VEL. (M/SEC) | STACK DIAMETER (METERS) | BUILDING EXISTS | EMISS SCAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIGIN | 0 | 0.00000E+00 | 0.0 | 0.0 | 0.0 | 10.00 | 500.00 | 30.00 | 10.00 | NO | |
| LD7032A | 0 | 0.90000E+00 | -39.6 | 0.0 | 0.0 | 15.20 | 825.00 | 35.60 | 5.80 | YES | |
| LD7032B | 0 | 0.90000E+00 | 0.0 | 0.0 | 0.0 | 15.20 | 825.00 | 35.60 | 5.80 | YES | |
| LD7032C | 0 | 0.90000E+00 | 39.6 | 0.0 | 0.0 | 15.20 | 825.00 | 35.60 | 5.80 | YES | |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

| GROUP ID | SOURCE IDs |
|---|---|
| LD7032 | LD7032A , LD7032B , LD7032C , |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: LD7032A

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0, | 0.0, | 0 | 2 | 0.0, | 0.0, | 0 | 3 | 0.0, | 0.0, | 0 | 4 | 0.0, | 0.0, | 0 | 5 | 0.0, | 0.0, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 0.0, | 0.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 0.0, | 0.0, | 0 | 21 | 0.0, | 0.0, | 0 | 22 | 0.0, | 0.0, | 0 | 23 | 0.0, | 0.0, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 17.2, | 0 | 32 | 12.2, | 17.2, | 0 | 33 | 12.2, | 16.6, | 0 | 34 | 0.0, | 0.0, | 0 | 35 | 0.0, | 0.0, | 0 | |

SOURCE ID: LD7032B

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 8.5, | 14.4, | 0 | 4 | 12.2, | 17.2, | 0 | 5 | 12.2, | 17.2, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 19.1, | 0 | 14 | 12.2, | 19.5, | 0 | 15 | 12.2, | 19.3, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 8.5, | 18.2, | 0 | |
| 19 | 8.5, | 27.4, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 8.5, | 22.3, | 0 | 22 | 12.2, | 17.2, | 0 | 23 | 12.2, | 17.2, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 19.1, | 0 | 32 | 12.2, | 19.5, | 0 | 33 | 12.2, | 19.3, | 0 | 34 | 8.5, | 12.0, | 0 | 35 | 8.5, | 9.2, | 0 | |

SOURCE ID: LD7032C

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 12.2, | 19.3, | 0 | 4 | 12.2, | 19.5, | 0 | 5 | 12.2, | 19.1, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 12.2, | 17.2, 0 | 14 | 12.2, | 17.2, 0 | 15 | 12.2, | 16.6, 0 | 16 | 8.5, | 12.0, 0 | 17 | 0.0, | 0.0, 0 |
| 19 | 0.0, | 0.0, 0 | 20 | 8.5, | 12.0, 0 | 21 | 12.2, | 19.3, 0 | 22 | 12.2, | 19.5, 0 | 23 | 12.2, | 19.1, 0 |
| 25 | 12.2, | 15.6, 0 | 26 | 12.2, | 14.1, 0 | 27 | 12.2, | 12.2, 0 | 28 | 12.2, | 14.1, 0 | 29 | 12.2, | 15.6, 0 |
| 31 | 12.2, | 17.2, 0 | 32 | 12.2, | 17.2, 0 | 33 | 12.2, | 16.6, 0 | 34 | 8.5, | 12.0, 0 | 35 | 8.5, | 9.2, 0 |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

16100.0, 16200.0, 16300.0, 16400.0, 16500.0, 16600.0, 16700.0, 16800.0, 16900.0, 17000.
17100.0, 17200.0, 17300.0, 17400.0, 17500.0, 17600.0, 17700.0, 17800.0, 17900.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

292.0, 294.0, 296.0, 298.0, 300.0, 302.0, 304.0, 306.0, 308.0,

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FI

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| B | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| C | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+ |
| D | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+ |
| E | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+ |
| F | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+ |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E- |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E- |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***

*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\MET\ORL91D.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 12815 UPPER AIR STATION NO.: 12842
NAME: ORLANDO NAME: WPB
YEAR: 1991 YEAR: 1991

| YR | MN | DY | HR | FLOW VECTOR | SPEED (M/S) | TEMP (K) | STAB CLASS | MIXING HEIGHT (M) RURAL | MIXING HEIGHT (M) URBAN | USTAR (M/S) | M-O LENGTH (M) | Z-0 (M) | IPCODE | PRATE (mm/HR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91 | 01 | 01 | 01 | 1.0 | 4.12 | 294.3 | 4 | 1598.7 | 1598.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 02 | 328.0 | 2.06 | 294.3 | 5 | 1613.5 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 03 | 74.0 | 1.54 | 292.6 | 6 | 1628.3 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 04 | 343.0 | 1.54 | 292.0 | 7 | 1643.0 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 05 | 123.0 | 1.54 | 290.9 | 7 | 1657.8 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 06 | 302.0 | 2.06 | 290.9 | 6 | 1672.6 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 07 | 195.0 | 2.06 | 289.8 | 6 | 1687.4 | 383.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 08 | 273.0 | 2.06 | 290.9 | 5 | 170.8 | 517.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 09 | 267.0 | 0.00 | 294.8 | 4 | 440.8 | 729.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 10 | 301.0 | 2.06 | 297.0 | 3 | 710.9 | 941.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 11 | 314.0 | 4.63 | 298.7 | 3 | 980.9 | 1154.1 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 12 | 316.0 | 4.12 | 299.8 | 3 | 1250.9 | 1366.4 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 13 | 293.0 | 3.09 | 300.9 | 2 | 1521.0 | 1578.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 14 | 319.0 | 4.63 | 300.9 | 3 | 1791.0 | 1791.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 15 | 302.0 | 3.60 | 301.5 | 3 | 1791.0 | 1791.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 16 | 284.0 | 4.12 | 300.9 | 3 | 1791.0 | 1791.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 17 | 271.0 | 5.14 | 299.3 | 4 | 1791.0 | 1791.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 18 | 237.0 | 4.63 | 297.6 | 4 | 1786.4 | 1786.4 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 19 | 244.0 | 3.09 | 295.4 | 5 | 1775.2 | 1497.4 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 20 | 227.0 | 3.60 | 294.3 | 5 | 1763.9 | 1289.5 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 21 | 220.0 | 4.12 | 293.2 | 5 | 1752.7 | 1081.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 22 | 212.0 | 4.12 | 292.0 | 4 | 1741.5 | 1741.5 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 23 | 250.0 | 4.12 | 291.5 | 4 | 1730.3 | 1730.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 91 | 01 | 01 | 24 | 230.0 | 3.09 | 291.5 | 4 | 1719.1 | 1719.1 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: LD703
INCLUDING SOURCE(S): LD7032A , LD7032B , LD7032C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 16100.00 | 16200.00 | 16300.00 | 16400.00 |
|---|---|---|---|---|
| 292.0 | 0.03510 (91020624) | 0.03513 (91020624) | 0.03516 (91020624) | 0.03518 (91020624) |
| 294.0 | 0.03443 (91022024) | 0.03447 (91022024) | 0.03452 (91022024) | 0.03456 (91022024) |
| 296.0 | 0.04899 (91021924) | 0.04901 (91021924) | 0.04902 (91021924) | 0.04903 (91021924) |
| 298.0 | 0.07527 (91021924) | 0.07531 (91021924) | 0.07535 (91021924) | 0.07538 (91021924) |
| 300.0 | 0.06349 (91021924) | 0.06351 (91021924) | 0.06352 (91021924) | 0.06354 (91021924) |
| 302.0 | 0.03536 (91021924) | 0.03535 (91021924) | 0.03534 (91021924) | 0.03533 (91021924) |
| 304.0 | 0.03894 (91011124) | 0.03896 (91011124) | 0.03898 (91011124) | 0.03899 (91011124) |
| 306.0 | 0.03167 (91052724) | 0.03162 (91052724) | 0.03157 (91052724) | 0.03153 (91052724) |
| 308.0 | 0.04103 (91030124) | 0.04106 (91030124) | 0.04109 (91030124) | 0.04111 (91030124) |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: LD703
INCLUDING SOURCE(S): LD7032A , LD7032B , LD7032C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 16600.00 | 16700.00 | 16800.00 | 16900.00 |
|---|---|---|---|---|
| 292.0 | 0.03523 (91020624) | 0.03525 (91020624) | 0.03528 (91020624) | 0.03530 (91020624) |
| 294.0 | 0.03464 (91022024) | 0.03468 (91022024) | 0.03472 (91022024) | 0.03475 (91022024) |
| 296.0 | 0.04905 (91021924) | 0.04906 (91021924) | 0.04907 (91021924) | 0.04907 (91021924) |
| 298.0 | 0.07545 (91021924) | 0.07549 (91021924) | 0.07552 (91021924) | 0.07555 (91021924) |
| 300.0 | 0.06356 (91021924) | 0.06357 (91021924) | 0.06358 (91021924) | 0.06358 (91021924) |
| 302.0 | 0.03531 (91021924) | 0.03530 (91021924) | 0.03529 (91021924) | 0.03528 (91021924) |
| 304.0 | 0.03902 (91011124) | 0.03904 (91011124) | 0.03905 (91011124) | 0.03906 (91011124) |
| 306.0 | 0.03143 (91052724) | 0.03139 (91052724) | 0.03134 (91052724) | 0.03130 (91052724) |
| 308.0 | 0.04116 (91030124) | 0.04119 (91030124) | 0.04121 (91030124) | 0.04123 (91030124) |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: LD703
INCLUDING SOURCE(S): LD7032A , LD7032B , LD7032C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 17100.00 | 17200.00 | 17300.00 | 17400.00 |
|---|---|---|---|---|
| 292.0 | 0.03534 (91020624) | 0.03536 (91020624) | 0.03538 (91020624) | 0.03540 (91020624) |
| 294.0 | 0.03483 (91022024) | 0.03486 (91022024) | 0.03490 (91022024) | 0.03493 (91022024) |
| 296.0 | 0.04908 (91021924) | 0.04908 (91021924) | 0.04909 (91021924) | 0.04909 (91021924) |
| 298.0 | 0.07560 (91021924) | 0.07563 (91021924) | 0.07565 (91021924) | 0.07567 (91021924) |
| 300.0 | 0.06359 (91021924) | 0.06359 (91021924) | 0.06360 (91021924) | 0.06360 (91021924) |
| 302.0 | 0.03525 (91021924) | 0.03524 (91021924) | 0.03522 (91021924) | 0.03521 (91021924) |
| 304.0 | 0.03908 (91011124) | 0.03909 (91011124) | 0.03910 (91011124) | 0.03911 (91011124) |
| 306.0 | 0.03126 (91022024) | 0.03127 (91022024) | 0.03128 (91022024) | 0.03129 (91022024) |
| 308.0 | 0.04127 (91030124) | 0.04128 (91030124) | 0.04130 (91030124) | 0.04132 (91030124) |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: LD703
INCLUDING SOURCE(S): LD7032A , LD7032B , LD7032C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 17600.00 | 17700.00 | 17800.00 | 17900.00 |
|---|---|---|---|---|
| 292.0 | 0.03544 (91020624) | 0.03546 (91020624) | 0.03547 (91020624) | 0.03549 (91020624) |
| 294.0 | 0.03499 (91022024) | 0.03502 (91022024) | 0.03506 (91022024) | 0.03509 (91022024) |
| 296.0 | 0.04909 (91021924) | 0.04909 (91021924) | 0.04908 (91021924) | 0.04908 (91021924) |
| 298.0 | 0.07571 (91021924) | 0.07573 (91021924) | 0.07574 (91021924) | 0.07576 (91021924) |
| 300.0 | 0.06359 (91021924) | 0.06359 (91021924) | 0.06359 (91021924) | 0.06358 (91021924) |
| 302.0 | 0.03518 (91021924) | 0.03516 (91021924) | 0.03514 (91021924) | 0.03512 (91021924) |
| 304.0 | 0.03912 (91011124) | 0.03912 (91011124) | 0.03912 (91011124) | 0.03913 (91011124) |
| 306.0 | 0.03131 (91022024) | 0.03131 (91022024) | 0.03132 (91022024) | 0.03132 (91022024) |
| 308.0 | 0.04134 (91030124) | 0.04136 (91030124) | 0.04137 (91030124) | 0.04138 (91030124) |

*** ISCST3 - VERSION 99155 *** *** 1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| GROUP ID | | AVERAGE CONC | DATE (YYMMDDHH) | RECEPTOR (XR, YR, ZELEV, ZFLAG) | | | | OF |
|---|---|---|---|---|---|---|---|---|
| LD7032 HIGH | 1ST HIGH VALUE IS | 0.07576 | ON 91021924: AT ( | -15804.76, | 8403.54, | 0.00, | 0.00) | |

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART

```
                        DP = DISCPOLR
                        BD = BOUNDARY
  *** ISCST3 - VERSION 99155 ***   - ***  1991 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS            9/9/99    ***
                                    ***  PM SIG IMP- 24 HR- 70% 32 F/ 300 DEG, 17000 M                    ***
**MODELOPTs:
CONC                         RURAL  FLAT         DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of          144 Informational Message(s)

A Total of          144 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
CO STARTING
CO TITLEONE  1987 PALMETTO OSCEOLA-CO- SIMPLE CYCLE CTS        9/9/99
CO TITLETWO  CO SIG IMP-  1 HR- BASE 32 F/ 160 DEG, 1600 M
CO MODELOPT  DFAULT CONC   RURAL
CO AVERTIME  1
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - 1OCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00       0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0       500.0     30.00    10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**         SRCID SRCTYP        XS        YS        ZS
**   UTM                       (m)       (m)       (m)
SO LOCATION  BASE32A  POINT   -39.6      0.0       0.0
SO LOCATION  BASE32B  POINT     0.0      0.0       0.0
SO LOCATION  BASE32C  POINT    39.6      0.0       0.0
** Source Parameter Cards:
** 50 ft CT stack
** POINT:  SRCID             QS     HS        TS        VS        DS
**                          (g/s)   (m)       (K)      (m/s)      (m)
SO SRCPARAM   BASE32A      14.2   15.2      858.0     44.9      5.8
SO SRCPARAM   BASE32B      14.2   15.2      858.0     44.9      5.8
SO SRCPARAM   BASE32C      14.2   15.2      858.0     44.9      5.8

SO BUILDHGT BASE32A-BASE95A   0.00    0.00    0.00    0.00    0.00   12.19
SO BUILDHGT BASE32A-BASE95A  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32A-BASE95A  12.19   12.19   12.19    0.00    0.00    0.00
SO BUILDHGT BASE32A-BASE95A   0.00    0.00    0.00    0.00    0.00   12.19
SO BUILDHGT BASE32A-BASE95A  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32A-BASE95A  12.19   12.19   12.19    0.00    0.00    0.00
SO BUILDWID BASE32A-BASE95A   0.00    0.00    0.00    0.00    0.00   16.65
SO BUILDWID BASE32A-BASE95A  15.63   14.12   12.19   14.12   15.63   16.65
SO BUILDWID BASE32A-BASE95A  17.18   17.18   16.65    0.00    0.00    0.00
SO BUILDWID BASE32A-BASE95A   0.00    0.00    0.00    0.00    0.00   16.65
SO BUILDWID BASE32A-BASE95A  15.63   14.12   12.19   14.12   15.63   16.65
SO BUILDWID BASE32A-BASE95A  17.18   17.18   16.65    0.00    0.00    0.00

SO BUILDHGT BASE32B-BASE95B   8.53    8.53    8.53   12.19   12.19   12.19
SO BUILDHGT BASE32B-BASE95B  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32B-BASE95B  12.19   12.19   12.19    8.53    8.53    8.53
SO BUILDHGT BASE32B-BASE95B   8.53    8.53    8.53   12.19   12.19   12.19
SO BUILDHGT BASE32B-BASE95B  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32B-BASE95B  12.19   12.19   12.19    8.53    8.53    8.53
SO BUILDWID BASE32B-BASE95B   9.18   11.98   14.42   17.18   17.18   16.65
SO BUILDWID BASE32B-BASE95B  15.63   14.12   12.19   14.12   15.63   18.18
SO BUILDWID BASE32B-BASE95B  19.14   19.51   19.29   11.98   18.18   30.48
SO BUILDWID BASE32B-BASE95B  27.36   11.98   22.34   17.18   17.18   16.65
SO BUILDWID BASE32B-BASE95B  15.63   14.12   12.19   14.12   15.63   18.18
SO BUILDWID BASE32B-BASE95B  19.14   19.51   19.29   11.98    9.18   15.24

SO BUILDHGT BASE32C-BASE95C   8.53    8.53   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32C-BASE95C  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32C-BASE95C  12.19   12.19   12.19    8.53    0.00    0.00
SO BUILDHGT BASE32C-BASE95C   0.00    8.53   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32C-BASE95C  12.19   12.19   12.19   12.19   12.19   12.19
SO BUILDHGT BASE32C-BASE95C  12.19   12.19   12.19    8.53    8.53    8.53
SO BUILDWID BASE32C-BASE95C   9.18   11.98   19.29   19.51   19.14   16.65
SO BUILDWID BASE32C-BASE95C  15.63   14.12   12.19   14.12   15.63   16.65
SO BUILDWID BASE32C-BASE95C  17.18   17.18   16.65   11.98    0.00    0.00
SO BUILDWID BASE32C-BASE95C   0.00   11.98   19.29   19.51   19.14   16.65
SO BUILDWID BASE32C-BASE95C  15.63   14.12   12.19   14.12   15.63   16.65
SO BUILDWID BASE32C-BASE95C  17.18   17.18   16.65   11.98    9.18    6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)         (MICROGRAMS/CUBIC-METER)

SO SRCGROUP BASE32  BASE32A BASE32B BASE32C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG    0.0    0.0
```

```
RE GRIDPOLR POL DIST  1500 1600 1700
RE GRIDPOLR POL GDIR    9  152 2.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL87D.MET
ME ANEMHGHT   10.100 METERS
ME SURFDATA  12815  1987           ORLANDO
ME UAIRDATA  12842  1987           WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED


 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************

  *** ISCST3 - VERSION 99155 ***    ***  1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS       9/9/99        ***
                                   ***  CO SIG IMP-  1 HR- BASE 32 F/ 160 DEG, 1600 M                    ***
**MODELOPTs:
CONC                        RURAL  FLAT          DFAULT

                                          ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:   1-HR

**This Run Includes:     4 Source(s);      1 Source Group(s); and      27 Receptor(s)

**The Model Assumes A Pollutant Type of:  GENERIC

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
```

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.10 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10
Output Units = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model = 1.2 MB of RAM.

**Input Runstream File: REFCO1.I87
**Output Print File: REFCO1.087
*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

| SOURCE ID | NUMBER PART. CATS. | EMISSION RATE (USER UNITS) | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | STACK HEIGHT (METERS) | STACK TEMP. (DEG.K) | STACK EXIT VEL. (M/SEC) | STACK DIAMETER (METERS) | BUILDING EXISTS | EMISS SCAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIGIN | 0 | 0.00000E+00 | 0.0 | 0.0 | 0.0 | 10.00 | 500.00 | 30.00 | 10.00 | NO | |
| BASE32A | 0 | 0.14200E+02 | -39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32B | 0 | 0.14200E+02 | 0.0 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32C | 0 | 0.14200E+02 | 39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

| GROUP ID | SOURCE IDs |
|---|---|
| BASE32 | BASE32A , BASE32B , BASE32C , |

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: BASE32A

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0, | 0.0, | 0 | 2 | 0.0, | 0.0, | 0 | 3 | 0.0, | 0.0, | 0 | 4 | 0.0, | 0.0, | 0 | 5 | 0.0, | 0.0, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 0.0, | 0.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 0.0, | 0.0, | 0 | 21 | 0.0, | 0.0, | 0 | 22 | 0.0, | 0.0, | 0 | 23 | 0.0, | 0.0, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 17.2, | 0 | 32 | 12.2, | 17.2, | 0 | 33 | 12.2, | 16.6, | 0 | 34 | 0.0, | 0.0, | 0 | 35 | 0.0, | 0.0, | 0 | |

SOURCE ID: BASE32B

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 8.5, | 14.4, | 0 | 4 | 12.2, | 17.2, | 0 | 5 | 12.2, | 17.2, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 19.1, | 0 | 14 | 12.2, | 19.5, | 0 | 15 | 12.2, | 19.3, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 8.5, | 18.2, | 0 | |
| 19 | 8.5, | 27.4, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 8.5, | 22.3, | 0 | 22 | 12.2, | 17.2, | 0 | 23 | 12.2, | 17.2, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 19.1, | 0 | 32 | 12.2, | 19.5, | 0 | 33 | 12.2, | 19.3, | 0 | 34 | 8.5, | 12.0, | 0 | 35 | 8.5, | 9.2, | 0 | |

SOURCE ID: BASE32C

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 12.2, | 19.3, | 0 | 4 | 12.2, | 19.5, | 0 | 5 | 12.2, | 19.1, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 12.2, | 19.3, | 0 | 22 | 12.2, | 19.5, | 0 | 23 | 12.2, | 19.1, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |

31 12.2, 17.2, 0 32 12.2, 17.2, 0 33 12.2, 16.6, 0 34 8.5, 12.0, 0 35 8.5, 9.2, 0

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

1500.0, 1600.0, 1700.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

152.0, 154.0, 156.0, 158.0, 160.0, 162.0, 164.0, 166.0, 168.0,

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FI

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| B | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| C | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+ |
| D | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+ |
| E | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+ |
| F | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+ |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E- |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E- |

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\MET\ORL87D.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 12815 UPPER AIR STATION NO.: 12842
NAME: ORLANDO NAME: WPB
YEAR: 1987 YEAR: 1987

| YR | MN | DY | HR | FLOW VECTOR | SPEED (M/S) | TEMP (K) | STAB CLASS | MIXING HEIGHT (M) RURAL | MIXING HEIGHT (M) URBAN | USTAR (M/S) | M-O LENGTH (M) | Z-0 (M) | IPCODE | PRATE (mm/HR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | 01 | 01 | 01 | 341.0 | 7.20 | 292.0 | 4 | 602.1 | 602.1 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 02 | 348.0 | 6.17 | 292.0 | 4 | 654.8 | 654.8 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 03 | 354.0 | 6.17 | 292.0 | 4 | 707.6 | 707.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 04 | 353.0 | 6.17 | 292.0 | 4 | 760.4 | 760.4 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 05 | 13.0 | 6.17 | 291.5 | 4 | 813.1 | 813.1 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 06 | 42.0 | 6.17 | 292.0 | 4 | 865.9 | 865.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 07 | 65.0 | 9.26 | 290.9 | 4 | 918.7 | 918.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 08 | 63.0 | 9.26 | 289.8 | 4 | 971.4 | 971.4 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 09 | 77.0 | 9.26 | 289.3 | 4 | 1024.2 | 1024.2 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 10 | 101.0 | 7.72 | 288.2 | 4 | 1076.9 | 1076.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 11 | 84.0 | 9.77 | 287.6 | 4 | 1129.7 | 1129.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 12 | 76.0 | 8.75 | 287.0 | 4 | 1182.5 | 1182.5 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 13 | 73.0 | 6.69 | 286.5 | 4 | 1235.2 | 1235.2 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 14 | 69.0 | 9.77 | 287.0 | 4 | 1288.0 | 1288.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 15 | 92.0 | 9.26 | 287.0 | 4 | 1288.0 | 1288.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 16 | 94.0 | 7.72 | 287.0 | 4 | 1288.0 | 1288.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 17 | 111.0 | 5.66 | 287.0 | 4 | 1288.0 | 1288.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 18 | 87.0 | 3.60 | 285.9 | 5 | 1285.9 | 1223.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 19 | 84.0 | 3.60 | 285.4 | 5 | 1280.7 | 1066.2 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 20 | 67.0 | 4.12 | 284.3 | 5 | 1275.6 | 909.2 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 21 | 80.0 | 3.60 | 284.3 | 5 | 1270.4 | 752.1 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 22 | 92.0 | 4.12 | 284.8 | 4 | 1265.3 | 1265.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 23 | 110.0 | 4.12 | 284.8 | 4 | 1260.2 | 1260.2 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 87 | 01 | 01 | 24 | 110.0 | 4.63 | 284.8 | 4 | 1255.0 | 1255.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE3
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 1500.00 | 1600.00 | 1700.00 |
|---|---|---|---|
| 152.0 | 7.18447 (87082013) | 7.59373 (87082013) | 7.64203 (87082013) |
| 154.0 | 7.55917 (87082013) | 7.97427 (87082013) | 8.01792 (87082013) |
| 156.0 | 7.81741 (87082013) | 8.23612 (87082013) | 8.27651 (87082013) |
| 158.0 | 7.94903 (87082013) | 8.36930 (87082013) | 8.40792 (87082013) |
| 160.0 | 7.94888 (87082013) | 8.36871 (87082013) | 8.40710 (87082013) |
| 162.0 | 7.81703 (87082013) | 8.23443 (87082013) | 8.27415 (87082013) |
| 164.0 | 7.55878 (87082013) | 7.97170 (87082013) | 8.01424 (87082013) |
| 166.0 | 7.18439 (87082013) | 7.59067 (87082013) | 7.63739 (87082013) |
| 168.0 | 6.70859 (87082013) | 7.10589 (87082013) | 7.15797 (87082013) |

*** ISCST3 - VERSION 99155 *** *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 1 HR- BASE 32 F/ 160 DEG, 1600 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| GROUP ID | | AVERAGE CONC | DATE (YYMMDDHH) | RECEPTOR (XR, YR, ZELEV, ZFLAG) | OF |
|---|---|---|---|---|---|
| BASE32 | HIGH 1ST HIGH VALUE IS | 8.40792 | ON 87082013: AT ( | 636.83, -1576.21, 0.00, | 0.00) |

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
  *** ISCST3 - VERSION 99155 ***    *** 1987 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS       9/9/99          ***
                                    ***  CO SIG IMP-  1 HR- BASE 32 F/ 160 DEG, 1600 M                   ***
**MODELOPTs:
CONC                         RURAL  FLAT          DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of         273 Informational Message(s)

A Total of         273 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
CO STARTING
CO TITLEONE  1990 PALMETTO OSCEOLA-CO- SIMPLE CYCLE CTS      9/9/99
CO TITLETWO  CO SIG IMP-  8 HR- BASE 32 F/ 180 DEG, 20000 M
CO MODELOPT  DFAULT CONC   RURAL
CO AVERTIME  8
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - 1OCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00       0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0      500.0      30.00    10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**         SRCID SRCTYP        XS         YS        ZS
**   UTM                       (m)        (m)       (m)
SO LOCATION  BASE32A  POINT   -39.6       0.0       0.0
SO LOCATION  BASE32B  POINT     0.0       0.0       0.0
SO LOCATION  BASE32C  POINT    39.6       0.0       0.0
** Source Parameter Cards:
** 50 ft CT stack
** POINT:    SRCID            QS     HS        TS         VS        DS
**                          (g/s)   (m)        (K)       (m/s)      (m)
SO SRCPARAM   BASE32A      14.2   15.2       858.0      44.9       5.8
SO SRCPARAM   BASE32B      14.2   15.2       858.0      44.9       5.8
SO SRCPARAM   BASE32C      14.2   15.2       858.0      44.9       5.8
**
SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32B-BASE95B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID BASE32B-BASE95B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT BASE32C-BASE95C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT BASE32C-BASE95C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32C-BASE95C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID BASE32C-BASE95C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     9.18     6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)

SO SRCGROUP BASE32  BASE32A BASE32B BASE32C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG    0.0   0.0
```

```
RE GRIDPOLR POL DIST  19100 19200 19300 19400 19500 19600 19700 19800 19900
RE GRIDPOLR POL DIST  20000 20100 20200 20300 20400 20500 20600 20700 20800
RE GRIDPOLR POL DIST  20900
RE GRIDPOLR POL GDIR     9  172 2.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL90D.MET
ME ANEMHGHT   10.100 METERS
ME SURFDATA  12815  1990           ORLANDO
ME UAIRDATA  12842  1990           WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED


 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************

  *** ISCST3 - VERSION 99155 ***    *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS      9/9/99          ***
                                    *** CO SIG IMP-  8 HR- BASE 32 F/ 180 DEG, 20000 M                  ***
**MODELOPTs:
CONC                         RURAL  FLAT         DFAULT

                                               ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:   8-HR

**This Run Includes:     4 Source(s);      1 Source Group(s); and     171 Receptor(s)

**The Model Assumes A Pollutant Type of:  GENERIC

**Model Set To Continue RUNning After the Setup Testing.
```

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.10 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10
Output Units = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model = 1.2 MB of RAM.

**Input Runstream File: REFCO8.I90
**Output Print File: REFCO8.O90
*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

| SOURCE ID | NUMBER PART. CATS. | EMISSION RATE (USER UNITS) | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | STACK HEIGHT (METERS) | STACK TEMP. (DEG.K) | STACK EXIT VEL. (M/SEC) | STACK DIAMETER (METERS) | BUILDING EXISTS | EMISS SCAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIGIN | 0 | 0.00000E+00 | 0.0 | 0.0 | 0.0 | 10.00 | 500.00 | 30.00 | 10.00 | NO | |
| BASE32A | 0 | 0.14200E+02 | -39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32B | 0 | 0.14200E+02 | 0.0 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32C | 0 | 0.14200E+02 | 39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

| GROUP ID | SOURCE IDs |
|---|---|
| BASE32 | BASE32A , BASE32B , BASE32C , |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***
**MODELOPTs:
CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: BASE32A

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0, | 0.0, | 0 | 2 | 0.0, | 0.0, | 0 | 3 | 0.0, | 0.0, | 0 | 4 | 0.0, | 0.0, | 0 | 5 | 0.0, | 0.0, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 0.0, | 0.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 0.0, | 0.0, | 0 | 21 | 0.0, | 0.0, | 0 | 22 | 0.0, | 0.0, | 0 | 23 | 0.0, | 0.0, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 17.2, | 0 | 32 | 12.2, | 17.2, | 0 | 33 | 12.2, | 16.6, | 0 | 34 | 0.0, | 0.0, | 0 | 35 | 0.0, | 0.0, | 0 | |

SOURCE ID: BASE32B

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 8.5, | 14.4, | 0 | 4 | 12.2, | 17.2, | 0 | 5 | 12.2, | 17.2, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 19.1, | 0 | 14 | 12.2, | 19.5, | 0 | 15 | 12.2, | 19.3, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 8.5, | 18.2, | 0 | |
| 19 | 8.5, | 27.4, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 8.5, | 22.3, | 0 | 22 | 12.2, | 17.2, | 0 | 23 | 12.2, | 17.2, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 19.1, | 0 | 32 | 12.2, | 19.5, | 0 | 33 | 12.2, | 19.3, | 0 | 34 | 8.5, | 12.0, | 0 | 35 | 8.5, | 9.2, | 0 | |

SOURCE ID: BASE32C

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 12.2, | 19.3, | 0 | 4 | 12.2, | 19.5, | 0 | 5 | 12.2, | 19.1, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 0.0, | 0.0, | 0 | |

```
  19    0.0,    0.0, 0    20    8.5,   12.0, 0    21   12.2,   19.3, 0    22   12.2,   19.5, 0    23   12.2,   19.1, 0
  25   12.2,   15.6, 0    26   12.2,   14.1, 0    27   12.2,   12.2, 0    28   12.2,   14.1, 0    29   12.2,   15.6, 0
  31   12.2,   17.2, 0    32   12.2,  -17.2, 0    33   12.2,   16.6, 0    34    8.5,   12.0, 0    35    8.5,    9.2, 0
```

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

```
19100.0,  19200.0,  19300.0,  19400.0,  19500.0,  19600.0,  19700.0,  19800.0,  19900.0,  20000.
20100.0,  20200.0,  20300.0,  20400.0,  20500.0,  20600.0,  20700.0,  20800.0,  20900.0,
```

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

```
172.0,   174.0,   176.0,   178.0,   180.0,   182.0,   184.0,   186.0,   188.0,
```

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FI

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| B | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| C | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+ |
| D | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+ |
| E | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+ |
| F | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+ |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E- |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E- |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\MET\ORL90D.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 12815 UPPER AIR STATION NO.: 12842
NAME: ORLANDO NAME: WPB
YEAR: 1990 YEAR: 1990

| YR MN DY HR | FLOW VECTOR | SPEED (M/S) | TEMP (K) | STAB CLASS | MIXING HEIGHT (M) RURAL | URBAN | USTAR (M/S) | M-O LENGTH (M) | Z-0 (M) | IPCODE | PRATE (mm/HR) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 01 01 01 | 11.0 | 5.14 | 292.6 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 02 | 18.0 | 5.66 | 293.2 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 03 | 14.0 | 6.17 | 293.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 04 | 33.0 | 5.14 | 293.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 05 | 23.0 | 6.17 | 293.2 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 06 | 22.0 | 5.66 | 293.2 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 07 | 25.0 | 6.17 | 293.2 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 08 | 53.0 | 5.14 | 293.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 09 | 67.0 | 5.14 | 293.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 10 | 71.0 | 4.63 | 292.6 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 11 | 124.0 | 7.20 | 292.6 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 12 | 116.0 | 5.14 | 292.6 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 13 | 133.0 | 5.14 | 291.5 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 14 | 139.0 | 4.12 | 290.9 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 15 | 172.0 | 6.17 | 289.3 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 16 | 174.0 | 5.14 | 288.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 17 | 181.0 | 4.12 | 288.7 | 4 | 1309.0 | 1309.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 18 | 247.0 | 3.09 | 287.0 | 5 | 1309.0 | 1241.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 19 | 214.0 | 1.54 | 284.8 | 6 | 1309.0 | 1079.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 20 | 197.0 | 3.09 | 283.2 | 5 | 1309.0 | 916.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 21 | 190.0 | 3.09 | 282.0 | 5 | 1309.0 | 754.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 22 | 192.0 | 3.09 | 281.5 | 5 | 1309.0 | 591.3 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 23 | 200.0 | 3.09 | 281.5 | 5 | 1309.0 | 428.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 90 01 01 24 | 170.0 | 3.09 | 281.5 | 5 | 1309.0 | 266.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE3
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 19100.00 | 19200.00 | 19300.00 | 19400.00 |
|---|---|---|---|---|
| 172.0 | 0.95159 (90092508) | 0.95197 (90092508) | 0.95234 (90092508) | 0.95269 (90092508) |
| 174.0 | 0.81291 (90030524) | 0.81380 (90030524) | 0.81469 (90030524) | 0.81556 (90030524) |
| 176.0 | 1.15274 (90030524) | 1.15411 (90030524) | 1.15546 (90030524) | 1.15679 (90030524) |
| 178.0 | 1.40204 (90122508) | 1.40213 (90122508) | 1.40219 (90122508) | 1.40223 (90122508) |
| 180.0 | 2.05300 (90122508) | 2.05403 (90122508) | 2.05502 (90122508) | 2.05597 (90122508) |
| 182.0 | 1.44305 (90122508) | 1.44301 (90122508) | 1.44294 (90122508) | 1.44285 (90122508) |
| 184.0 | 0.96412 (90111824) | 0.96482 (90111824) | 0.96550 (90111824) | 0.96617 (90111824) |
| 186.0 | 1.30713 (90010308) | 1.30845 (90010308) | 1.30975 (90010308) | 1.31102 (90010308) |
| 188.0 | 1.64845 (90010308) | 1.65014 (90010308) | 1.65181 (90010308) | 1.65344 (90010308) |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE3
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

DIRECTION | DISTANCE (METERS)

| (DEGREES) | 19600.00 | 19700.00 | 19800.00 | 19900.00 |
|---|---|---|---|---|
| 172.0 | 0.95335 (90092508) | 0.95365 (90092508) | 0.95394 (90092508) | 0.95421 (90092508) |
| 174.0 | 0.81726 (90030524) | 0.81810 (90030524) | 0.81892 (90030524) | 0.81972 (90030524) |
| 176.0 | 1.15939 (90030524) | 1.16065 (90030524) | 1.16190 (90030524) | 1.16313 (90030524) |
| 178.0 | 1.40223 (90122508) | 1.40219 (90122508) | 1.40214 (90122508) | 1.40206 (90122508) |
| 180.0 | 2.05776 (90122508) | 2.05859 (90122508) | 2.05939 (90122508) | 2.06016 (90122508) |
| 182.0 | 1.44260 (90122508) | 1.44244 (90122508) | 1.44225 (90122508) | 1.44204 (90122508) |
| 184.0 | 0.96744 (90111824) | 0.96805 (90111824) | 0.96864 (90111824) | 0.96921 (90111824) |
| 186.0 | 1.31350 (90010308) | 1.31470 (90010308) | 1.31588 (90010308) | 1.31704 (90010308) |
| 188.0 | 1.65661 (90010308) | 1.65816 (90010308) | 1.65967 (90010308) | 1.66115 (90010308) |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE3
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 20100.00 | 20200.00 | 20300.00 | 20400.00 |
|---|---|---|---|---|
| 172.0 | 0.95387 (90092508) | 0.95316 (90092508) | 0.95245 (90092508) | 0.95174 (90092508) |
| 174.0 | 0.82048 (90030524) | 0.82032 (90030524) | 0.82015 (90030524) | 0.81998 (90030524) |
| 176.0 | 1.16434 (90030524) | 1.16421 (90030524) | 1.16408 (90030524) | 1.16394 (90030524) |
| 178.0 | 1.40068 (90122508) | 1.39925 (90122508) | 1.39781 (90122508) | 1.39637 (90122508) |
| 180.0 | 2.05969 (90122508) | 2.05846 (90122508) | 2.05722 (90122508) | 2.05596 (90122508) |
| 182.0 | 1.44040 (90122508) | 1.43881 (90122508) | 1.43721 (90122508) | 1.43561 (90122508) |
| 184.0 | 0.96939 (90111824) | 0.96897 (90111824) | 0.96854 (90111824) | 0.96810 (90111824) |
| 186.0 | 1.31798 (90010308) | 1.31766 (90010308) | 1.31732 (90010308) | 1.31697 (90010308) |
| 188.0 | 1.66237 (90010308) | 1.66200 (90010308) | 1.66162 (90010308) | 1.66122 (90010308) |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE3
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 20600.00 | 20700.00 | 20800.00 | 20900.00 |
|---|---|---|---|---|
| 172.0 | 0.95029 (90092508) | 0.94956 (90092508) | 0.94883 (90092508) | 0.94809 (90092508) |
| 174.0 | 0.81963 (90030524) | 0.81944 (90030524) | 0.81925 (90030524) | 0.81906 (90030524) |
| 176.0 | 1.16363 (90030524) | 1.16347 (90030524) | 1.16329 (90030524) | 1.16311 (90030524) |
| 178.0 | 1.39346 (90122508) | 1.39200 (90122508) | 1.39054 (90122508) | 1.38907 (90122508) |
| 180.0 | 2.05340 (90122508) | 2.05210 (90122508) | 2.05078 (90122508) | 2.04946 (90122508) |
| 182.0 | 1.43239 (90122508) | 1.43077 (90122508) | 1.42914 (90122508) | 1.42752 (90122508) |
| 184.0 | 0.96721 (90111824) | 0.96676 (90111824) | 0.96630 (90111824) | 0.96583 (90111824) |
| 186.0 | 1.31625 (90010308) | 1.31588 (90010308) | 1.31549 (90010308) | 1.31510 (90010308) |
| 188.0 | 1.66039 (90010308) | 1.65996 (90010308) | 1.65951 (90010308) | 1.65905 (90010308) |

*** ISCST3 - VERSION 99155 *** *** 1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** CO SIG IMP- 8 HR- BASE 32 F/ 180 DEG, 20000 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| GROUP ID | | AVERAGE CONC | DATE (YYMMDDHH) | RECEPTOR (XR, YR, ZELEV, ZFLAG) | OF |
|---|---|---|---|---|---|
| BASE32 | HIGH 1ST HIGH VALUE IS | 2.06088 | ON 90122508: AT ( | 0.00, -20000.00, 0.00, | 0.00) |

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
                              BD = BOUNDARY
  *** ISCST3 - VERSION 99155 ***     ***  1990 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS       9/9/99              ***
                                    -***  CO SIG IMP-  8 HR- BASE 32 F/ 180 DEG, 20000 M                       ***
**MODELOPTs:
CONC                            RURAL  FLAT          DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of          382 Informational Message(s)

A Total of          382 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
CO STARTING
CO TITLEONE  1989 PALMETTO OSCEOLA-CO- SIMPLE CYCLE CTS              9/9/99
CO TITLETWO  NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M
CO MODELOPT  DFAULT CONC   RURAL
CO AVERTIME  PERIOD
CO POLLUTID  GENERIC
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
** MODELING ORIGIN IS AT STK FOR CT NO.2
** NOT A SOURCE - lOCATION IS USED FOR POLAR DISCREET RECEPTORS.
SO LOCATION  ORIGIN   POINT   0.00      0.00      0.00
SO SRCPARAM  ORIGIN   0.0    10.0      500.0     30.00    10.00

**  CT STACK LETTER CODE
** ------------------------
**  A -  CT 1
**  B -  CT 2
**  C -  CT 3
** Source Location Cards:
**          SRCID SRCTYP        XS        YS        ZS
**   UTM                        (m)       (m)       (m)
SO LOCATION  BASE32A  POINT   -39.6       0.0       0.0
SO LOCATION  BASE32B  POINT     0.0       0.0       0.0
SO LOCATION  BASE32C  POINT    39.6       0.0       0.0

** Source Parameter Cards:
** 50 ft CT stack
** POINT:   SRCID            QS     HS       TS        VS       DS
**                         (g/s)   (m)      (K)      (m/s)     (m)
SO SRCPARAM   BASE32A      14.0   15.2     858.0      44.9      5.8
SO SRCPARAM   BASE32B      14.0   15.2     858.0      44.9      5.8
SO SRCPARAM   BASE32C      14.0   15.2     858.0      44.9      5.8

SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDHGT BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32A-BASE95A   12.19    12.19    12.19     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00
SO BUILDWID BASE32A-BASE95A    0.00     0.00     0.00     0.00     0.00    16.65
SO BUILDWID BASE32A-BASE95A   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32A-BASE95A   17.18    17.18    16.65     0.00     0.00     0.00

SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDHGT BASE32B-BASE95B    8.53     8.53     8.53    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32B-BASE95B   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32B-BASE95B    9.18    11.98    14.42    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98    18.18    30.48
SO BUILDWID BASE32B-BASE95B   27.36    11.98    22.34    17.18    17.18    16.65
SO BUILDWID BASE32B-BASE95B   15.63    14.12    12.19    14.12    15.63    18.18
SO BUILDWID BASE32B-BASE95B   19.14    19.51    19.29    11.98     9.18    15.24

SO BUILDHGT BASE32C-BASE95C    8.53     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     0.00     0.00
SO BUILDHGT BASE32C-BASE95C    0.00     8.53    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19    12.19    12.19    12.19
SO BUILDHGT BASE32C-BASE95C   12.19    12.19    12.19     8.53     8.53     8.53
SO BUILDWID BASE32C-BASE95C    9.18    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     0.00     0.00
SO BUILDWID BASE32C-BASE95C    0.00    11.98    19.29    19.51    19.14    16.65
SO BUILDWID BASE32C-BASE95C   15.63    14.12    12.19    14.12    15.63    16.65
SO BUILDWID BASE32C-BASE95C   17.18    17.18    16.65    11.98     9.18     6.10

SO EMISUNIT    .100000E+07 (GRAMS/SEC)         (MICROGRAMS/CUBIC-METER)

SO SRCGROUP BASE32   BASE32A BASE32B BASE32C

SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
```

```
RE GRIDPOLR POL ORIG    0.0   0.0
RE GRIDPOLR POL DIST  200  300 400
RE GRIDPOLR POL GDIR    9  222 2.00
RE GRIDPOLR POL  END
RE FINISHED

ME STARTING
ME INPUTFIL D:\MET\ORL89D.MET
ME ANEMHGHT   10.100 METERS
ME SURFDATA  12815  1989            ORLANDO
ME UAIRDATA  12842  1989            WPB
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU FINISHED


 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

************************************
*** SETUP Finishes Successfully ***
************************************

  *** ISCST3 - VERSION 99155 ***    ***  1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS              9/9/99    ***
                                   ***  NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M                    ***
**MODELOPTs:
CONC                            RURAL  FLAT          DFAULT

                                              ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Use Calms Processing Routine.
          5. Not Use Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.
          8. "Upper Bound" Values for Supersquat Buildings.
          9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates PERIOD Averages Only

**This Run Includes:     4 Source(s);     1 Source Group(s); and      27 Receptor(s)

**The Model Assumes A Pollutant Type of:  GENERIC

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
```

Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Anem. Hgt. (m) = 10.10 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = (GRAMS/SEC) ; Emission Rate Unit Factor = 0.10
Output Units = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model = 1.2 MB of RAM.

**Input Runstream File: REFNO2AN.I89
**Output Print File: REFNO2AN.O89

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** POINT SOURCE DATA ***

| SOURCE ID | NUMBER PART. CATS. | EMISSION RATE (USER UNITS) | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | STACK HEIGHT (METERS) | STACK TEMP. (DEG.K) | STACK EXIT VEL. (M/SEC) | STACK DIAMETER (METERS) | BUILDING EXISTS | EMISS SCAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ORIGIN | 0 | 0.00000E+00 | 0.0 | 0.0 | 0.0 | 10.00 | 500.00 | 30.00 | 10.00 | NO | |
| BASE32A | 0 | 0.14000E+02 | -39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32B | 0 | 0.14000E+02 | 0.0 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |
| BASE32C | 0 | 0.14000E+02 | 39.6 | 0.0 | 0.0 | 15.20 | 858.00 | 44.90 | 5.80 | YES | |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

| GROUP ID | SOURCE IDs |
|---|---|
| BASE32 | BASE32A , BASE32B , BASE32C , |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: BASE32A

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0, | 0.0, | 0 | 2 | 0.0, | 0.0, | 0 | 3 | 0.0, | 0.0, | 0 | 4 | 0.0, | 0.0, | 0 | 5 | 0.0, | 0.0, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 0.0, | 0.0, | 0 | 17 | 0.0, | 0.0, | 0 | |
| 19 | 0.0, | 0.0, | 0 | 20 | 0.0, | 0.0, | 0 | 21 | 0.0, | 0.0, | 0 | 22 | 0.0, | 0.0, | 0 | 23 | 0.0, | 0.0, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 17.2, | 0 | 32 | 12.2, | 17.2, | 0 | 33 | 12.2, | 16.6, | 0 | 34 | 0.0, | 0.0, | 0 | 35 | 0.0, | 0.0, | 0 | |

SOURCE ID: BASE32B

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 8.5, | 14.4, | 0 | 4 | 12.2, | 17.2, | 0 | 5 | 12.2, | 17.2, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 19.1, | 0 | 14 | 12.2, | 19.5, | 0 | 15 | 12.2, | 19.3, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 8.5, | 18.2, | 0 | |
| 19 | 8.5, | 27.4, | 0 | 20 | 8.5, | 12.0, | 0 | 21 | 8.5, | 22.3, | 0 | 22 | 12.2, | 17.2, | 0 | 23 | 12.2, | 17.2, | 0 | |
| 25 | 12.2, | 15.6, | 0 | 26 | 12.2, | 14.1, | 0 | 27 | 12.2, | 12.2, | 0 | 28 | 12.2, | 14.1, | 0 | 29 | 12.2, | 15.6, | 0 | |
| 31 | 12.2, | 19.1, | 0 | 32 | 12.2, | 19.5, | 0 | 33 | 12.2, | 19.3, | 0 | 34 | 8.5, | 12.0, | 0 | 35 | 8.5, | 9.2, | 0 | |

SOURCE ID: BASE32C

| IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | IFV | BH | BW | WAK | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5, | 9.2, | 0 | 2 | 8.5, | 12.0, | 0 | 3 | 12.2, | 19.3, | 0 | 4 | 12.2, | 19.5, | 0 | 5 | 12.2, | 19.1, | 0 | |
| 7 | 12.2, | 15.6, | 0 | 8 | 12.2, | 14.1, | 0 | 9 | 12.2, | 12.2, | 0 | 10 | 12.2, | 14.1, | 0 | 11 | 12.2, | 15.6, | 0 | |
| 13 | 12.2, | 17.2, | 0 | 14 | 12.2, | 17.2, | 0 | 15 | 12.2, | 16.6, | 0 | 16 | 8.5, | 12.0, | 0 | 17 | 0.0, | 0.0, | 0 | |

```
 19   0.0,   0.0, 0    20   8.5,  12.0, 0    21  12.2,  19.3, 0    22  12.2,  19.5, 0    23  12.2,  19.1, 0
 25  12.2,  15.6, 0    26  12.2,  14.1, 0    27  12.2,  12.2, 0    28  12.2,  14.1, 0    29  12.2,  15.6, 0
 31  12.2,  17.2, 0    32  12.2,  17.2, 0    33  12.2,  16.6, 0    34   8.5,  12.0, 0    35   8.5,   9.2, 0
```

*** ISCST3 - VERSION 99155 ***   *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS   9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC   RURAL FLAT   DFAULT

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

200.0, 300.0, 400.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

222.0, 224.0, 226.0, 228.0, 230.0, 232.0, 234.0, 236.0, 238.0,

*** ISCST3 - VERSION 99155 ***   *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS   9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC   RURAL FLAT   DFAULT

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FI

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| B | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E-01 | .70000E- |
| C | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+00 | .10000E+ |
| D | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+ |
| E | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+00 | .35000E+ |
| F | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+00 | .55000E+ |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+ |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E- |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E- |

*** ISCST3 - VERSION 99155 ***   *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS   9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:

CONC RURAL FLAT DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: D:\MET\ORL89D.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 12815 UPPER AIR STATION NO.: 12842
NAME: ORLANDO NAME: WPB
YEAR: 1989 YEAR: 1989

| YR | MN | DY | HR | FLOW VECTOR | SPEED (M/S) | TEMP (K) | STAB CLASS | MIXING HEIGHT (M) RURAL | MIXING HEIGHT (M) URBAN | USTAR (M/S) | M-O LENGTH (M) | Z-0 (M) | IPCODE | PRATE (mm/HR) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | 01 | 01 | 01 | 21.0 | 1.54 | 291.5 | 7 | 999.5 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 02 | 8.0 | 2.06 | 290.4 | 6 | 999.1 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 03 | 34.0 | 2.06 | 290.4 | 6 | 998.8 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 04 | 33.0 | 2.06 | 289.8 | 6 | 998.4 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 05 | 43.0 | 2.06 | 290.4 | 6 | 998.1 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 06 | 22.0 | 2.06 | 289.8 | 6 | 997.7 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 07 | 45.0 | 2.06 | 289.3 | 6 | 997.4 | 590.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 08 | 33.0 | 3.09 | 290.4 | 5 | 100.0 | 628.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 09 | 27.0 | 3.09 | 292.6 | 4 | 244.9 | 689.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 10 | 21.0 | 4.63 | 295.4 | 3 | 394.9 | 750.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 11 | 14.0 | 4.12 | 297.6 | 3 | 544.9 | 811.8 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 12 | 56.0 | 4.63 | 298.2 | 3 | 695.0 | 872.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 13 | 43.0 | 5.14 | 299.8 | 3 | 845.0 | 933.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 14 | 59.0 | 4.12 | 300.9 | 3 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 15 | 32.0 | 6.17 | 301.5 | 4 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 16 | 44.0 | 4.63 | 300.9 | 3 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 17 | 61.0 | 3.60 | 299.8 | 4 | 995.0 | 995.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 18 | 37.0 | 3.09 | 298.2 | 5 | 993.6 | 990.5 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 19 | 54.0 | 3.09 | 297.0 | 6 | 990.2 | 979.6 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 20 | 67.0 | 3.60 | 295.9 | 5 | 986.7 | 968.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 21 | 150.0 | 2.06 | 295.4 | 6 | 983.3 | 957.7 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 22 | 132.0 | 2.06 | 294.3 | 6 | 979.9 | 946.8 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 23 | 130.0 | 0.00 | 293.2 | 7 | 976.4 | 935.9 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |
| 89 | 01 | 01 | 24 | 130.0 | 0.00 | 292.6 | 7 | 973.0 | 925.0 | 0.0000 | 0.0 | 0.0000 | 0 | 0.00 |

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE PERIOD ( 8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: BASE32
INCLUDING SOURCE(S): BASE32A , BASE32B , BASE32C ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| DIRECTION (DEGREES) | DISTANCE (METERS) 200.00 | 300.00 | 400.00 |
|---|---|---|---|
| 222.00 | 0.06115 | 0.05883 | 0.04659 |
| 224.00 | 0.06129 | 0.05940 | 0.04715 |
| 226.00 | 0.06143 | 0.05991 | 0.04771 |
| 228.00 | 0.06141 | 0.06035 | 0.04829 |
| 230.00 | 0.06136 | 0.06071 | 0.04886 |
| 232.00 | 0.06122 | 0.06097 | 0.04939 |
| 234.00 | 0.06098 | 0.06108 | 0.04985 |
| 236.00 | 0.06057 | 0.06107 | 0.05018 |
| 238.00 | 0.06010 | 0.06087 | 0.05035 |

*** ISCST3 - VERSION 99155 *** *** 1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS 9/9/99 ***
*** NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M ***

**MODELOPTs:
CONC RURAL FLAT DFAULT

*** THE SUMMARY OF MAXIMUM PERIOD ( 8760 HRS) RESULTS ***

** CONC OF GENERIC IN (MICROGRAMS/CUBIC-METER) **

| GROUP ID | AVERAGE CONC | RECEPTOR (XR, YR, ZELEV, ZFLAG) | OF TYPE | NETWORK GRID-ID |
|---|---|---|---|---|

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BASE32   1ST HIGHEST VALUE IS       0.06143 AT (    -143.87,     -138.93,      0.00,      0.00)  GP   POL
         2ND HIGHEST VALUE IS       0.06141 AT (    -148.63,     -133.83,      0.00,      0.00)  GP   POL
         3RD HIGHEST VALUE IS       0.06136 AT (    -153.21,     -128.56,      0.00,      0.00)  GP   POL
         4TH HIGHEST VALUE IS       0.06129 AT (    -138.93,     -143.87,      0.00,      0.00)  GP   POL
         5TH HIGHEST VALUE IS       0.06122 AT (    -157.60,     -123.13,      0.00,      0.00)  GP   POL
         6TH HIGHEST VALUE IS       0.06115 AT (    -133.83,     -148.63,      0.00,      0.00)  GP   POL
         7TH HIGHEST VALUE IS       0.06108 AT (    -242.71,     -176.34,      0.00,      0.00)  GP   POL
         8TH HIGHEST VALUE IS       0.06107 AT (    -248.71,     -167.76,      0.00,      0.00)  GP   POL
         9TH HIGHEST VALUE IS       0.06098 AT (    -161.80,     -117.56,      0.00,      0.00)  GP   POL
        10TH HIGHEST VALUE IS       0.06097 AT (    -236.40,     -184.70,      0.00,      0.00)  GP   POL

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
  *** ISCST3 - VERSION 99155 ***   ***  1989 PALMETTO OSCEOLA CO- SIMPLE CYCLE CTS              9/9/99    ***
                                   ***  NO2 SIG IMP- ANNUAL- BASE 32 F/ 230 DEG, 200 M                     ***
**MODELOPTs:
CONC                        RURAL  FLAT        DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of         345 Informational Message(s)

A Total of         345 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    14 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
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