# Bay Area Air Quality Management District

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# Permit Evaluation
# and
# Statement of Basis
# for
# MAJOR FACILITY REVIEW PERMIT

**for**

## Los Medanos Energy Center, LLC
## Facility #B1866

**Facility Address:**
750 East Third Street
Pittsburg, CA 94565

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P.O. Box 551
Pittsburg, CA 94565

August 2004

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# Title V Statement of Basis

## A. Background

This facility is subject to the Operating Permit requirements of Title V of the federal Clean Air Act, Part 70 of Volume 40 of the Code of Federal Regulations (CFR), and BAAQMD Regulation 2, Rule 6, Major Facility Review because it is a major facility as defined by BAAQMD Regulation 2-6-212. It is a major facility because it has the "potential to emit," as defined by BAAQMD Regulation 2-6-218, of more than 100 tons per year of nitrogen oxides, carbon monoxide, PM10, and ammonia. The facility is not a major source of hazardous air pollutants. The facility is also subject because it is subject to the Title IV requirements (Acid Rain). All Title IV facilities are subject to Title V.

Major Facility Operating permits (Title V permits) must meet specifications contained in 40 CFR Part 70 as contained in BAAQMD Regulation 2, Rule 6. The permits must contain all applicable requirements (as defined in BAAQMD Regulation 2-6-202), monitoring requirements, recordkeeping requirements, and reporting requirements. The permit holders must submit reports of all monitoring at least every six months and compliance certifications at least every year.

In addition, Phase II Acid Rain facilities must meet the requirements of Title IV of the federal Clean Air Act, Acid Rain, and the Acid Rain regulations in Parts 72 through 78 of Volume 40 of the Code of Federal Regulations. These regulations were adopted and incorporated by reference by BAAQMD Regulation 2, Rule 7, Acid Rain. The main provisions of the regulations for natural gas fired acid rain sources, such as the ones at this facility, are the requirement to obtain one $SO_2$ allowance for each ton of $SO_2$ that is emitted, stringent monitoring requirements for NOx, CO, $CO_2$, and $SO_2$, and stringent recordkeeping and reporting.

In the Bay Area, state and District requirements are also applicable requirements and are included in the permit. These requirements can be federally enforceable or non-federally enforceable. All applicable requirements are contained in Sections I through VI of the permit.

Each facility in the Bay Area is assigned a facility identifier that consists of a letter and a 4-digit number. This identifier is also considered to be the identifier for the permit. The identifier for this facility is B1866.

This facility is a new facility that received an Authority to Construct on September 10, 1999 pursuant to Application #18594 that was submitted to the District on August 16, 1998. An extensive evaluation of the requirements, including much background information, was prepared before the issuance of the Authority to Construct. This evaluation, referred to as the Final Determination of Compliance, is contained in Appendix A. The Final Determination of Compliance (FDOC) was prepared pursuant to District Regulation 2, Rule 3, Power Plants. The FDOC summarized how the proposed power plant would comply with all applicable District, state, and federal regulations. As the lead agency under CEQA, the California Energy

Commission adopts the FDOC as part of the record for the licensing of power plants in the state of California.

The FDOC was amended by Application 1272. Enron Corporation submitted the original application. When Calpine Corporation purchased the project, they submitted an application to increase the capacity of the Heat Recovery Steam Generators from 83 to 333 MMbtu/hr, and the Auxiliary Boiler from 266 to 320 MMbtu/hr.

The original Major Facility Review permit was based on the FDOC pursuant to Application 18595, Application 1272, which superseded Application 18595, and Title V/Acid Rain Application 2804. The FDOC provided the legal and factual basis upon which the District issued the original Major Facility Review permit, and therefore, was the original statement of basis. At the time, the District did no label these documents "Statement of Basis."

The FDOC for Application 18595 and the permit evaluation for 1272 are attached to this document and form part of this statement of basis. The Acid Rain Application is attached to the permit.

The original proposed Major Facility Review permit for this facility was published for public notice on July 3, 2001. The public comment period ended on August 2, 2001, 30 days after publication of the notice. The proposed permit was submitted to EPA for review on June 28, 2001. The EPA review period ended on August 12, 2001, or August 13, 2001. The permit was issued on September 6, 2001.

The permit was revised on January 13, 2004, to increase the time allowed for a cold startup and to allow infrequent tune-ups pursuant to Application 7081. This statement of basis has been prepared for the reopening of the permit ordered by US EPA on May 24, 2004. It is intended to answer the questions raised by US EPA in the order and in supporting documentation.

Additionally, Applications 4227 and 9497 were submitted for two formerly exempt engines. The engines will be added to the Major Facility Review permit in this action.

**B. Final Determination of Compliance (FDOC)**

# Final
# Determination of Compliance

## Pittsburg District Energy Facility, LLC

Bay Area Air Quality Management District
Application 18595

June 10, 1999

Dennis Jang, P.E.
Air Quality Engineer

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# I Introduction

This is the Final Determination of Compliance (FDOC) for the Pittsburg District Energy Facility, LLC (PDEF), a nominal 520 MW, natural gas fired, combined cycle merchant power plant proposed by Enron Capital & Trade Resources Group. The power plant will be located near the intersection of East 3rd Street and Columbia in the city of Pittsburg and will have two possible configurations:

- two natural-gas fired, F-class turbines (each 170 MW) with associated heat recovery steam generators (each 90 MW), one common steam turbine, and one auxiliary boiler

(1 X 1 Configuration)

- two natural-gas fired, F-class turbines (each 170 MW) with associated heat recovery steam generators (each 90 MW), each with a dedicated steam turbine, and one auxiliary boiler (2 X 1 Configuration)

This FDOC was prepared by the staff of the Bay Area Air Quality Management District in accordance with District Regulation 2, Rule 3, Section 403. The FDOC describes how the proposed facility will comply with applicable federal, state, and BAAQMD regulations, including the Best Available Control Technology and emission offset requirements of New Source Review. Permit conditions necessary to insure compliance with applicable regulations are also included. Pursuant to Regulation 2-3-405, the District will issue the Authority to Construct for the PDEF after the CEC issues the Certificate for the facility.

## A. Background

Pursuant to BAAQMD Regulation 2, Rule 3, Section 403, this document serves as the Final Determination of Compliance review. It will also serve as the evaluation report for the District Authority to Construct application #18595. Pursuant to Regulation 2, Rule 3, Section 404, the FDOC has fullfilled the public notice, public inspection, and 30-day public comment period requirements of District Regulation 2, Rule 2, Sections 406 and 407.

## B. Project Description

### 1. Process Equipment

***The applicant is proposing a combined-cycle cogeneration facility capable of producing a nominal electrical output of 520 MW and 75,000 pounds per hour of process steam. The primary steam customer will be USS POSCO Industries. The Pittsburg District Energy Facility will consist of the following permitted equipment:***

S-1 Combustion Gas Turbine #1, General Electric Frame 7FA Model PG 7231 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst

S-2 Heat Recovery Steam Generator #1, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst.

S-3 Combustion Gas Turbine #2, General Electric Frame 7FA Model PG 7231 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst

S-4 Heat Recovery Steam Generator #2, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst.

S-5 Auxiliary Steam Boiler, 266 MM BTU per hour, equipped with low-$NO_x$ burners

***As stated earlier, the Pittsburg District Energy Facility will have two possible configurations:***

- two natural-gas fired F-class turbines with associated heat recovery steam generators, one common steam turbine, and one auxiliary boiler (1 X 1 Configuration)

- two natural-gas fired F-class turbines with associated heat recovery steam generators, each with a dedicated steam turbine, and one auxiliary boiler (2 X 1 Configuration)

In both configurations, each natural gas fired combustion turbine generator (CTG) will have a nominal electrical output of 170 MW and each heat recovery steam generator (HRSG) will have a nominal electrical output of 90 MW. The maximum combined heat input for each CTG/HRSG power train will be 2,012 MM BTU/hr. The gas turbines and steam turbine(s) will each drive separate generators.

The facility will also include a six-cell cooling tower that is exempt from District permit requirements pursuant to Regulation 2-1-128.4 since it will not be used for the evaporative cooling of process water.

## 2. Air Pollution Control Equipment

The proposed facility includes sources that trigger the Best Available Control Technology (BACT) requirement of New Source Review (District Regulation 2, Rule 2, NSR) for emissions of nitrogen oxides ($NO_x$), carbon monoxide (CO), precursor organic

compounds (POCs), sulfur dioxide ($SO_2$), and particulate matter of less than 10 microns in diameter ($PM_{10}$).

### a. Selective Catalytic Reduction with Ammonia Injection for the Control of $NO_x$

The combustion turbine generator, HRSG duct burners, and auxiliary boiler each trigger BACT for $NO_x$ emissions. The gas turbines and HRSG will be equipped with dry low-$NO_x$ (DLN) combustors, which are designed to minimize $NO_x$ emissions. In addition, the $NO_x$ emissions will be further reduced through the use of abatement equipment in the form of selective catalytic reduction (SCR) with ammonia injection. The auxiliary boiler will be equipped with low-$NO_x$ burners to minimize $NO_x$ emissions.

### b. Oxidation Catalyst for the Control of CO Emissions

The combustion turbine generator, HRSG duct burners, and auxiliary boiler each trigger BACT for CO emissions. The combustion turbines and HRSGs will be equipped with dry low-$NO_x$ combustors, which are also designed to minimize CO emissions. These CO emissions will be further reduced through the use of an oxidation catalyst. Good combustion practices will be utilized to reduce CO emissions from the auxiliary boiler.

### c. Low-$NO_x$ Burners and Oxidation Catalyst to minimize POC Emissions

The CTGs and HRSGs each trigger BACT for POC emissions. Each source will utilize low-$NO_x$ burners, which are designed to minimize incomplete combustion and therefore minimize POC emissions. The oxidation catalyst is expected to achieve a POC conversion efficiency of 30% by weight. Together with the use of good combustion practices, each CTG is expected to achieve a BACT-level POC emission rate of 0.00136 lb/MM BTU and the HRSG is expected to achieve a BACT-level POC emission rate of 0.01 lb/MM BTU. When operating simultaneously, the CTG and HRSG are expected to achieve a combined POC emission rate of 0.0017 lb/MM BTU.

### d. Exclusive Use of a "Clean" Fuel to Minimize $SO_2$ and $PM_{10}$ Emissions

The combustion turbine generator, HRSG duct burners, and auxiliary boiler will utilize natural gas exclusively to minimize $SO_2$ and $PM_{10}$ emissions. Because the emission rate of $SO_2$ depends on the sulfur content of the fuel burned and is not dependent upon the burner type or other combustion characteristics, the use of natural gas will result in the lowest possible emission of $SO_2$. $PM_{10}$ emissions are minimized through the use of best combustion practices and "clean burning" natural gas.

# II Project Emissions

The facility criteria pollutant emissions and toxic air contaminant emissions are presented in the following tables. Detailed emission calculations, including the derivations of emission factors are presented in the appendices.

**Table 1** is a summary of maximum facility regulated air pollutant emissions. The total emissions in tons per year are used to determine if the Prevention of Significant Deterioration (PSD) requirement of New Source Review (Regulation 2-2-304) has been triggered for each pollutant.

**Table 2** is a summary of the maximum facility toxic air contaminant (TAC) emissions. These emissions are used as input data for air pollutant dispersion models used to assess the increased health risk to the public resulting from the project. The ammonia emissions shown are based upon a worst-case ammonia emission concentration of 10 ppmvd @ 15% $O_2$ due to ammonia slip from the A-1 and A-2 SCR Systems.

**Table 3** is a summary of the daily maximum regulated air pollutant emissions for each permitted source, including the combustion turbine generators (CTGs), the heat recovery steam generators (HRSGs), and the auxiliary boiler. These emissions are used to determine if the Best Available Control Technology (BACT) requirement of Regulation 2, Rule 2 New Source Review (NSR) is triggered on a pollutant-specific basis. Pursuant to Regulation 2-2-301.1, any new source that will result in POC, NPOC, $NO_x$, $SO_2$, $PM_{10}$, or CO emissions in excess of 10 pounds per highest day per pollutant are subject to the BACT requirement.

## Table 1 Maximum Facility Regulated Air Pollutant Emissions[a]

| **Pollutant** | pounds/hour[b] | Pounds/day[b] | Tons/year[c] |
|---|---|---|---|
| Nitrogen Oxides (as $NO_2$) | 39.05 | 939.5 | 154.8 |
| Carbon Monoxide | 62.8 | 1507.8 | 488.1 |
| Precursor Organic Compounds | 7.13 | 173.4 | 97.61 |
| Particulate Matter ($PM_{10}$) | 35.77 | 858.4 | 123.6 |
| Sulfur Dioxide | 11.86 | 284.7 | 39.86 |

[a] Includes emissions from permitted and exempt sources

[b] Includes only combined CTG and HRSG baseload emissions (i.e. excluding CTG startup and shutdown emissions) based upon 24 hour per day operation

[c] Includes start-up and shutdown emissions for CTG (312 total hot start-ups and 312 total shutdowns per year for both turbines combined)

# Table 2
# Maximum Facility Toxic Air Contaminant (TAC) Emissions

| **Contaminant** | pounds/year | Risk Screening Trigger Level[a] (lb/yr) |
|---|---|---|
| S-1, S-2, S-3, S-4, & S-5[b] | | |
| Acetaldehyde[d] | 2,266 | 72 |
| Acrolein | 768 | 3.9 |
| Ammonia[c] | 396,670 | 19,300 |
| Benzene[d] | 430 | 6.7 |
| 1,3-Butadiene[d] | 4.1 | 1.1 |
| Ethylbenzene | 582.5 | 193,000 |
| Formaldehyde[d] | 3,643.3 | 33 |
| Hexane | 8,428 | 83,000 |
| Napthalene | 54.3 | 270 |
| PAHs[d] | 75.3 | 0.043 |
| Propylene | 25,110 | N/S |
| Propylene Oxide[d] | 1,535.2 | 52 |
| Toluene | 2,346.3 | 38,600 |
| Xylene | 891 | 57,900 |
| Cooling Tower Emissions | | |
| Aluminum | 0.39 | N/S[e] |
| Arsenic[d] | 0.016 | 0.024 |
| Silver | 0.02 | N/S |
| Barium | 0.05 | N/S |
| Beryllium[d] | 0.04 | 0.015 |
| Cadmium[d] | 0.04 | 0.046 |
| Chloride | 900 | N/S |
| Hexavalent chromium[d] | 0.02 | 0.0014 |
| Copper | 0.028 | 463 |
| Fluoride | 2.8 | N/S |
| Lead[d] | 0.087 | 29 |
| Magnesium | 105 | N/S |
| Manganese | 0.53 | 77 |
| Mercury | 0.0008 | 57.9 |
| Selenium[d] | 0.028 | 96.5 |
| Silica[d] | 0.11 | N/S |
| Sodium hydroxide | 0.028 | 926 |
| Sulfate | 771 | N/S |
| Zinc | 0.05 | 6,760 |

[a]pursuant to District Toxic Risk Management Policy

[b]combined TAC emissions from S-1 & S-3 CTGs, S-2 & S-4 HRSGs, and S-5 Auxiliary Boiler

[c]based upon the worst-case ammonia slip from the A-1 and A-2 SCR systems of 10 ppmvd @ 15% $O_2$ and 8,080 hours of operation per CTG at 100% load

[d]carcinogenic compound

[e]none specified

**Table 3**
**Daily Maximum Regulated Air Pollutant Emissions by Source (lb/day)**

| Pollutant | Source | | |
|---|---|---|---|
| | S-1 CTG & S-2 HRSG[a] | S-3 CTG & S-4 HRSG[a] | S-5 Auxiliary Boiler[b] |
| Nitrogen Oxides (as $NO_2$) | 688.4 | 688.4 | 68.3 |
| Carbon Monoxide | 2656.5 | 2656.5 | 233 |
| Precursor Organic Compounds | 551.17 | 551.17 | 8.75 |
| Particulate Matter ($PM_{10}$) | 408 | 408 | 31.9 |
| Sulfur Dioxide | 133.76 | 133.76 | 17.2 |

[a]Based upon one 1 hour hot startup, 22.5 hours of CTG/HRSG operation at maximum firing rate of 2,012 MM BTU/hr, and one 0.5 hour shutdown in one day

[b]Based upon 24 hour per day operation of the auxiliary boiler at its maximum firing rate of 266 MM BTU/hr

# III Statement of Compliance

The following section summarizes the applicable District Rules and Regulations and describes how the proposed project will comply with those requirements.

## A. Regulation 2, Rule 2; New Source Review

The primary requirements of New Source Review that apply to the PDEF project are Section 2-2-301; “Best Available Control Technology Requirement”, Section 2-2-302; “Offset Requirements, Precursor Organic Compounds and Nitrogen Oxides, NSR”, and Section 2-2-303; “Offset Requirement, PM10 and Sulfur Dioxide, NSR” and Section 2-2-404, “PSD Air Quality Analysis”.

# 1. Best Available Control Technology (BACT) Determinations

Pursuant to Regulation 2-2-206, BACT is defined as the more stringent of:

a) "The most effective control device or technique which has been successfully utilized for the type of equipment comprising such a source; or

(b) The most stringent emission limitation achieved by an emission control device or technique for the type of equipment comprising such a source: or

(c) Any emission control device or technique determined to be technologically feasible and cost-effective by the APCO, or

(d) The most effective emission control limitation for the type of equipment comprising such a source which the EPA states, prior to or during the public comment period, is contained in an approved implementation plan of any state, unless the applicant demonstrates to the satisfaction of the APCO that such limitations are not achievable. Under no circumstances shall the emission control required be less stringent than the emission control required by any applicable provision of federal, state or District laws, rules or regulations."

The type of BACT described in definitions (a) and (b) must have been demonstrated in practice and approved by a local Air Pollution Control District, CARB, or the EPA. This type of BACT is termed "achieved in practice". The type of BACT described in definition (c) must have been demonstrated to be effective and reliable on a full-scale unit **and** shown to be cost-effective on the basis of dollars per ton of pollutant abated. This type of BACT is referred to as "technologically feasible/cost-effective".

BACT specifications (for both the "achieved in practice" and "technologically feasible/cost-effective" categories) for various source categories has been compiled in the BAAQMD BACT Guideline. The following section includes BACT determinations by pollutant for the permitted sources of the proposed Pittsburg District Energy Facility. Because each CTG and the associated HRSG duct burners will exhaust through common stacks and be subject to combined emission limitations, the BACT determinations will apply to each CTG and HRSG power train as a combined unit.

In accordance with current District policy, all emission concentration limits are averaged over any consecutive three-hour period. This averaging period will allow for a well considered operator response to normal operational excursions while insuring compliance with BACT standards on a continual basis. Furthermore, pollutant mass emission limits (in both lb/hr and lb/MM BTU of natural gas fired) will insure that daily and annual emission rate limitations are not exceeded.

**Nitrogen Oxides ($NO_x$)**

- Combustion Turbine Generators (CTGs):

  District BACT Guideline 89.2.1 specifies BACT (achieved in practice) for $NO_x$ for a gas turbine with a rated heat input $\geq$ 23 MM BTU per hour as $NO_x$ emissions < 5 ppmvd @ 15% $O_2$, achieved through the use of Selective Catalytic Reduction (SCR) with ammonia injection in conjunction with combustion modifications. The SCAQMD BACT Guideline for gas turbines $\geq$ 3 MW specifies BACT for $NO_x$ as 2.5 ppmvd, @ 15% $O_2$ with an efficiency correction factor and an assumed averaging period of one hour. This BACT determination was based upon the demonstration of a SCONOX system on a 32 MW combined cycle, baseload turbine currently in operation in Vernon, California. The EPA has accepted this BACT determination as Federal LAER and further established a $NO_x$ concentration of 2.0 ppmvd @ 15% $O_2$ averaged over three hours as equivalent to 2.5 ppmvd, @ 15% $O_2$ averaged over one hour.

  In response to comments from the ARB and EPA, the applicant has agreed to a $NO_x$ emission concentration limit of 2.5 ppmvd $NO_x$ @ 15% $O_2$ averaged over one hour with allowance for excursions from the 1-hour standard caused by transient, non-steady state operating conditions. The condition allows for a 24 month period to evaluate the transient conditions (if any) under which excursions from the 1-hour standard may occur. During this 24-month test period, the applicant will also develop procedures and/or effect modifications to the turbine/HRSG systems to insure on-going compliance with the 1-hour standard. The EPA and ARB have agreed to the "allowable excursion" language in permit condition #22 as shown in this FDOC.

- Heat Recovery Steam Generator (HRSG)

  Supplemental heat will be supplied to the HRSGs with dry, low-$NO_x$ burners, which are designed to minimize $NO_x$ emissions. The duct burner emissions will also be abated by the SCR system with ammonia injection mentioned above and when combined with the CTG exhaust, will achieve $NO_x$ emissions of 2.5 ppmvd @ 15% $O_2$ averaged over one hour.

- Auxiliary Boiler

  District BACT Guideline 17.3.1 specifies BACT (achieved in practice) for $NO_x$ for a boiler with a rated heat input $\geq$ 50 MM BTU/hr as a $NO_x$ emission concentration of 9 ppmvd @ 3% $O_2$. The proposed boiler is expected to achieve this $NO_x$ emission level through the use of dry low-$NO_x$ burners.

**Carbon Monoxide (CO)**

- Combustion Turbine Generator (CTG):

  District BACT Guideline 89.2.1 specifies BACT (achieved in practice) for CO for gas turbines with a rated heat input $\geq$ 23 MM BTU per hour as a CO emission concentration of 10 ppmvd @ 15% $O_2$. BACT (technologically feasible/cost-effective) is specified as a CO emission concentration of < 6 ppmvd @ 15% $O_2$.

  The applicant has proposed a controlled CO emission level of 6.0 ppmvd @ 15% $O_2$ which will be achieved through the use of dry low-$NO_x$ burners which minimize incomplete combustion and an oxidation catalyst. Each CTG/HRSG power train will be conditioned to a combined CO emission limit of 6.0 ppmvd @ 15% $O_2$, averaged over any consecutive three hour period after abatement by the oxidation catalyst.

- Heat Recovery Steam Generator (HRSG)

  The HRSG will be equipped with dry, low-$NO_x$ burners which will minimize incomplete combustion and thereby minimize CO emissions. Through the use of the same catalytic oxidation system mentioned above, the HRSG exhaust gas, when combined with the CTG exhaust gas, will also achieve a CO emission level of 6.0 ppmvd @ 15% $O_2$, averaged over any consecutive three hour period.

- Auxiliary Boiler

  With highest-day CO emissions of 233 pounds, S-5 Auxiliary Boiler triggers the BACT requirement of New Source Review (District Regulation 2, Rule 2). BAAQMD BACT Guideline 17.3.1 specifies BACT for CO for boilers with a rated heat input $\geq$ 50 MM BTU/hr as a CO emission concentration of 50 ppmvd @ 3% $O_2$. The proposed auxiliary boiler will be limited by permit condition to a CO emission concentration of 50 ppmvd @ 3% $O_2$, averaged over any consecutive three hour period. The boiler will achieve this CO emission level through the use of dry low-$NO_x$ burners and good combustion practices.

**Precursor Organic Compounds (POCs)**

- Combustion Turbine Generator (CTG):

  District BACT Guideline 89.2.1 specifies BACT for POC for gas turbines with a heat input rating $\geq$ 23 MM BTU per hour as 50% reduction by weight to be achieved through the use of an oxidation catalyst. Because the sampling of the turbine exhaust upstream of the oxidation catalyst is problematic due to exhaust gas flow rate measurement inaccuracy due to the proximity of the HSRG, the verification of the reduction efficiency is not feasible. Because CEMs for organic compounds only measure carbon (as $C_1$), it is not possible to determine non-methane/ethane

hydrocarbon concentrations on a real-time basis. As a result, a continuous emission concentration limitation as BACT for POC is not feasible. Therefore, BACT for POC is deemed to be the use of an oxidation catalyst together with a POC mass emission rate limitations of 3.43 lb/hour and 0.0017 lb/MM BTU. These limitations are derived from gas turbine, duct burner, and catalyst vendor guarantees obtained by the applicant and apply to the turbines alone and to the combined exhaust from the turbine and duct burners.

- Heat Recovery Steam Generator (HRSG)

  The HRSG duct burners will be of low-$NO_x$ design and therefore minimize incomplete combustion, resulting in a reduced POC emission rate. They will also be abated by an oxidation catatyst. This configuration is deemed BACT for POC emissions from the HRSG duct burners.

- Auxiliary Boiler

  With worst-case daily POC emissions of less than 10 pounds, the auxiliary boiler does not trigger the BACT requirement of New Source Review (District Regulation 2-2-301) for POC.

**Sulfur Dioxide ($SO_2$) and Particulate Matter ($PM_{10}$)**

- Combustion Turbine Generator (CTG)

  District BACT Guideline 89.2.1 specifies BACT for $SO_2$ and $PM_{10}$ for gas turbines with a heat input rating $\geq$ 23 MM BTU per hour as the use of natural gas. The proposed turbine will utilize natural gas exclusively.

- Heat Recovery Steam Generator (HRSG)

  As in the case of the CTG, BACT for $SO_2$ and $PM_{10}$ for the HRSG duct burners is deemed to be the use of natural gas exclusively.

- Auxiliary Boiler

  As is the case for the CTGs and HRSGs, BACT for $SO_2$ and $PM_{10}$ for the auxiliary boiler is deemed to be the exclusive use of natural gas as a fuel.

# 2. Emission Offsets

*(i) General Requirements*

Pursuant to Regulation 2-2-302, federally enforceable emission offsets are required for POC and $NO_x$ emission increases from permitted sources at facilities which will emit 15 tons per year or more on a pollutant-specific basis. Furthermore, if the facility will emit 50 tons per year or more on a pollutant-specific basis, then offsets must be provided by the applicant at a ratio of 1.15 to 1.0.

Pursuant to Regulation 2-2-303, emission offsets shall be provided (at a ratio of 1.0:1.0) for $PM_{10}$ emission increases at new facilities that will be permitted to emit more than 100 tons of $PM_{10}$ per year. Pursuant to Regulation 2-2-303.1, emission reduction credits of nitrogen oxides or sulfur dioxide may be used to offset $PM_{10}$ emission increases.

Pursuant to District Regulation 2, Rule 2, Section 302, offsets are required only for permitted sources. Therefore, emission offsets will be required for the POC, $NO_x$, and $PM_{10}$ emission increases associated with S-1 CTG, S-2 HRSG, S-3 CTG, S-4 HRSG, and S-5 Auxiliary Boiler only. Emission offsets will not be required for the $PM_{10}$ emissions attributed to the exempt cooling towers. Please see Appendix C for further detail.

It should be noted that District regulations do not require consideration of the location of the source of the the proposed emission reduction credits relative to the location of emission increases that will be offset.

*(ii) Timing for Provision of Offsets*

In accordance with current BAAQMD Permit Services Division policy and District Regulation 2-2-410, the applicant must demonstrate control of the required quantity of valid emission reduction credits through options contracts or equivalent binding legal documents prior to the issuance of the Authority to Construct. The actual emission reduction credit certificates must be provided to the District prior to the issuance of the Permit to Operate for the new or modified facility. However, in response to a request from the CEC, the provision of the emission reduction credits will be required prior to the start of construction of the PDEF. Pursuant to District Regulation 2, Rule 3, Power Plants, the Authority to Construct will not be issued until the California Energy Commission issues the Certificate for the power plant.

*(iii) Interpollutant Offset Ratios*

Pursuant to District Regulation, 2-2-303.1, an applicant can provide $NO_x$ and/or $SO_2$ emission reduction credits to offset $PM_{10}$ emission increases at ratios deemed appropriate

by the APCO. Pursuant to current District policy, the interpollutant offset ratio for $NO_x$ to $PM_{10}$ is 6.0:1.0 and the ratio for $SO_2$ to $PM_{10}$ is 4.0: 1.0. These ratios are based upon an interpollutant trade-off ratio analysis conducted by Systems Applications International for the Shell Refinery located in Martinez, California. The analysis utilized three methods to estimate the amount of secondary $PM_{10}$ formation resulting from the emission of $NO_x$ and $SO_2$. The first method was based entirely upon an analysis of ambient air quality data. The second method used a photochemical box model to compute the aerosol yield from a unit of $NO_x$ or $SO_x$ emissions. The third method used the photochemical model to simulate the effect of an incremental unit of precursor emissions on typical atmosphere with variable mixing height. Under current policy, if an applicant wishes to utilize different (i.e. lower) interpollutant offset ratios, they must submit an analysis for review.

*(iv) Offset Requirements by Pollutant*

***(v) POC Offsets***

Because the PDEF will emit greater than 50 tons per year of Precursor Organic Compounds (POCs), the applicant must provide emission reduction credits (ERCs) of POC at a ratio of 1.15 to 1.0 pursuant to District Regulation 2-2-302. The amount of POC offsets due is 123.55 tons per year. Pursuant to District Regulation, 2-2-302.1, the applicant has the option to provide $NO_x$ ERCs to offset the proposed POC emission increases at a ratio of 1.15 to 1.0. Currently, the applicant plans to provide POC emission reduction credits to offset the proposed POC emission increases associated with the PDEF. The POC offsets to be provided by the applicant originate from the change in the method of operation of Quebecor Printing located in San Jose, California. The ERCs were officially banked under Certificate #589 on June 2, 1999. The banking evaluation and review under District application #18791 certified that the credits are real, quantifiable, permanent, and enforceable.

***(vi) $NO_x$ Offsets***

Because the PDEF will emit greater than 50 tons per year of Nitrogen Oxides ($NO_x$), the applicant must provide emission reduction credits (ERCs) of $NO_x$ at a ratio of 1.15 to 1.0 pursuant to District Regulation 2-2-302. Pursuant to District Regulation, 2-2-302.2, the applicant has the option to provide POC ERCs to offset the proposed $NO_x$ emission increases at a ratio of 1.15 to 1.0. Currently, the applicant plans to provide 177 tons of $NO_x$ emission reduction credits to offset the proposed $NO_x$ emission increases associated with the PDEF. The applicant is proposing to provide 73.62 tons of $NO_x$ offsets from Banking Certificate #518 which originate from an Owens-Brockway facility located in Oakland. The banking evaluation and review under District application certified that those credits are real, quantifiable, permanent, and enforceable. The balance of the required offsets (103.38 tons/year) were evaluated under District application 18833

(banking Certificate #590) and were generated from the shutdown of a glass melting furnace at an Owens-Brockway facility located in Antioch. The 30-day public review and comment period for those credits ended at 5 p.m. on June 9, 1999. No comments were received. The banking evaluation and review under District application 18833 certified that the credits are real, quantifiable, permanent, and enforceable.

#### *(vii) $PM_{10}$ Offsets*

With projected $PM_{10}$ emissions of greater than 100 tons per year, the PDEF is considered to be a Major Facility for $PM_{10}$ pursuant to District Regulation 2-2-220.1. Therefore, emission offsets must be provided at a ratio of 1.0 to 1.0 pursuant to District Regulation 2-2-303. Pursuant to District Regulation, 2-2-303.1, the applicant has the option to provide $NO_x$ and/or $SO_2$ ERCs to offset the proposed $PM_{10}$ emission increases at offset ratios deemed appropriate by the APCO. As stated earlier, the interpollutant offset ratios for $SO_2$ and $NO_x$ for $PM_{10}$, are 4.0 to 1.0 and 6.0 to 1.0, respectively. Currently, the applicant plans to provide 98.13 tons of $PM_{10}$ emission reduction credits to offset 98.13 tons of the proposed $PM_{10}$ emission increases resulting from the PDEF. The balance of the $PM_{10}$ emission increases will be offset with $SO_2$ emission reduction credits at the applicable ratio of 4.0 to 1.0. Therefore, under this scenario, the applicant must provide 103.5 tons of $SO_2$ emission reduction credits to offset the balance of 25.87 tons of $PM_{10}$ emission increases. 46.3 tons of $SO_2$ ERCs are from Banking Certificate #518 which were generated by the shutdown of a boiler at an Owens-Brockway facility in Oakland. The balance of the required $SO_2$ offsets (57.2 tons/year) were evaluated under District application #18833 (Banking Certificate #590) and were generated from the shutdown of a glass melting furnace at an Owens-Brockway facility located in Antioch. The 30-day public review and comment period for those credits ended at 5 p.m. on June 9, 1999. No comments were received. The banking evaluation and review under District application 18833 certified that the credits are real, quantifiable, permanent, and enforceable.

$SO_2$ Offsets

Pursuant to Regulation 2-2-303, emission reduction credits are not required for the proposed $SO_2$ emission increases associated with this project since the facility $SO_2$ emissions will each not exceed 100 tons per year. Regulation 2-2-303 does allow for the voluntary offsetting of $SO_2$ emission increases of less than 100 tons per year. The Pittsburg District Energy Facility has not volunteered to provide such emission offsets. The required offsets and applicable offset ratios are summarized in Appendix C, Table C-1.

### 3. PSD Air Quality Analysis

Pursuant to BAAQMD Regulation 2-2-414.1, the applicant has submitted a modeling analysis that adequately demonstrates the air quality impacts of the PDEF project. The applicant's analysis was based on EPA-approved models and was performed in accordance with District Regulation 2-2-414.

Pursuant to Regulation 2-2-414.2, the District has found that the modeling analysis has demonstrated that the allowable emission increases from the PDEF project, in conjunction with all other applicable emissions, will not cause or contribute to a violation of applicable ambient air quality standards for $NO_2$, CO, and $PM_{10}$ or an exceedance of any applicable PSD increment.

Pursuant to Regulation 2-2-417, the applicant has submitted an analysis of the impact of the proposed source and source-related growth on visibility, soils, and vegetation.

Please see Appendix E for further detail.

## B. Health Risk Assessment

Pursuant to the BAAQMD Risk Management Policy, a health risk screening must be executed to determine the potential impact on public health resulting from the potential emissions of toxic air contaminants (TACs) from the PDEF project. The potential TAC emissions (both carcinogenic and noncarcinogenic) from the PDEF are summarized on page 5, Table 2. In accordance with the requirements of the BAAQMD Risk Management Policy and CAPCOA guidelines, the impact on public health due to the emission of these compounds was assessed utilizing air pollutant dispersion models. The results of the health risk assessment modeling performed by the Pittsburg District Energy Facility are summarized in Table 4.

**Table 4**
**Health Risk Assessment Results**

| Multi-pathway Carcinogenic Risk (risk in one million) | Noncarcinogenic Chronic Hazard Index | Noncarcinogenic Acute Hazard Index |
|---|---|---|
| 0.5 | 0.018 | 0.042 |

The health risk assessment performed by the applicant has been reviewed by the District Toxics Evaluation Section and found to comply with current accepted practice as well as BAAQMD policies and procedures. In accordance with the BAAQMD Risk Management Policy, the increased carcinogenic risk attributed to this project is

considered to be not significant since it is less than 1.0 in one million. Furthermore, the acute and chronic hazard indices attributed to this project are considered to be not significant since they are each less than 1.0. Therefore, the PDEF project is deemed to be in compliance with the BAAQMD Risk Management Policy. Please see Appendix D for further detail.

# C. Other Applicable District Rules and Regulations

**Regulation 1, Section 301: Public Nuisance**

None of the project's proposed sources of air contaminants are expected to cause injury, detriment, nuisance, or annoyance to any considerable number of persons or the public with respect to any impacts resulting from the emission of air contaminants regulated by the District. In part, the air quality impact analysis is designed to insure that the proposed facility will comply with this Regulation.

**Regulation 2, Rule 1, Sections 301 and 302**

Pursuant to Regulation 2-1-301 and 2-1-302, the Pittsburg District Energy Facility has submitted an application to the District to obtain an Authority to Construct and Permit to Operate for the S-1 and S-3 Combustion Turbine Generators, S-2 and S-4 Heat Recovery Steam Generators, and S-5 Auxiliary Boiler.

Because the proposed cooling tower will not be used for the evaporative cooling of process water, it is exempt from District permit requirements (Regulation 2-1-301 and 2-1-302) pursuant to Regulation 2, Rule 1, Section 128.4. Although worst-case emission projections indicate that the cooling towers will emit toxic air contaminants at rates in excess of their risk management screening trigger levels as specified in Table 2-1-316 of Regulation 2, Rule 1, the applicant has demonstrated that the cooling tower emissions have passed a risk screening analysis in accordance with the District Air Toxic Risk Screening Procedure.

**Regulation 2, Rule 3: Power Plants**

Pursuant to Regulation 2-3-403, this Preliminary Determination of Compliance (DOC) serves as the APCO's preliminary decision as to whether the proposed power plant will meet the requirements of applicable District regulations. The preliminary DOC contains proposed permit conditions to ensure compliance with District regulations. Pursuant to Regulation 2-3-304, the preliminary DOC will be subject to the public notice, public comment, and public inspection requirements contained in Regulation 2-2-406 and 407., On July 15, 1998, the District made a determination pursuant to Regulation 2-2-402 that the Application for Certification contained sufficient information for the District to undertake a Determination of Compliance review.

**Regulation 2, Rule 7: Acid Rain**

The Pittsburg District Energy Facility will be subject to the requirements of Title IV of the federal Clean Air Act. The requirements of Title IV are outlined in 40 CFR Part 72 and include specifications for the type and operation of continuous emission monitors (CEMs) for pollutants that contribute to the formation of acid rain. District Regulation 2, Rule 7 incorporates by reference the provisions of 40 CFR Part 72.

**Regulation 6: Particulate Matter and Visible Emissions**

Through the use of dry low-$NO_x$ burner technology and proper combustion practices, the combustion of natural gas at the proposed gas turbines, HRSG duct burners, and auxiliary boiler is not expected to result in visible emissions. Specifically, the facility's combustion sources are expected to comply with Regulation 6, including sections 301 (Ringelmann No. 1 Limitation), 302 (Opacity Limitation) with visible emissions not to exceed 20% opacity, and 310 (Particulate Weight Limitation) with particulate matter emissions of less than 0.15 grains per dry standard cubic foot of exhaust gas volume. As calculated in accordance with Regulation 6-310.3, the grain loading resulting from the simultaneous operation of each power train (CTG and HRSG Duct Burners) is 0.0054 gr/dscf @ 6% $O_2$. See Appendix A for CTG/HRSG grain loading calculations.

With maximum total dissolved solids content of 970 mg/l and corresponding maximum $PM_{10}$ emission rate of 0.44 lb/hr, the proposed cooling towers are expected to comply with the requirements of Regulation 6.

Particulate matter emissions associated with the construction of the facility are subject to Regulation 6. The California Energy Commission will impose conditions on construction activities that will require the use of water and/or chemical dust suppressants to prevent visible particulate emissions.

**Regulation 7: Odorous Substances**

Regulation 7-302 prohibits the discharge of odorous substances which remain odorous beyond the facility property line after dilution with four parts odor-free air. Regulation 7-302 limits ammonia emissions to 5000 ppm. Because the ammonia emissions from the SCR system will be limited by permit condition to 10 ppmvd @ 15% $O_2$, the facility is expected to comply with the requirements of Regulation 7.

**Regulation 8: Organic Compounds**

This facility is exempt from Regulation 8, Rule 2, “Miscellaneous Operations” per 8-2-110 since natural gas will be fired exclusively at the PDEF.

The use of solvents for cleaning and maintenance at the PDEF is expected to comply with Regulation 8, Rule 4, "General Solvent and Surface Coating Operations" section 302.1 by emitting less than 5 tons per year of volatile organic compounds.

**Regulation 9: Inorganic Gaseous Pollutants**

Regulation 9, Rule 1; Sulfur Dioxide:

This regulation establishes emission limits for sulfur dioxide from all sources and applies to the combustion sources at this facility. Section 301 (Limitations on Ground Level Concentrations) prohibits emissions which would result in ground level $SO_2$ concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes, 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Section 302 (General Emission Limitation) prohibits $SO_2$ emissions in excess of 300 ppm (dry). With maximum projected $SO_2$ emissions of < 1 ppm, the gas turbines and HRSG duct burners are not expected to contribute to noncompliance with ground level $SO_2$ concentrations and should easily comply with section 302. The auxiliary boiler is expected to comply with these requirements through the exclusive use of natural gas.

Regulation 9, Rule 3, Nitrogen Oxides from Heat Transfer Operations:

The proposed combustion gas turbines (rated at 1929 MM BTU/hr HHV) shall comply with the Regulation 9-3-303 $NO_x$ limit of 125 ppm with nitrogen oxide emissions of 2.5 ppmvd @ 15% $O_2$. The HRSG duct burners have heat input ratings of less than 250 MM BTU/hr and are therefore not subject to this regulation. The proposed auxiliary boiler will comply with Regulation 9-3-303 with $NO_x$ emissions of 9 ppmvd, @3% $O_2$.

Regulation 9, Rule 7, Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters:

The proposed HRSGs are exempt from Regulation 9, Rule 7, per section 110.5. The proposed auxiliary boiler (rated at 266 MM BTU per hour) is expected to comply with Regulation 9, Rule 7 section 301.1 with $NO_x$ emissions of 9 ppmv @ 3% $O_2$ and section 301.2 with expected CO emissions of 50 ppmvd @ 3% $O_2$ which is much less than the limit of 400 ppmvd @ 3% $O_2$.

Regulation 9, Rule 9, Nitrogen Oxides from Stationary Gas Turbines:

Because each of the proposed combustion gas turbines will be limited by permit condition to $NO_x$ emissions of 2.5 ppmvd @ 15% $O_2$, they are expected to comply with the Regulation 9-9-301.3 $NO_x$ limitation of 9 ppmvd @ 15% $O_2$.

# IV Permit Conditions

***The following permit conditions will be imposed to ensure that the proposed project complies with all applicable District, State, and Federal Regulations. The conditions limit operational parameters such as fuel use, stack gas emission concentrations, and mass emission rates. Permit conditions will also specify abatement device operation and performance levels. To aid enforcement efforts, conditions specifying emission monitoring, source testing, and record keeping requirements are included.***

To provide maximum operational flexibility, no limitations will be imposed on the type, quantity, or duration of gas turbine start-ups or shutdowns. Instead, the facility must comply with daily and annual (consecutive twelve-month) mass emission limits at all times. Compliance with CO and $NO_x$ limitations will be verified by continuous emission monitors (CEMs) that will be in operation during all turbine operating modes, including start-up and shutdown. Compliance with POC, $SO_2$, and $PM_{10}$ mass emission limits will be verified by annual source testing.

In addition to permit conditions that apply to steady-state operation of each CTG/HRSG power train and the auxiliary boiler, conditions will be imposed that govern equipment operation during the initial commissioning period when the CTG/HRSG power trains will operate without oxidation catalysts and/or SCR systems in place. During this commissioning period, the gas turbines will be tested, control systems will be adjusted, and the HRSGs and auxiliary boiler steam tubes will be cleaned. Permit conditions 1 through 13 apply to this commissioning period.

## Pittsburg District Energy Facility

### *(viii) Permit Conditions*

**Definitions:**

| | |
|---|---|
| Clock Hour: | Any continuous 60-minute period beginning on the hour. |
| Calendar Day: | Any continuous 24-hour period beginning at 12:00 AM or 0000 hours. |
| Year: | Any consecutive twelve-month period of time |
| Heat Input: | All heat inputs refer to the heat input at the higher heating value (HHV) of the fuel, in BTU/scf. |
| Rolling 3-hour period: | Any three-hour period that begins on the hour and does not include start-up or shutdown periods. |
| Firing Hours: | Period of time during which fuel is flowing to a unit, measured in fifteen minute increments. |
| MM BTU: | million british thermal units |

| | |
|---|---|
| Gas Turbine Start-up Mode: | The lesser of the first 120 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 21(b) and 21(d). |
| Gas Turbine Shutdown Mode: | The lesser of the 30 minute period immediately prior to the termination of fuel flow to the Gas Turbine or the period of time from non-compliance with any requirement listed in Conditions 21(a) through 21(f) until termination of fuel flow to the Gas Turbine. |
| Auxiliary Boiler Start-up: | The lesser of the first 120 minutes of continuous fuel flow to an Auxiliary Boiler after fuel flow is initiated; or the period of time from fuel flow initiation until the Boiler achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 28(b) and 28(d). |
| Auxiliary Boiler Shutdown: | The lesser of the 30 minute period immediately prior the termination of fuel flow to the Auxiliary Boiler; or the period of time from non-compliance with any requirement listed in Conditions 28(a) through 28(d) until termination of fuel flow to the auxiliary boiler. |
| Specified PAHs: | The polycyclic aromatic hydrocarbons listed below shall be considered to Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds.<br>Benzo[a]anthracene<br>Benzo[b]fluoranthene<br>Benzo[k]fluoranthene<br>Benzo[a]pyrene<br>Dibenzo[a,h]anthracene<br>Indeno[1,2,3-cd]pyrene |
| Corrected Concentration: | The concentration of any pollutant (generally $NO_x$, CO, or $NH_3$) corrected to a standard stack gas oxygen concentration. For emission point P-1 (Gas Turbine S-1 and HRSG S-2) and emission point P-2 (Gas Turbine S-3 and HRSG S-4) the standard stack gas oxygen concentration is 15% $O_2$ by volume on a dry basis. For emission point P-3 (Auxiliary Boiler S-5), the standard stack gas oxygen concentration is 3% $O_2$ by volume on a dry basis. |
| Commissioning Activities: | All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the PDEF construction contractor to insure safe and reliable steady state operation of the gas turbines, heat recovery |

| | |
|---|---|
| | steam generators, steam turbine, auxiliary boiler, and associated electrical delivery systems. |
| Commissioning Period: | The Period shall commence when all mechanical, electrical, and control systems are installed and individual system start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The period shall terminate when the plant has completed performance testing, is available for commercial operation, and has initiated sales to the power exhange. |
| Precursor Organic Compounds (POCs): | Any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate |
| CEC CPM: | California Energy Commission Compliance Program Manager |

Conditions for the Commissioning Period

1. The owner/operator of the Pittsburg District Energy Facility (PDEF) shall minimize emissions of carbon monoxide and nitrogen oxides from S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators (HRSG), and S-5 Auxiliary Boiler to the maximum extent possible during the commissioning period. Conditions 1 through 13 shall only apply during the commissioning period as defined above. Unless otherwise indicated, Conditions 14 through 51 shall apply after the commissioning period has ended.

2. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the combustors of S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators, and S-5 Auxiliary Boiler shall be tuned to minimize the emissions of carbon monoxide and nitrogen oxides.

3. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, A-1 & A-3 SCR Systems and A-2 & A-4 Oxidation Catalysts shall be installed, adjusted, and operated to minimize the emissions of carbon monoxide and nitrogen oxides from S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators.

4. Coincident with the steady-state operation of A-1 & A-3 SCR Systems and A-2 & A-4 Oxidation Catalysts pursuant to conditions 3, 8, and 9, the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) shall comply with the $NO_x$ and CO emission limitations specified in conditions 21(a) through 21(d).

5. The owner/operator of the PDEF shall submit a plan to the District Permit Services Division and the CEC CPM at least four weeks prior to first firing of S-1 and S-3

Gas Turbines describing the procedures to be followed during the commissioning of the turbines, HRSGs, auxiliary boiler, and steam turbine. The plan shall include a description of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but not be limited to, the tuning of the Dry-Low-$NO_x$ combustors, the installation and operation of the SCR systems and oxidation catalysts, the installation, calibration, and testing of the CO and $NO_x$ continuous emission monitors, and any activities requiring the firing of S-1 and S-3 Gas Turbines and S-2 and S-4 HRSGs without abatement by the SCR Systems or oxidation catalysts.

6. During the commissioning period, the owner/operator of the PDEF shall demonstrate compliance with conditions 11 and 12 through the use of properly operated and maintained continuous emission monitors and recorders for the following parameters:

   firing hours
   fuel flow rates
   stack gas nitrogen oxide emission concentrations,
   stack gas carbon monoxide emission concentrations
   stack gas oxygen concentrations.

   The monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for S-1 and S-3 Gas Turbines, S-2 and S-4 HRSGs, and S-5 Auxiliary Boiler. The owner/operator shall use District-approved methods to calculate heat input rates, nitrogen oxide mass emission rates, carbon monoxide mass emission rates, and $NO_x$ and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to District personnel upon request.

7. The District-approved continuous monitors specified in condition 6 shall be installed, calibrated, and operational prior to first firing of S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators, and S-5 Auxiliary Boiler. After first firing of the turbines and auxiliary boiler, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of CO and $NO_x$ emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval.

8. The total number of firing hours of S-1 Gas Turbine and S-2 Heat Recovery Steam Generator without abatement of nitrogen oxide and carbon monoxide emissions by A-1 SCR System and A-2 Oxidation Catalyst shall not exceed 250 hours during the commissioning period. Such operation of S-1 Gas Turbine and S-2 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without SCR and oxidation catalysts in place. Upon completion of these activities, the owner/operator shall provide written notice to the District

Permit Services and Enforcement Divisions and the unused balance of the 250 firing hours without abatement shall expire.

9. The total number of firing hours of S-3 Gas Turbine and S-4 Heat Recovery Steam Generator without abatement of nitrogen oxide and carbon monoxide emissions by A-3 SCR System and A-4 Oxidation Catalyst shall not exceed 250 hours during the commissioning period. Such operation of S-3 Gas Turbine and S-4 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without SCR and oxidation catalysts in place. Upon completion of these activities, the owner/operator shall provide written notice to the District Permit Services and Enforcement Divisions and the unused balance of the 250 firing hours without abatement shall expire.

10. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, $PM_{10}$, and sulfur dioxide that are emitted by S-1, S-2, S-3, S-4, and S-5 during the commissioning period shall accrue towards the consecutive twelve month emission limits specified in condition 33.

11. Combined pollutant emissions from S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators shall not exceed the following limits during the commissioning period. These emission limits shall include emissions resulting from the start-up and shutdown of S-1 & S-3 Gas Turbines.

| | | |
|---|---|---|
| $NO_x$ (as $NO_2$) | 1,360 pounds per calendar day | 616 pounds/hour |
| CO | 6,800 pounds per calendar day | 5,053.8 pounds/hour |
| POC (as $CH_4$) | 720 pounds per calendar day | |
| $PM_{10}$ | 816 pounds per calendar day | |
| $SO_2$ | 268 pounds per calendar day | |

12. Pollutant emissions from S-5 Auxiliary Boiler shall not exceed the following limits during the commissioning period. These emission limits shall include emissions that occur during S-5 Auxiliary Boiler start-ups.

| | | |
|---|---|---|
| $NO_x$ (as $NO_2$) | 69.8 pounds per calendar day | 2.91 pounds per hour |
| CO | 233.8 pounds per calendar day | 9.74 pounds per hour |
| POC (as $CH_4$) | 8.64 pounds per calendar day | |
| $PM_{10}$ | 31 pounds per calendar day | |
| $SO_2$ | 3.6 pounds per calendar day | |

13. Prior to the end of the Commissioning Period, the Owner/Operator shall conduct a District and CEC approved source test using external continuous emission monitors to determine compliance with condition 23. The source test shall determine $NO_x$, CO, and POC emissions during start-up and shutdown of the gas turbines. The POC

emissions shall be analyzed for methane and ethane to account for the presence of unburned natural gas. The source test shall include a minimum of three start-up and three shutdown periods. Twenty calendar days before the execution of the source tests, the Owner/Operator shall submit to the District and the CEC CPM a detailed source test plan designed to satisfy the requirements of this condition. The District and the CEC CPM will notify the Owner/Operator of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The Owner/Operator shall incorporate the District and CEC CPM comments into the test plan. The Owner/Operator shall notify the District and the CEC CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CEC CPM within 30 days of the source testing date.

**Conditions for the Gas Turbines (S-1 & S-3) and the Heat Recovery Steam Generators (HRSGs) (S-2 & S-4).**

14. The Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. (BACT for $SO_2$ and $PM_{10}$)

15. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed 2,012 MM BTU per hour, averaged over any rolling 3-hour period. (PSD for $NO_x$)

16. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed 48,288 MM BTU per calendar day. (PSD for $PM_{10}$)

17. The combined cumulative heat input rate for both Gas Turbines (S-1 and S-3) and both HRSGs (S-2 and S-4) shall not exceed 32,500,000 MM BTU per year. (Offsets)

18. The HRSG duct burners shall not be fired unless its associated Gas Turbine is in operation. (BACT for $NO_x$, CO, POC)

19. The Gas Turbine (S-1) and HRSG (S-2) shall be abated by the properly operated and properly maintained Oxidizing Catalyst (A-1) and Selective Catalytic Reduction System (A-2), in series. (BACT for $NO_x$ and CO)

20. The Gas Turbine (S-3) and HRSG (S-4) shall be abated by the properly operated and properly maintained Oxidizing Catalyst (A-3) and Selective Catalytic Reduction System (A-4), in series. (BACT for $NO_x$ and CO)

21. The owner/operator of the Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall meet all of the requirements listed in (a) through (f) below, except during a Gas Turbine Start-up or a Gas Turbine Shutdown. (BACT, PSD, and Toxic Risk Management Policy)

    (a) Nitrogen oxide emissions at P-1 (the combined exhaust point for the S-1 Gas Turbine and the S-2 HRSG after control by the A-1 SCR System and A-2 Oxidation Catalyst) shall not exceed 17.5 pounds per hour, calculated as $NO_2$, nor 0.009 lbs/MM BTU of natural gas fired. Nitrogen oxide emissions at P-2 (the combined exhaust point for the S-3 Gas Turbine and the S-4 HRSG after control by the A-3 SCR System and A-4 Oxidation Catalyst) shall not exceed 17.5 pounds per hour, calculated as $NO_2$, nor 0.009 lbs/MM BTU of natural gas fired. (PSD for $NO_x$)

    (b) The nitrogen oxide concentration at P-1 and P-2 each shall not exceed 2.5 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any 1-hour period. (BACT for $NO_x$)

    (c) Carbon monoxide emissions at P-1 and P-2 each shall not exceed 26.56 pounds per hour, nor 0.0132 lb/MM BTU of natural gas fired. (PSD for CO)

    (d) The carbon monoxide concentration at P-1 and P-2 each shall not exceed 6 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for CO)

    (e) Ammonia ($NH_3$) emissions at P-1 and P-2 each shall not exceed 10 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous records of the ammonia injection rate to A-1 and A-2 SCR Systems. The correlation between the gas turbine and HRSG heat input rates, A-1 and A-2 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1 and P-2 shall be determined in accordance with permit condition 38. (TRMP for $NH_3$)

    (f) Precursor organic compound (POC) emissions at P-1 and P-2 each shall not exceed 3.43 pounds per hour, nor 0.0017 lb/MM BTU of natural gas fired. (BACT)

22. The following conditions shall apply to $NO_x$ emissions resulting from or attributable to transient, non-steady state operating conditions. (BACT for $NO_x$)

    (a) CEM $NO_x$ emission concentration data points that result from or are attributable to transient, non-steady state conditions shall not be subject to the emission limitations specified in Condition 21(b). In any event, the nitrogen oxide concentration at P-1 and P-2 each shall not exceed 2.5 ppmv, corrected to 15%

$O_2$, on a dry basis, averaged over any rolling 3-hour period. All CEM $NO_x$ emission concentration data points shall be utilized when determining compliance with this emission concentration limit.

(b) The emission limitation specified in Condition 22(a) shall be valid for a period not to exceed 24 months from the end of the Commissioning period. At such time the emission limitation specified in Condition 21(b) shall apply for all operating conditions except gas turbine start-up and shutdown periods, unless specific transient, non-steady state conditions are identified pursuant to conditions 22(f) and (g).

(c) Definitions

A transient, non-steady state condition shall occur when the following conditions exist:

(1) One or more equipment design features is unable to support rapid changes in operation and respond to and adjust all operating parameters required to maintain the steady-state NOx emission limit specified in condition 21(b). A change in operation shall be limited to one or more of the following: a change in combustion turbine load greater than 6 MW/minute; a change in SCR system space velocity greater than 50 ft/minute; initiation/shutdown of the evaporative cooler; initiation/shutdown of the duct burners; and a change in duct burner firing rate greater than 600,000 BTU/minute. Additional non-steady state conditions may be defined based upon operational experience and mutual written agreement of the owner/operator, the District, ARB, and EPA.

(2) For purposed of this condition, transient, non-steady state conditions shall not include the start-up and shutdown periods that are the subject of condition 23.

(d) The owner/operator shall maintain continuous emission monitor (CEM) data and complete records of plant emission performance under transient, non-steady state conditions. The owner/operator shall record the $NO_x$ emission concentration and document the cause of each transient, non-steady state condition with operational data. A description of the specific parameters that will be monitored to document a transient, non-steady state condition shall be submitted to the District, ARB, and EPA for approval at least 60 days prior to the end of the Commissioning period.

(e) Within 6 months of the end of the Commissioning period, the owner/operator shall compile and submit source test data, using a District-approved test protocol, to assess $NO_x$ emissions under transient, non-steady state conditions. A source test protocol shall be submitted to the District and EPA for approval at least 60 days prior to testing.

(f) Within 15 months of the end of the Commissioning period, the owner/operator shall submit a plan to the District and EPA designed to minimize emissions during transient, non-steady state conditions. The plan shall identify reasonable measures that will be taken to control $NO_x$ emissions. This plan shall be based upon the CEM and source test data developed in accordance with condition 22(e) and actual operating experience during the preceding months of plant operation. The plan shall be developed in consultation with the manufacturers selected for the gas turbine, HRSG, control systems, and air pollution control units. After the plan has been approved by the District and EPA, the owner/operator shall use the procedures described in the plan to minimize $NO_x$ emissions during transient, non-steady state conditions.

(g) On a semi-annual basis, for the first 24 months after the end of the Commissioning period, the owner/operator shall provide a report to the District with continuous emission monitoring and source test data developed in accordance with this condition. The District will use the data and related operating experience to establish maximum $NO_x$ emission limits for transient, non-steady state conditions for the following 6 month period. The District will consider operations at similar (e.g., electrical generation and fuel-type) facilities in determining the revised emission limits. In no event shall the $NO_x$ emission limits established pursuant to section (g) be less than the $NO_x$ emission limits specified in Condition 21(b). In addition, if appropriate, on a semi-annual basis the district will use all data and related operating experience to establish (i) a revised definition of transient, non-steady state conditions to which the $NO_x$ emission limitations established pursuant to this section (g) shall apply, and (ii) the data collection and recordkeeping requirements that the owner/operator shall use to document the occurrence of transient non-steady state conditions.

23. The pollutant emission rates from each of the Gas Turbines (S-1 and S-3) during a start-up or shutdown shall not exceed the limits established below. These limits apply to any 60-minute period, not a three-hour average. (PSD)

| | Start-Up (lbs/hr) | Shutdown (lbs/hr) |
|---|---|---|
| Oxides of Nitrogen (as $NO_2$) | 223 | 58 |
| Carbon Monoxide (CO) | 1821 | 238 |
| Precursor Organic Compounds (as $CH_4$) | 239 | 253 |

Within three months of the end of the Commissioning period, the owner/operator shall submit a plan designed to minimize emissions during the transient conditions encountered during gas turbine start-ups and shutdowns. This plan shall indicate what steps will be taken to start controlling $NO_x$ emissions as soon as feasible, including when ammonia can be fed to the SCR system without producing ammonia slip in excess of 10 ppmvd @ 15% $O_2$. This plan shall be based upon the

experience gathered from the source tests performed per condition #13 and actual operating experience gained during the first six-months of operation. This plan shall also be developed in consultation with the manufacturers of the gas turbines, HRSGs, control systems, and air pollution control units. This plan shall be submitted to the CEC CPM for approval. After the plan has been approved, the owner/operator shall use the procedures included in the plan to minimize $NO_x$ emissions during gas turbine start-ups and shutdowns.

Within 24 months of the end of the Commissioning period, the owner/operator shall submit a report to the District and the CEC CPM that establishes reasonable maximum hourly mass emission rates for start-up and shutdown conditions. The revised mass emission rates shall be based upon source test and continuous emission monitoring data. Pending approval of the District and the CEC CPM, these revised mass emission rates shall be established as new emission limitations that will supersede the limits included in this condition.

24. The Gas Turbines (S-1 and S-3) shall not be in start-up mode simultaneously. (PSD)

**Conditions for the Auxiliary Boiler (S-5)**

25. The Auxiliary Boiler (S-5) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. (BACT for $SO_2$ and $PM_{10}$)

26. The heat input rate to the Auxiliary Boiler (S-5) shall not exceed 266 million BTU per hour, averaged over any rolling 3-hour period. (Cumulative Increase)

27. The cumulative heat input rate to the Auxiliary Boiler (S-5) shall not exceed 399,000 million BTU per year. (Cumulative Increase)

28. The owner/operator of the Auxiliary Boiler (S-5) shall meet all of the requirements listed in (a) through (d) below, except during an Auxiliary Boiler Start-up or an Auxiliary Boiler Shutdown. (BACT, PSD)

    (a) Nitrogen oxide emissions at P-3 (the exhaust point for the Auxiliary Boiler) shall not exceed 2.9 pounds per hour, calculated as $NO_2$. (PSD for $NO_x$)

    (b) The nitrogen oxide concentration at P-3 shall not exceed 9.0 ppmv, measured as $NO_x$, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for $NO_x$)

    (c) Carbon monoxide emissions at P-3 shall not exceed 9.8 pounds per hour. (PSD for CO)

(d) The carbon monoxide concentration at P-3 shall not exceed 50 ppmv, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for CO)

(e) Precursor organic compound (POC) emissions at P-3 shall not exceed 0.36 pounds per hour.

29. The Auxiliary Boiler (S-5), its burners, combustion chamber, and exhaust system shall be designed and constructed so that the boiler can be retrofitted with an SCR system and/or an oxidizing catalyst in the event the Auxiliary Boiler cannot consistently comply with the emission limitations specified in condition 28. (BACT for $NO_x$ and CO)

**Conditions for All Sources**
**(S-1, S-2, S-3, S-4, and S-5)**

30. The combined heat input rate to the Gas Turbines (S-1 and S-3), HRSGs (S-2 and S-4), and Auxiliary Boiler (S-5) shall not exceed 102,960 million BTU per calendar day. (PSD, CEC Offsets)

31. The cumulative heat input rate to the Gas Turbines (S-1 and S-3), HRSGs (S-2 and S-4), and Auxiliary Boiler (S-5) combined shall not exceed 32,900,000 million BTU per year. (Offsets)

32. Total combined emissions from the Gas Turbines, HRSGs, and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine Start-ups, Gas Turbine Shutdowns, Auxiliary Boiler Start-ups, and Auxiliary Boiler Shutdowns, shall not exceed the following limits during any calendar day:

| | | |
|---|---|---|
| (a) | 1190 pounds of $NO_x$ (as $NO_2$) per day | (CEQA) |
| (b) | 5224 pounds of CO per day | (PSD) |
| (c) | 892 pounds of POC (as $CH_4$) per day | (CEQA) |
| (d) | 842 pounds of $PM_{10}$ per day | (PSD) |
| (e) | 272.4 pounds of $SO_2$ per day | (BACT) |

During days with two cold start-ups (the Gas Turbines have been out of service for more than 72 hours) daily combined $NO_x$ emissions (as $NO_2$) from the Gas Turbines, HRSGs, and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5) shall not exceed 1330 pounds per day. The number of days where the combined $NO_x$ emissions are greater 1190 lb/day and less than 1330 lb/day shall be limited to 10 per consecutive twelve month period.

33. Cumulative emissions from the Gas Turbines, HRSGs, and the Auxiliary Boiler combined (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine Start-ups, Gas Turbine Shutdowns, Auxiliary Boiler Start-ups, and Auxiliary

Boiler Shutdowns, shall not exceed the following limits during any consecutive twelve-month period:

(a) 153.2 tons of $NO_x$ (as $NO_2$) per year (Offsets, PSD)

(b) 487.5 tons of CO per year (Cumulative Increase)
(c) 97.61 tons of POC (as $CH_4$) per year (Offsets)
(d) 123.55 tons of $PM_{10}$ per year (Offsets, PSD)
(e) 39.86 tons of $SO_2$ per year (Cumulative Increase)

34. The maximum projected annual toxic air contaminant emissions from the Gas Turbines, HRSGs, and the Auxiliary Boiler combined (S-1, S-2, S-3, S-4, and S-5) shall not exceed the following limits:

(a) 3,668 pounds of formaldehyde per year
(b) 441.7 pounds of benzene per year
(c) 76.2 pounds of Specified polycyclic aromatic hydrocarbons (PAHs) per year

unless the owner/operator meets the requirements of (d), (e), and (f) below:

(d) The owner/operator shall perform a health risk assessment using the emission rates determined by source test and the most current Bay Area Air Quality Management District (District) approved procedures and unit risk factors in effect at the time of the analysis. The calculated excess cancer risk shall not exceed 1.0 in one million.

(e) The owner/operator shall perform a second risk analysis using the emission rates determined by source test and the procedures and unit risk factors in effect when the Determination of Compliance was issued. The calculated excess cancer risk shall not exceed 1.0 in one million.

(f) Both of these risk analyses shall be submitted to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will satisfy the conditions stated in parts (d) and (e) above, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (TRMP)

35. The owner/operator shall demonstrate compliance with conditions 15 through 18, 21(a) through 21(d), 23, 24, 26, 28(a) through 28(d), 32(a), 32(b), 33(a), and 33(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment Start-up and Shutdown periods) for all of the following parameters:

(a) Firing Hours and Fuel Flow Rates for each of the following sources: S-1 and S-2 combined, S-3 and S-4 combined, and S-5.

(b) Oxygen ($O_2$) Concentrations, Nitrogen Oxides ($NO_x$) Concentrations, and Carbon Monoxide (CO) Concentrations at each of the following exhaust points: P-1, P-2 and P-3.

(c) Ammonia injection rate at A-1 and A-2 SCR Systems

The owner/operator shall record all of the above parameters every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total Firing Hours, the average hourly Fuel Flow Rates, and pollutant emission concentrations.

The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

(c) Heat Input Rate for each of the following sources: S-1 and S-2 combined, S-3 and S-4 combined, and S-5.

(d) Corrected $NO_x$ concentrations, $NO_x$ mass emissions (as $NO_2$), corrected CO concentrations, and CO mass emissions at each of the following exhaust points: P-1, P-2, and P-3.

For each source, source grouping, or exhaust point, the owner/operator shall record the parameters specified in conditions 35(c) and 35(d) at least once every 15 minutes (excluding normal calibration periods). As specified below, the owner/operator shall calculate and record the following data:

(e) total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.

(f) on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and associated HRSG combined, the Auxiliary Boiler, and all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(g) the average $NO_x$ mass emissions (as $NO_2$), CO mass emissions, and corrected $NO_x$ and CO emission concentrations for every clock hour and for every rolling 3-hour period.

(h) on an hourly basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine and associated HRSG combined, the Auxiliary Boiler, and all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(i) For each calendar day, the average hourly Heat Input Rates, Corrected $NO_x$ emission concentrations, $NO_x$ mass emissions (as $NO_2$), corrected CO emission concentrations, and CO mass emissions for each Gas Turbine and associated HRSG combined and the Auxiliary Boiler.

(j) on a daily basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and cumulative total CO mass emissions, for each calendar year for all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(1-520.1, 9-9-501, BACT, Offsets, NSPS, PSD, Cumulative Increase)

36. To demonstrate compliance with conditions 23, 32(c) through 32(e), and 33(c) through 33(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter ($PM_{10}$) mass emissions (including condensable particulate matter), and Sulfur Dioxide ($SO_2$) mass emissions from each power train and the auxiliary boiler. The owner/operator shall use the actual Heat Input Rates calculated pursuant to condition 35, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:

(a) For each calendar day, POC, $PM_{10}$, and $SO_2$ Emissions shall be summarized for: each power train (Gas Turbine and its respective HRSG combined); the Auxiliary Boiler; and the five sources (S-1, S-2, S-3, S-4, and S-5) combined.
(b) on a daily basis, the cumulative total POC, $PM_{10}$, and $SO_2$ mass emissions, for each year for all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(Offsets, PSD, Cumulative Increase)

37. To demonstrate compliance with Condition 34, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Formaldehyde, Benzene, and Specified PAH's. Maximum projected annual emissions shall be calculated using the maximum Heat Input Rate of 32,912,920 MM BTU/year and the highest emission factor (pounds of pollutant per MM BTU of Heat Input) determined by any source test at the Gas Turbine, HRSG, or Auxiliary Boiler. (TRMP)

38. Within 60 days of start-up of the PDEF, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 to determine the corrected ammonia ($NH_3$) emission concentration to determine compliance with condition 21(e). The source test shall determine the correlation between the heat input rates of the gas turbine and associated HRSG, A-1 or A-2 SCR System ammonia injection rate, and the corresponding $NH_3$ emission concentration at emission point P-1 or P-2. The source test shall be conducted over the expected operating range of the turbine (at a minimum, 60%, 80%, and 100% load) to establish the range of ammonia injection rates necessary to achieve $NO_x$ emission reductions while maintaining ammonia slip levels. Continuing compliance with condition 21(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate. (TRMP)

39. Within 60 days of start-up of the PDEF and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1 and P-2 while each Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum load to determine compliance with Conditions 21(a), (b), (c), (d), & (f) and while each Gas Turbine and associated Heat Recovery Steam Generator are operating at minimum load to determine compliance with Conditions 21(c), (d), & (f) and to verify the accuracy of the continuous emission monitors required in condition 35. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and emissions, methane, ethane, and particulate matter ($PM_{10}$) emissions including condensable particulate matter. (BACT, offsets)

40. Within 60 days of start-up of the PDEF and on an annual basis thereafter, the owner/operator shall conduct a District approved source test on exhaust point P-3 while the Auxiliary Boiler (S-5) is operating at maximum allowable operating rates to determine compliance with the emission limitations of Condition 28(a) through 28(d) and to verify the accuracy of the continuous emission monitors required in condition 35. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and emissions, and particulate matter ($PM_{10}$) emissions including condensable particulate matter. (BACT, offsets)

41. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CEC CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the Owner/Operator shall measure the contribution of condensable PM (back half) to the total $PM_{10}$ emissions. However, the Owner/Operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. Source test results shall be submitted to the District and the CEC CPM within 30 days of conducting the tests. (BACT)

42. Within 60 days of start-up of the PDEF and on an biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 while the Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum allowable operating rates to demonstrate compliance with Condition 34. Unless the requirements of condition 42(b) have been met, the owner/operator shall determine the formaldehyde, benzene, and Specified PAH emission rates (in pounds/MM BTU). If any of the above pollutants are not detected (below the analytical detection limit), the emission concentration for that pollutant shall be deemed to be one half (50%) of the detection limit concentration. (TRMP)

(a) The owner/operator shall calculate the maximum projected annual emission rate for each pollutant by multiplying the pollutant emission rate (in pounds/MM BTU; determined by source testing) by 32,912,920 MM BTU/year.

(b) If three consecutive biennial source tests demonstrate that the emission rates calculated pursuant to part (a) for any of the compounds listed below are less than the annual emission rates shown, then the owner/operator may discontinue future testing for that pollutant:

| | | |
|---|---|---|
| Benzene | ≤ | 221 pounds/year |
| Formaldehyde | ≤ | 1,834 pounds/year |
| Specified PAH's | ≤ | 38 pounds/year |

(TRMP)

43. The owner/operator shall submit all reports (including, but not limited to monthly CEM reports, monitor breakdown reports, emission excess reports, equipment breakdown reports, etc.) as required by District Rules or Regulations and in accordance with all procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual. (Regulation 2-6-502)

44. The owner/operator shall maintain all records and reports on site for a minimum of 5 years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emissions, monitor excesses, breakdowns, etc.), source test and analytical records, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Regulation 2-6-501)

45. The owner/operator shall notify the District and the CEC CPM of any violations of these permit conditions. Notification shall be submitted in a timely manner, in accordance with all applicable District Rules, Regulations, and the Manual of Procedures. Not withstanding the notification and reporting requirements given in any District Rule, Regulation, or the Manual of Procedures, the owner/operator shall submit written notification (facsimile is acceptable) to the Enforcement Division within 96 hours of the violation of any permit condition. (Regulation 2-1-403)

46. The stack heights of the emission points P-1 and P-2 shall be at least 150 feet above mean sea level (approximately 138.8 feet above grade level at the stack base). The stack height of the emission point P-3 shall be at least 100.6 feet above mean sea level (approximately 88.6 feet above grade level at the stack base). (PSD, TRMP)

47. The Owner/Operator of PDEF shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall be subject to BAAQMD review and approval.

(Regulation 1-501)

48. Within 180 days of the issuance of the Authority to Construct, the Owner/Operator shall contact the BAAQMD Technical Services Division regarding requirements for the continuous monitors, sampling ports, platforms, and source tests required by Conditions 38, 39, 40, and 42. All source testing and monitoring shall be conducted in accordance with the BAAQMD Manual of Procedures. (Regulation 1-501)

49. Prior to the issuance of the BAAQMD Authority to Construct for the Pittsburg District Energy Facility, the Owner/Operator shall demonstrate that valid emission reduction credits in the amount of 176.18 tons/year of Nitrogen Oxides, 112.25 tons/year of Precursor Organic Compounds, and 123.55 tons/year of $PM_{10}$ or equivalent as defined by District Regulations 2-2-302.1, 2-2-302.2, and 2-2-303.1 are under their control through option to purchase contracts or equivalent binding legal documents. (Offsets)

50. Prior to the start of construction of the Pittsburg District Energy Facility, the Owner/Operator shall provide emission reduction credits in the amount of 176.18 tons/year of Nitrogen Oxides, 112.25 tons/year of Precursor Organic Compounds, and 123.55 tons/year of $PM_{10}$ or equivalent as defined by District Regulations 2-2-302.1, 2-2-302.2, and 2-2-303.1. (Offsets)

51. Pursuant to BAAQMD Regulation 2, Rule 6, section 404.1, the owner/operator of PDEF shall submit an application to the District for a Federal (Title V) Operating Permit within 12 months of the date of issuance of the BAAQMD Permit to Operate for the PDEF. (Regulation 2-6-404.1)

# V Recommendation

The APCO has concluded that the proposed Pittsburg District Energy Facility power plant, which is composed of the sources listed below, meets the requirements of all applicable District regulations. These sources will be subject to the permit conditions and BACT and offset requirements discussed previously.

**S-1 Combustion Gas Turbine #1, General Electric Frame 7FA Model PG 7241 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst**

**S-2 Heat Recovery Steam Generator #1, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst.**

**S-3 Combustion Gas Turbine #2, General Electric Frame 7FA Model PG 7241 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst**

**S-4 Heat Recovery Steam Generator #2, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst.**

**S-5 Auxiliary Steam Boiler, 266 MM BTU per hour, equipped with low-$NO_x$ burners**

Pursuant to District Regulation 2-3-404, this document shall be subject to the public notice, public comment, and public inspection requirements of Regulation 2-2-406 and 2-2-407.

# Appendix A

## Emission Factor Derivations

The following physical constants and standard conditions were utilized to derive the criteria-pollutant emission factors used to calculate criteria pollutant and toxic air contaminant emissions.

| | |
|---|---|
| standard temperature[a]: | 70°F |
| standard pressure[a]: | 14.7 psia |
| molar volume: | 385.3 dscf/lbmol |
| ambient oxygen concentration: | 20.95% |
| dry flue gas factor[b]: | 8600 dscf/MM BTU |
| natural gas higher heating value: | 1030 BTU/dscf |

[a]BAAQMD standard conditions per Regulation 1, Section 228.

[b]based upon the assumption of complete stoichiometric combustion of natural gas. In effect, all excess air present before combustion is assumed to be emitted in the exhaust gas stream. Based upon typical composition of natural gas.

Table A-1 summarizes the criteria pollutant and toxic air contaminant emission factors that were used to calculate mass emissions for each source. All units are pounds per million BTU of natural gas fired based upon the high heating value (HHV). All applicable abatement efficiency factors are included.

### Table A-1
### Controlled Regulated Air Pollutant Emission Factors
### (lb/MM BTU)

| Pollutant | Source | | | |
|---|---|---|---|---|
| | **CTG** | **HRSG** | **CTG & HRSG Combined** | **Auxiliary Boiler** |
| | | | | |
| Nitrogen Oxides (as $NO_2$) | 0.009[a] | 0.009[a] | 0.009[a] | 0.0107 |
| Carbon Monoxide | 0.0132[b] | 0.0132[b] | 0.0132[b] | 0.0365 |
| Precursor Organic Compounds | 0.00136 | 0.01 | 0.0017 | 0.00137 |
| Particulate Matter ($PM_{10}$) | 0.00845 | 0.00845 | 0.00845 | 0.005 |
| Sulfur Dioxide | 0.00277 | 0.00277 | 0.00277 | 0.00277 |

[a]based upon the permit condition emission limit of 2.5 ppmvd $NO_x$ @ 15% $O_2$ that reflects the use of dry low-$NO_x$ combustors at the CTG, low-$NO_x$ burners at the HRSG, and abatement by the proposed A-1 and A-3 Selective Catalytic Reduction Systems with Ammonia Injection

[b]based upon the permit condition emission limit of 6 ppmvd CO @ 15% $O_2$

## REGULATED AIR POLLUTANTS

### NITROGEN OXIDE EMISSION FACTORS

Combustion Turbine Generator and Heat Recovery Steam Generator Combined

The combined $NO_x$ emissions from the CTG and HRSG will be limited to 2.5 ppmv, dry @ 15% $O_2$. This emission limit will also apply when the HRSG duct burners are in operation. This concentration is converted to a mass emission factor as follows:

(2.5 ppmvd)(20.95 - 0)/(20.95 - 15) = 8.8 ppmv $NO_x$, dry @ 0% $O_2$

$(8.8/10^6)$(1 lbmol/385.3 dscf)(46.01 lb $NO_2$/lbmol)(8600 dscf/MM BTU)

= **0.009 lb $NO_2$/MM BTU**

Auxiliary Boiler

The auxiliary boiler $NO_x$ emissions will be limited to the BACT level of 9 ppmv, dry @ 3% $O_2$. This concentration is converted to a mass emission factor as follows:

(9 ppmvd)(20.95 - 0)/(20.95 - 3) = 10.5 ppmv, dry @ 0% $O_2$

$[(10.5/10^6)$/385.3 dscf/lbmol](46.01 lb $NO_2$/lbmol)(8600 dscf/MM BTU)

= **0.0108 lb $NO_2$/MM BTU**

### CARBON MONOXIDE EMISSION FACTORS

Combustion Turbine Generator and Heat Recovery Steam Generator Combined

The combined CO emissions from the CTG and HRSG duct burner will be conditioned to a maximum controlled CO emission limit of 6 ppmv, dry @ 15% $O_2$. The emission factor corresponding to this emission concentration is calculated as follows:

(6 ppmv)(20.95 - 0)/(20.95 - 15) = 21.13 ppmv, dry @ 0% $O_2$

$(21.13/10^6)$(lbmol/385.3 dscf)(28 lb CO/lbmol)(8600 dscf/MM BTU)

= **0.0132 lb CO/MM BTU**

The corresponding CO emission rate in lb/hr based upon the maximum combined firing rate of the CTG and HRSG is calculated as follows:

(0.0132 lb/MM BTU)(2,012 MM BTU/hr) = 26.56 lb CO/hr

Auxiliary Boiler

Pursuant to current BACT Guidelines and vendor guarantees, the auxiliary boiler will achieve a CO emission concentration of 50 ppmv, dry @ 3% $O_2$. The emission factor corresponding to this emission concentration is calculated as follows:

(50 ppmv)(20.95 - 0)/(20.95 - 3) = 58.35 ppmv, dry @ 0% $O_2$

$(58.35/10^6)$(lbmol/385.3 dscf)(28 lb CO/lbmol)(8600 dscf/MM BTU)

= **0.0365 lb CO/MM BTU**

## PRECURSOR ORGANIC COMPOUND (POC) EMISSION FACTORS

Combustion Turbine Generator

The turbine vendor, G.E. has guaranteed a POC (non-methane/ethane hydrocarbon) emission concentration of 1.40 ppmw @ 15% $O_2$. Engelhard, the oxidation catalyst vendor, has guaranteed a POC conversion efficiency of 30% by weight. Based upon a turbine exhaust gas moisture content of 9% by volume, the POC emission factor is calculated as follows:

(1.4 ppmvw)/(1 – 0.09) = 1.54 ppmvd @ 15 % $O_2$

(1.54 ppmvd)(20.95)/(20.95 – 0.15) = 5.42 ppmvd @ 0% $O_2$

$(5.42/10^6)$(lb-mol/385.3 dscf)(16 lb/lb-mol)(8600 dscf/MM BTU) = 0.00194 lb/MM BTU

Applying the oxidation catalyst conversion efficiency yields:

(0.00194 lb/MM BTU)(1 – 0.30) = 0.00136 lb/MM BTU

Converting to a mass emission rate:

POC = (0.00136 lb/MM BTU)(1929 MM BTU/hr) = 2.62 lb/hr

Heat Recovery Steam Generator

The duct burner vendor has guaranteed a POC emission factor of 0.014 lb/MM BTU. Given the duct burner heat input rate of 83 MM BTU/hr, and the oxidation catalyst POC conversion efficiency of 30% (wt), this converts to a mass emisson rate of:

POC = (0.014 lb/MM BTU)(83 MM BTU/hr)(1 - 0.30) = 0.81 lb/hr

Combustion Turbine Generator and Heat Recovery Steam Generator Combined

The combined POC mass emission rate is calculated as follows:

2.62 lb/hr + 0.81 lb/hr = 3.43 lb/hr

This converts to an emission factor of:

(3.43 lb/hr)/2012 MM BTU/hr) = 0.0017 lb/MM BTU

Auxiliary Boiler

Per AP-42, Section 1.4, Table 1.4-3, the applicable POC emission factor for the auxiliary boiler is 1.7 lb POC/$10^6$ $ft^3$. 17% (wt) of the POC is considered to be methane.

The **POC emission factor** is therefore:

(1.7 lb POC/$10^6$ $ft^3$)(1 $ft^3$/1030 BTU)(1 - 0.17) = **0.00137 lb POC/MM BTU**

**PARTICULATE MATTER ($PM_{10}$) EMISSION FACTORS**

Combustion Turbine Generator and HRSG Combined

To maximize flexibility, the applicant has opted to use the ABB vendor guarantee for $PM_{10}$ of 17 lb/hr at the maximum combined firing rate of 2,012 MM BTU/hr. In light of the small heat input rate of the HRSG duct burners (83 MM BTU/hr) relative to the gas turbine heat input rate, it is assumed that the 17 lb/hr $PM_{10}$ emission rate also applies to simultaneous firing of the CTG and HRSG duct burners. The corresponding $PM_{10}$ emission factor is therefore:

(17 lb $PM_{10}$/hr)/(2,012 MM BTU/hr) = **0.00845 lb $PM_{10}$/MM BTU**

It is assumed that this $PM_{10}$ emission factor includes secondary $PM_{10}$ formation of ammonium bisulfate.

The following stack data will be used to calculate the grain loading for simultaneous CTG and HRSG operation at standard conditions to determine compliance with BAAQMD Regulation 6-310.3.

| | |
|---|---|
| $PM_{10}$ mass emission rate: | 17 lb/hr |
| typical flow rate: | 980,661 acfm |
| water content: | 9% by volume |
| observed temperature: | 203°F |
| standard temperature: | 70°F |
| oxygen content (wet basis): | 12% $O_2$ by volume |
| oxygen content (dry basis): | 13.2% $O_2$ by volume |

Correcting the flow rate to standard conditions yields:

(980,661 acfm)(70 + 460/203 + 460)(1 - 0.09) = 713,383 dscfm

Converting to grains/dscf:

(17 lb $PM_{10}$/hr)(1 hr/60 min)(7000 gr/lb)/(713,383 dscfm) = 0.0028 gr/dscf

Converting to 6% $O_2$ basis:

(0.0028 gr/dscf)[(20.95 - 6)/(20.95 – 13.2)] = 0.0054 gr/dscf @ 6% $O_2$

Auxiliary Boiler

Per AP-42, Section 1.4, Table 1.4-2, the applicable $PM_{10}$ emission factor for the auxiliary boiler is 5 lb $PM_{10}/10^6$ $ft^3$.

The **$PM_{10}$ emission factor** is therefore:

(5 lb $PM_{10}/10^6$ $ft^3$)(1 $ft^3$/1,030 BTU) = **0.005 lb $PM_{10}$/MM BTU**

## SULFUR DIOXIDE EMISSION FACTORS

Combustion Turbine Generator & Heat Recovery Steam Generator

The $SO_2$ emission factor is based upon a maximum natural gas sulfur content of 1 gr/100 scf and a higher heating value of 1030 BTU/$ft^3$ as specified by PG&E. It applies to the firing of the CTG alone, the HRSG alone, and the CTG and HRSG simultaneously.

The sulfur emission factor is calculated as follows:

(1 gr S/100 scf)(1 scf/1,030 BTU)(2 gr $SO_2$/1 gr S)(1 lb/7000 gr)($10^6$ BTU/MM BTU)

= **0.00277 lb $SO_2$/MM BTU**

This is converted to an emission concentration as follows:

(0.00277 lb $SO_2$/MM BTU)(385.3 dscf/lbmol)($10^6$)(lbmol/64.06 lb $SO_2$)(MM BTU/8600 dscf)

= 1.94 ppmvd $SO_2$ @ 0% $O_2$

which is equivalent to:

(1.94 ppmvd)(20.95 - 15)/20.95 = 0.55 ppmv $SO_2$, dry @ 15% $O_2$

Auxiliary Boiler

As in the case of the CTG and HRSG, the maximum sulfur content of natural gas will be limited to 1 gr/100 scf. The **$SO_2$ emission factor** for the auxiliary boiler is therefore also **0.0027 lb $SO_2$/MM BTU**.

## Toxic Air Contaminants

***The following toxic air contaminant emission factors were used to calculate worst-case emissions rates used for air pollutant dispersion models that estimate the resulting increased health risk to the maximally exposed population. To ensure that the risk is properly assessed, the emission factors are conservative and may overestimate actual emissions.***

# Table A-2 TAC Emission Factors[a] for CTGs

| Contaminant | **Emission Factor** (lb/MM scf) |
|---|---|
| Acetaldehyde[c] | 6.86E-02 |
| Acrolein | 2.37E-02 |
| Ammonia[b] | 12.2 |
| Benzene[c] | 1.36E-02 |
| 1,3-Butadiene[c] | 1.27E-04 |
| Ethylbenzene | 1.79E-02 |
| Formaldehyde[c] | 1.10E-01 |
| Hexane | 2.59E-01 |
| Napthalene | 1.66E-03 |
| PAHs[c] | 2.32E-03 |
| Propylene | 7.70E-01 |
| Propylene Oxide[c] | 4.78E-02 |
| Toluene | 7.10E-02 |
| Xylene | 2.61E-02 |

[a]the highest of either Ventura County APCD or CATEF emission factors for gas turbines

[b]based upon maximum allowable ammonia slip of 10 ppmv, dry @ 15% $O_2$

[c]carcinogenic compound

# Table A-3 TAC Emission Factors[a] for Auxiliary Boiler

| Contaminant | **Emission Factor** (lb/MM scf) |
|---|---|
| Acetaldehyde[b] | 0.0089 |
| Acrolein | 0.0008 |
| Benzene[b] | 0.00431 |
| Ethylbenzene | 0.002 |
| Formaldehyde[b] | 0.221 |
| Hexane | 0.0013 |
| Napthalene | 0.0003 |
| PAHs[b] | 0.0004 |
| Propylene | 0.1553 |
| Toluene | 0.0078 |
| Xylene | 0.0058 |

[a]the highest of either Ventura County APCD or CATEF emission factors for industrial boilers

[b]carcinogenic compound

# Table A-4 TAC Emission Factors[a] for Cooling Towers

| Contaminant | Emission Factor (lb/hr) |
|---|---|
| Aluminum | 4.5E-05 |
| Arsenic[b] | 1.8E-06 |
| Silver | 2.3E-06 |
| Barium | 5.4E-06 |
| Beryllium[b] | 4.5E-06 |
| Cadmium[b] | 4.5E-06 |
| Chloride | 0.1027 |
| Hexavalent chromium[b] | 2.3E-06 |
| Copper | 3.2E-06 |
| Fluoride | 3.2E-04 |
| Lead[b] | 9.9E-06 |
| Magnesium | 1.2E-02 |
| Manganese | 6.1E-05 |
| Mercury | 9.1E-08 |
| Selenium[b] | 3.2E-06 |
| Silica[b] | 1.2E-05 |
| Sodium hydroxide | 3.2E-06 |
| Sulfate | 8.8E-02 |
| Zinc | 5.6E-06 |

[a]based upon 24 hr/day, 365 day/yr operation of cooling towers at maximum flow rate

[b]carcinogenic compound

AMMONIA EMISSION FACTOR

Combustion Turbine Generator & Heat Recovery Steam Generator

Each CTG/HRSG power train will exhaust through a common stack and be subject to a maximum ammonia exhaust concentration limit of 10 ppmvd @ 15% $O_2$.

| | |
|---|---|
| $NH_3$ emission concentration limit: | 10 ppmvd @ 15% $O_2$ |
| normal wet gas flow rate: | 980,661 acfm |
| maximum wet gas flow rate: | 1,026,503 acfm |
| moisture content: | 8% - 9% by vol. (CTG alone) |
| | 17% - 19% by vol. (with HRSG duct burner firing) |
| observed temperature: | 203$^o$F |
| standard temperature: | 70$^o$F |
| oxygen content (wet basis): | 11% - 12% $O_2$ by volume |

The exhaust gas oxygen content on a dry basis is determined to be:

(980,661 acfm)(0.12)/(980,661 acfm)(1 - 0.09) = 13.2% $O_2$

Correcting the flow rate to standard conditions yields:

(980,661 acfm)(70 + 460/203 + 460)(1 – 0.09) = 713,383 dscfm

(10 ppmvd)(20.95 – 13.2)/(20.95 – 15) = 13 ppmvd @ 13.2% $O_2$

(13 ppmvd/$10^6$)(713,383 dscfm)(60 min/hr)(lbmol/385.3 dscf)(17 lb $NH_3$/lbmol)

= **24.55 lb $NH_3$/hr**

Based upon the maximum combined heat input for a CTG/HRSG power train of 2,012 MM BTU/hr, this mass emission rate converts to the following emission factor:

(24.55 lb $NH_3$/hr)/(2,012 MM BTU/hr) = **0.0122 lb $NH_3$/MM BTU**
**= 12.2 lb $NH_3$/MM scf**

# Appendix B

## Emission Calculations

This appendix delineates the assumptions underlying the emission calculations used to determine the maximum regulated air pollutant and toxic air contaminant emission rates for the Pittsburg District Energy Facility.

Annual, daily, and hourly emissions from the CTGs, HRSGs, and auxiliary boiler will be limited through a variety of permit conditions limiting mass emission rates, emission concentrations, and fuel usage rates.

Individual and combined heat input limits for the CTG, HRSG, and auxiliary boiler are given below in Table B-1 below.

## Table B-1 Maximum Allowable Heat Input Rates

| **Source** | MM BTU/hour | MM BTU/day | MM BTU/year |
|---|---|---|---|
| S-1 CTG and S-2 HRSG Combined | 2,012 | 48,288 | 16,256,960[a] |
| S-3 CTG and S-4 HRSG Combined | 2,012 | 48,288 | 16,256,960[a] |
| Auxiliary Boiler | 266 | 6,384 | 399,000 |
| CTGs, HRSGs, & Auxiliary Boiler Combined | 4,290 | 102,960 | 32,900,000[b] |

[a]based upon 8,080 hours of simultaneous gas turbine and HRSG duct burner firing per year @ 100% load

[b]limited by permit condition

The maximum nitrogen oxide, carbon monoxide, and precursor organic compound emission rates from the CTG occur during start-up and shutdown periods. The $PM_{10}$, sulfur dioxide, ammonia, and toxic compound emissions are a function of fuel use rate only and are not increased during start-up or shutdown periods. The start-up and shutdown emissions listed in Table B-2 were provided by the CTG vendor and are projected and not guaranteed. See sections B-1.1 and B-1.2 for detailed CTG start-up and shutdown emission calculations.

## Table B-2 Maximum Start-up and Shutdown Emission Rates for each CTG (lb)

| Operating Mode | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Start-up[a] | 223 | 1821 | 239 | 17 | 5.6 |
| Shutdown[b] | 58 | 238 | 253 | 8.5 | 2.8 |

[a]Based upon a 1.0 hour hot start-up

[b]Based upon a 0.5 hour shutdown

## Table B-3 Maximum Facility Emissions[a]

| **Pollutant** | lb/hr[b] | lb/day[b] | ton/yr[c] |
|---|---|---|---|
| nitrogen oxides (as $NO_2$) | 39.05 | 939.5 | 154.8 |
| carbon monoxide | 62.8 | 1507.8 | 488.1 |
| precursor organic compounds | 7.22 | 173.3 | 97.61 |
| particulate matter ($PM_{10}$) | 35.77 | 858.4 | 123.6 |
| sulfur dioxide | 11.86 | 284.7 | 34.02 |

[a]includes $PM_{10}$ emissions from cooling towers which are exempt from BAAQMD permit requirements

[b]baseload operation of each CTG and associated HRSG (excluding CTG start-up and shutdown emissions) and includes 24 hr/day operation of auxiliary boiler

[c]includes CTG start-up and shutdown emissions

# B-1.0 CTG Start-Up and Shutdown Emission Rate Calculations

The following start-up emission rates are based upon data provided by Westinghouse. The duration of a turbine start-up is driven by the temperature of the steam turbine. The longer the gas turbine and steam turbine have been down, the longer it takes for the steam turbine blades and seals to be brought back up to operating temperature. Under the 2 X 1 configuration (two gas turbines and a shared steam turbine), cold starts and warm starts are very unlikely since it is anticipated that at least one turbine will be in operation at all times. According to the applicant, the 2 X 1 configuration is the most likely configuration for the PDEF. Therefore, the applicant has opted to base annual emission estimates upon the assumption that the vast majority of turbine start-ups will be hot.

$SO_2$ and $PM_{10}$ emission rates are not increased during start-up and shutdown periods. As a worst-case assumption, $SO_2$ and $PM_{10}$ emission estimates are based upon baseload emission factors of 0.00845 lb $PM_{10}$/MM BTU and 0.00277 lb $SO_2$/MM BTU during start-ups and shutdowns.

## Table B-4 CTG Start-Up Emissions (lb/start-up)

| **Pollutant** | Cold Start-Up[a] | Warm Start-Up[b] | Hot Start-Up[c] |
|---|---|---|---|
| $NO_x$ (as $NO_2$) | 280.3 | 245.7 | 223 |
| CO | 3,393.4 | 2,684.4 | 1,821 |
| UHC (as $CH_4$) | 359.4 | 319.9 | 239 |

[a]applies when CTG/ST has not been in operation for more than 72 hours

[b]applies when CTG/ST has not been in operation for more than 8 hours but less than 72 hours

[c]applies when CTG/ST has not been in operation for less than 8 hours

## Table B-5 CTG Shutdown Emissions[a] (lb/hr)

| Pollutant | PDEF Original Proposed[b] | PDEF Revised[c] | SF Energy FDOC[d] | Crockett Cogeneration Source Test[e] |
|---|---|---|---|---|
| $NO_x$ | 14.64 | 116 | 105.4 | 5.2 |
| CO | 29.8 | 476 | 477.4 | 29.5 |
| UHC (as $CH_4$) | 7 | 506 | 506 | 2.6 |

[a]based upon shutdown duration of one half hour

[b]Westinghouse estimates assuming 60% load during shutdown

[c]used in emission estimates as worst-case

[d]issued October 26, 1995; assumed fuel use rate of 85% during shutdown

[e]G.E. Frame 7F turbine; testing occurred June 1997

# B-1.1 START-UP EMISSION RATE CALCULATIONS:

## Hot Start

- Applies when CTG has not been in operation for less than 8 hours
- During first 30 minutes, CT is ramped up to 100% RPM
- During second 30 minutes, steam turbine (ST) is ramped up to 100% RPM
- Total duration: 1 hour

**NITROGEN OXIDES (as $NO_2$)**

(a) 0.5 hours into start-up, CTG exhaust temperature has reached minimum SCR operating temperature. A conservative SCR abatement factor of 60% (wt) will apply during the second 30 minutes of the 1 hour start-up.
(b) minimum CTG $NO_x$ emissions during first 30 minutes: **205 lbs** ***(per Westinghouse)***
(c) maximum uncontrolled CTG $NO_x$ emissions during second 30 minutes: **1.5 lb/min**

**$NO_2$** = 205 lb + (30 min)(1.5 lb/min)(1 – 0.60)
= **223 lb/hot start**

**CARBON MONOXIDE**

(a) no CO abatement credit given for oxidation catalyst during start-up
(b) maximum uncontrolled CTG CO emissions during first 30 minutes of start-up: **1,803 lbs**
(c) maximum uncontrolled CTG CO emissions during second 30 minutes of start-up: **0.6 lb/min**

**CO** = 1,803 lb CO + (30 min)(0.6 lb CO/min)
= **1,821 lb/hot start**

**PRECURSOR ORGANIC COMPOUNDS**

(a) no POC abatement credit given for oxidation catalyst during start-up
(b) maximum POC emissions during first 30 minutes of start-up: **236 lbs**
(c) maximum POC emissions during second 30 minutes of start-up: **0.1 lb/min**

**POC** = 236 lb POC + (30 min)(0.1 lb POC/min)
= **239 lb/hot start**

**PARTICULATE MATTER (as $PM_{10}$)**

(a) $PM_{10}$ emissions are not increased during start-up
(b) $PM_{10}$ emissions occur at the baseload rate of 0.00845 lb $PM_{10}$/MM BTU at the maximum combined rated heat input of the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $PM_{10}$ emissions during a start-up** are therefore:

$PM_{10}$ = (0.00845 lb $PM_{10}$/MM BTU)(2,012 MM BTU/hr)(1 hr start-up)
= 17 **lb $PM_{10}$/ hot start**

**SULFUR DIOXIDE**

(a) $SO_2$ emissions are not increased during start-up
(b) $SO_2$ emissions occur at baseload rate of 0.0027 lb $SO_2$/MM BTU at the maximum combined rated heat input for the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $SO_2$ emissions during a start-up** are therefore:

$SO_2$ = (0.00277 lb $SO_2$/MM BTU)(2,012 MM BTU/hr)(1 hr start-up)
= **5.6 lb $SO_2$/hot start**

## Cold Start

- Applies when CTG has not been in operation for more than 72 hours
- Total Duration of cold start: 217 minutes
- During first 30 minutes, CT is ramped up to 100% RPM
- During next 20 minutes, CT is held at 25% load
- During next 52 minutes, CT is held at 50% load
- During next 30 minutes, ST is ramped up to 100% RPM

*(ix) NITROGEN OXIDES **(as $NO_2$)***

(a) 0.5 hours into start-up, CTG exhaust temperature has reached minimum SCR operating temperature. SCR abatement factor of 75% (wt) will apply after 30 minutes have elapsed
(b) SCR abatement factor of 85% (wt) will apply after 40 minutes have elapsed
(c) maximum CTG $NO_x$ emissions during first 30 minutes: **205 lbs** ***(per Westinghouse)***
(d) maximum uncontrolled CTG $NO_x$ emissions during next 20 minutes: **4.2 lb/min**

(e) maximum uncontrolled CTG $NO_x$ emissions during next 127 minutes:
**2.6 lb/min**
(f) maximum uncontrolled CTG $NO_x$ emissions during next 40 minutes:
**1.5 lb/min**

**$NO_2$** = 205 lb + (10 min)(4.2 lb/min)(1 – 0.75) + (10 min)(4.2 lb/min)(1 – 0.85) + (127 min)(2.6 lb/min)(1 – 0.75) + (40 min)(1.5 lb/min)(1 – 0.75)
= **280.3 lb/cold start**

## CARBON MONOXIDE

(a) maximum CTG CO emissions during first 30 minutes: 1,803 lbs
(b) maximum CTG CO emissions during next 20 minutes: 32.6 lb/min
(c) maximum CTG CO emissions during next 127 minutes: 7.2 lb/min
(d) maximum CTG CO emissions during next 40 minutes: 0.6 lb/min

**CO** = 1,803 lb + (20 min)(32.6 lb/min) + (127 min)(7.2 lb/min) + (40 min)(0.6 lb/min)
= **3,393.4 lb/cold start**

## PRECURSOR ORGANIC COMPOUNDS

(a) no POC abatement credit given for oxidation catalyst during start-up
(b) maximum POC emissions during first 30 minutes of start-up:
**236 lbs**
(c) maximum POC emission rate during next 20 minutes of start-up:
**4.7 lb/min**
(d) maximum POC emission rate during next 127 minutes of start-up:
**0.2 lb/min**
(e) maximum POC emission rate during next 40 minutes of start-up:
**0.1 lb/min**

**POC** = 236 lb POC + (20 min)(4.7 lb POC/min) + (127 min)(0.2 lb POC/min) + (40 min)(0.1 lb POC/min)
= **359.4 lb/cold start**

## PARTICULATE MATTER (as $PM_{10}$)

(c) $PM_{10}$ emissions are not increased during start-up
(d) $PM_{10}$ emission rate during start-up equals baseload rate of 0.00845 lb $PM_{10}$/MM BTU at the maximum combined rated heat input of the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $PM_{10}$ emissions during a start-up** are therefore:

$PM_{10}$ = (0.00845 lb $PM_{10}$/MM BTU)(2,012 MM BTU/hr)(217 min start-up)(1 hr/60 min)
= **61.5 lb $PM_{10}$/cold start**

**SULFUR DIOXIDE**

(a) $SO_2$ emissions are not increased during start-up
(b) $SO_2$ emission rate during start-up equals baseload rate of 0.0027 lb $SO_2$/MM BTU at the maximum combined rated heat input for the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $SO_2$ emissions during a start-up** are therefore:

$SO_2$ = (0.00277 lb $SO_2$/MM BTU)(2,012 MM BTU/hr)(217 min start-up)(1 hr/60 min)
= **20.25 lb $SO_2$/cold start**

## Warm Start

- Applies when CTG has not been in operation for more than 8 hours but less than 72 hours
- Total Duration of cold start: 127 minutes
- During first 30 minutes, CT is ramped up to 100% RPM
- During next 15 minutes, CT is held at 25% load
- During next 52 minutes, CT is held at 50% load
- During next 30 minutes, ST is ramped up to 100% RPM

**NITROGEN OXIDES (as $NO_2$)**

(a) 0.5 hours into start-up, CTG exhaust temperature has reached minimum SCR operating temperature. SCR abatement factor of 75% (wt) will apply after 30 minutes have elapsed
(b) SCR abatement factor of 85% (wt) will apply after 40 minutes have elapsed
(c) maximum CTG $NO_x$ emissions during first 30 minutes: **205 lbs** ***(per Westinghouse)***
(d) maximum uncontrolled CTG $NO_x$ emission rate during next 15 minutes: **4.2 lb/min**
(e) maximum uncontrolled CTG $NO_x$ emission rate during next 52 minutes: **2.6 lb/min**
(f) maximum uncontrolled CTG $NO_x$ emission rate during next 30 minutes: **1.5 lb/min**

**$NO_2$** = 205 lb + (10 min)(4.2 lb/min)(1 – 0.75) + (5 min)(4.2 lb/min)(1 – 0.85) + (52 min)(2.6 lb/min)(1 – 0.75) + (30 min)(1.5 lb/min)(1 – 0.75)
= **245.7 lb/warm start**

**CARBON MONOXIDE**

(a) maximum CTG CO emissions during first 30 minutes: 1,803 lbs
(b) maximum CTG CO emission rate during next 15 minutes: 32.6 lb/min
(c) maximum CTG CO emission rate during next 52 minutes: 7.2 lb/min
(d) maximum CTG CO emission rate during next 30 minutes: 0.6 lb/min

**CO** = 1,803 lb + (15 min)(32.6 lb/min) + (52 min)(7.2 lb/min) + (30 min)(0.6 lb/min)
= **2,684.4 lb/warm start**

**PRECURSOR ORGANIC COMPOUNDS**

(a) no POC abatement credit given for oxidation catalyst during start-up
(b) maximum POC emissions during first 30 minutes of start-up:
**236 lbs**
(c) maximum POC emission rate during next 15 minutes of start-up:
**4.7 lb/min**
(d) maximum POC emission rate during next 52 minutes of start-up:
**0.2 lb/min**
(e) maximum POC emission rate during next 30 minutes of start-up:
**0.1 lb/min**

**POC** = 236 lb POC + (15 min)(4.7 lb POC/min) + (52 min)(0.2 lb POC/min) + (30 min)(0.1 lb POC/min)
= **319.9 lb/warm start**

**PARTICULATE MATTER (as $PM_{10}$)**

(a) $PM_{10}$ emissions are not increased during start-up
(b) $PM_{10}$ emission rate during start-up equals baseload rate of 0.00845 lb $PM_{10}$/MM BTU at the maximum combined rated heat input of the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $PM_{10}$ emissions during a start-up** are therefore:

$PM_{10}$ = (0.00845 lb $PM_{10}$/MM BTU)(2,012 MM BTU/hr)(127 min start-up)(1 hr/60 min)
= **36 lb $PM_{10}$/warm start**

**SULFUR DIOXIDE**

(a) $SO_2$ emissions are not increased during start-up
(b) $SO_2$ emission rate during start-up equals baseload rate of 0.0027 lb $SO_2$/MM BTU at the maximum combined rated heat input for the CTG/HRSG of 2,012 MM BTU/hr.

**CTG $SO_2$ emissions during a start-up** are therefore:

$SO_2$ = (0.00277 lb $SO_2$/MM BTU)(2,012 MM BTU/hr)(127 min start-up)(1 hr/60 min)
= **11.8 lb $SO_2$/warm start**

## B-1.2 SHUTDOWN EMISSION RATE CALCULATIONS:

**NITROGEN OXIDES (as $NO_2$)**

As a conservative assumption, $NO_2$ shutdown emissions will be based upon S.F. Energy Company FDOC emission estimates.

**CARBON MONOXIDE**

As a conservative assumption, CO shutdown emissions will be based upon S.F. Energy Company FDOC emission estimates.

**PRECURSOR ORGANIC COMPOUNDS**

As a conservative assumption, POC shutdown emissions will be based upon S.F. Energy Company FDOC emission estimates.

**PARTICULATE MATTER (as $PM_{10}$)**

(a) duration of shutdown: 1/2 hour
(b) $PM_{10}$ emissions are not increased during a shutdown and are emitted at the baseload rate of 0.00845 lb $PM_{10}$/MM BTU at the maximum rated heat input for the CTG of 2,012 MM BTU/hr.

**CTG $PM_{10}$ emissions during a shutdown** are therefore:

(0.00845 lb $PM_{10}$/MM BTU)(2,012 MM BTU/hr)(1/2 hr shutdown)

= **8.5 lb $PM_{10}$/shutdown**

**SULFUR DIOXIDE**

(a) duration of shutdown: 1/2 hour
(b) $SO_2$ emissions are not increased during a shutdown and are emitted at the baseload rate of 0.00277 lb $SO_2$/MM BTU at the maximum rated heat input for the CTG of 2,012 MM BTU/hr.

**CTG $SO_2$ emissions during a shutdown** are therefore:

(0.00277 lb $SO_2$/MM BTU)(2,012 MM BTU/hr)(1/2 hr shutdown)

= **2.8 lb $SO_2$/shutdown**

## B-2.0 Typical Operating Scenarios and Regulated Air Pollutant Emissions for the CTGs and HRSGs

The applicant expects three typical operating modes for the CTGs and HRSGs for the PDEF. In all cases, at least one CTG and HRSG power train will be in operation at all times.

Baseload: Both CTG and HRSG power trains operating continuously at 100% load with a maximum combined heat input rate of 2,012 MM BTU/hr per power train.

Load Following: The CTGs and HRSGs would be operated in response to contractual load and spot market demand. Total heat input would be less than baseload operating mode

Partial Shutdown: Due to low demand, one CTG and HRSG power train would be shutdown at certain times of day or times of the year. The applicant has assumed a worst-case scenario of 312 hot start-ups per year that occur during long-term operation in this mode.

***Regulated air pollutant emissions are calculated below for the following operating scenarios that may occur under the operating modes given above.***

***Regulated air pollutant emissions due to HRSG duct burner firing will have a negligible affect on total overall emissions since the heat input rates utilized in the emission calculations are based upon an ambient temperature of 50$^o$F. Duct burner firing is expected to occur on warmer days when the HHV heat input to the CTG will be lower. PDEF has agreed to comply with the emission limits based upon the assumption that HRSG duct burner firing will have negligible effect on overall emissions.***

*Scenario A* ***estimates the maximum emissions that would occur under the baseload operating mode with 5% downtime for maintenance. The emission rates calculated under Scenario A and summarized in Table B-6 were used as inputs for the ambient air quality impact analysis and represent the worst-case annual emissions.***

**8,080 hours of baseload (100% load) operation per year for each CTG @ 50°F**
156 one hour (hot) start-ups per CTG per year
156 half hour shutdowns per CTG per year

## Table B-6 Worst-Case Annual Regulated Air Pollutant Emissions for CTGs and HRSGs (Scenario A)

| Source (Operating Mode) | $NO_2$ (lb/yr) | CO (lb/yr) | POC (lb/yr) | $PM_{10}$ (lb/yr) | $SO_2$ (lb/yr) |
|---|---|---|---|---|---|
| S-1 CTG (156 hot start-ups) | 34,788 | 284,076 | 37,284 | 2,652 | 873.6 |
| S-1 CTG (156 shutdowns) | 9,048 | 37,128 | 39,468 | 1,326 | 436.8 |
| S-1 CTG (8,080 hrs @ 100% load) | 140,276.9[a] | 205,739.4[a] | 62,345.3[a] | 137,360[b] | 43,174.1[a] |
| S-3 CTG (156 hot start-ups) | 34,788 | 284,076 | 37,284 | 2,652 | 873.6 |
| S-3 CTG (156 shutdowns) | 9,048 | 37,128 | 39,468 | 1,326 | 436.8 |
| S-3 CTG (8,080 hrs @ 100% load) | 140,276.9[a] | 205,739.4[a] | 62,345.3[a] | 137,360[b] | 43,174.1[a] |
| Total Emissions (lb/yr) | 368,225.8 | 1,053,886.8 | 278,194.6 | 282,676 | 88,969 |
| (ton/yr) | **184.1** | **526.94** | **139.1** | **141.34** | **44.5** |

[a]based upon the maximum heat input rate for a CTG of 1,929 MM BTU/hr @ 50°F

[b]based upon the worst case $PM_{10}$ emission rate of 17 lb/hr and the maximum combined heat input rate for a CTG/HRSG power train of 2,012 MM BTU/hr

Scenario B **estimates the maximum emissions that would occur under the partial shutdown operating mode. The emission rates calculated under Scenario B and summarized in Table B-7 are the basis of permit condition limits and emission offset requirements. To provide maximum operational flexibility, no limitations will be imposed on the type or quantity of turbine start-ups. Instead, the facility must comply with consecutive twelve month mass limits at all times. As shown below, the applicant has opted to base the annual emission estimates upon the assumption that the vast majority of turbine start-ups will be hot.**

**10,400 hours of baseload (100% load) CTG operation per year @ 50°F**
3,328 hours of 60% load CTG operation per year @ 50°F
312 one hour (hot) CTG start-ups
312 half hour CTG shutdowns per year.

## Table B-7 Maximum Annual Regulated Air Pollutant Emissions for CTGs and HRSGs
### (Scenario B)

| Source (Operating Mode) | $NO_2$ (lb/yr) | CO (lb/yr) | POC (lb/yr) | $PM_{10}$ (lb/yr) | $SO_2$ (lb/yr) |
|---|---|---|---|---|---|
| S-1 and S-3 CTGs (312 hot start-ups) | 69,576 | 568,152 | 74,568 | 5,304 | 1,747.2 |
| S-1 and S-3 CTGs (312 shutdowns) | 18,096 | 74,256 | 78,936 | 2,652 | 873.6 |
| S-1 and S-3 CTGs (10,400 hrs[a] @ 100% load) | 180,554.4[b] | 264,813[b] | 35,572.2[b] | 176,814.6[d] | 55,570.6[b] |
| S-1 and S-3 CTGs (3,328 hrs[a] @ 60% load) | 37,110.5[c] | 54,428.8[c] | 5,607.8[c] | 56,580.6[d] | 11,421.8[c] |
| Total Emissions (lb/yr) | 305,336.9 | 961,649.9 | 194,684 | 241,351.2 | 69,613.2 |
| (ton/yr) | **152.67** | **480.8** | **97.34** | **120.67** | **34.8** |

[a]total combined firing hours for both turbines

[b]based upon the maximum heat input rate of 1,929 MM BTU/hr for each CTG

[c]based upon the maximum heat input rate of 1,239 MM BTU/hr for each CTG @ 50°F and 60% load

[d]based upon the worst case $PM_{10}$ emission rate of 17 lb/hr at the maximum combined heat input rate of 2,012 MM BTU/hr

## B-4.0 Cooling Tower Emissions

The cooling tower is exempt from District permit requirements pursuant to Regulation 2-1-128.4. It is assumed that all particulate matter will be emitted as $PM_{10}$.

Concentration Cycles: 3
Cooling tower circulation rate: 0.3 gpm
***maximum total dissolved solids:*** ***970 mg/l***

**$PM_{10}$** = (3 cycles)(0.3 gal/min)(60 min/hr)(970 mg/l)(3.785 l/gal)(lb/453.6 g)($g/10^3$ mg)
= 0.44 lb/hr
= 10.49 lb/day (24 hr/day operation)
= 3,828.8 lb/yr (8,760 hours per year maximum operation)
= *1.91 ton/yr*

## B-5.0 Auxiliary Boiler Emissions

The maximum hourly, daily, and annual regulated air pollutant emissions for S-5 Auxiliary Boiler are summarized in Table B-8.

### Table B-8 Maximum Regulated Air Pollutant Emissions for Auxiliary Boiler

| | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Emission Factor[a] (lb/MM BTU) | 0.0107 | 0.0365 | 0.00137 | 0.005 | 0.0027 |
| lb/hr[b] | 2.85 | 9.7 | 0.36 | 1.33 | 0.72 |
| lb/day[c] | 68.3 | 233 | 8.75 | 31.9 | 17.2 |
| lb/yr[d] | 4,269.3 | 14,563.5 | 546.6 | 1,995 | 1,077.3 |
| ton/yr | 2.13 | 7.28 | 0.27 | 1 | 0.54 |

[a]$NO_2$ emission factor is based upon BACT specification of 9 ppmv $NO_x$, dry @ 3% $O_2$. CO emission factor is based upon BACT specification of 50 ppmv, dry @ 3 % $O_2$. POC, and $SO_2$ emission factors are from AP-42, Section 1.4, Natural Gas Combustion, Table 1.4-2. $PM_{10}$ emission factor is from AP-42, Table 1.4-1.

[b]Based upon maximum heat input of 266 MM BTU/hr

[c]Based upon 24 hour per day operation @ 266 MM BTU/hr or 6,384 MM BTU/day

[d]Based upon a maximum 1,500 hr/yr operation and a corresponding maximum annual heat input of 399,000 MM BTU/yr

## B-6.0 Maximum Toxic Air Contaminant (TAC) Emissions

The maximum toxic air contaminant emissions resulting from the combustion of natural gas at the S-1 and S-3 CTGs, S-2 and S-4 HRSGs, and S-5 Auxiliary Boiler are summarized in Table B-9. These emission rates were used as input data for the health risk assessment modeling and are based upon a maximum combined annual heat input of 32,513,920 MM BTU per year for S-1 & S-3 CTGs, S-2 & S-4 HRSGs and an annual heat input of 399,000 MM BTU per year for S-5 Auxiliary Boiler. The derivation of the emission factors is detailed in appendix A.

## Table B-9
## Worst-Case TAC Emissions[a] for CTGs, HRSGs, and Auxiliary Boiler

| Toxic Air Contaminant | Emission Factor (lb/MM BTU) | g/sec | lb/yr |
|---|---|---|---|
| Acetaldehyde[d] | 6.86E-05 | 3.26E-02 | 2,266 |
| Acrolein | 2.37E-05 | 1.1E-02 | 768 |
| Ammonia[b,c] | 1.22E-02 | 5.7 | 396,670 |
| Benzene[d] | 1.36E-05 | 6.18E-03 | 430 |
| 1,3-Butadiene[c,d] | 1.27E-07 | 5.9E-05 | 4.1 |
| Ethylbenzene | 1.79E-05 | 8.38E-03 | 582.5 |
| Formaldehyde[d] | 1.10E-04 | 5.24E-02 | 3,643.4 |
| Hexane | 2.59E-04 | 1.21E-01 | 8,428 |
| Napthalene | 1.66E-06 | 7.81E-04 | 54.3 |
| PAHs[d] | 2.32E-06 | 1.08E-03 | 75.3 |
| Propylene | 7.70E-04 | 3.61E-01 | 25,110 |
| Propylene Oxide[c,d] | 4.78E-05 | 2.21E-02 | 1,535.2 |
| Toluene | 7.10E-05 | 3.37E-02 | 2,346.3 |
| Xylene | 2.61E-05 | 1.28E-02 | 891 |

[a]combined emissions from S-1 & S-3 CTGs, S-2 & S-4 HRSGs, and S-5 Auxiliary Boiler

[b]based upon the worst-case ammonia slip from the SCR system of 10 ppmvd @ 15% $O_2$ and 8,080 hours of operation per CTG at 100% load

[c]emitted from CTGs only, not from auxiliary boiler

[d]carcinogenic compounds

# Table B-10
## Worst-Case TAC Emissions for Cooling Towers[a]

| Toxic Air Contaminant | **Emission Factor** (lb/hr) | **Emission Rate (lb/yr)** | **Risk Screening Trigger Level (lb/yr)** |
|---|---|---|---|
| Aluminum | 4.5E-05 | 0.39 | N/S[b] |
| Arsenic[c] | 1.8E-06 | 0.016 | 0.024 |
| Silver | 2.3E-06 | 0.02 | N/S |
| Barium | 5.4E-06 | 0.05 | N/S |
| Beryllium[c] | 4.5E-06 | **0.04** | **0.015** |
| Cadmium[c] | 4.5E-06 | 0.04 | 0.046 |
| Chloride | 0.1027 | 900 | N/S |
| Hexavalent chromium[c] | 2.3E-06 | **0.02** | **0.0014** |
| Copper | 3.2E-06 | 0.028 | 463 |
| Fluoride | 3.2E-04 | 2.8 | N/S |
| Lead[c] | 9.9E-06 | 0.087 | 29 |
| Magnesium | 1.2E-02 | 105 | N/S |
| Manganese | 6.1E-05 | 0.53 | 77 |
| Mercury | 9.1E-08 | 0.0008 | 57.9 |
| Selenium[c] | 3.2E-06 | 0.028 | 96.5 |
| Silica[c] | 1.2E-05 | 0.11 | N/S |
| Sodium hydroxide | 3.2E-06 | 0.028 | 926 |
| Sulfate | 8.8E-02 | 771 | N/S |
| Zinc | 5.6E-06 | 0.05 | 6,760 |

[a]based upon 24 hr/day, 365 day/yr operation of cooling towers at maximum flow rate

[b]none specified

[c]carcinogenic compound

# B-7.0 Maximum Facility Emissions

The maximum annual permitted facility regulated air pollutant emissions are shown in Table B-11. These emissions occur under operating scenario B with a total of 312 hot start-ups and 312 shutdowns per year for both turbines combined. The total permitted facility emissions shown are the basis of permit condition limits and emission offset requirements.

## Table B-11 Maximum Annual Facility Emissions[a] (ton/yr)

| **Source** | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG and S-2 HRSG[a] | 76.33 | 240.41 | 48.67 | 60.34 | 16.74 |
| S-3 CTG and S-4 HRSG[a] | 76.33 | 240.41 | 48.67 | 60.34 | 16.74 |
| S-5 Auxiliary Boiler | 2.13 | 7.28 | 0.27 | 1 | 0.54 |
| Total Permitted Emissions | **154.8** | **488.1** | **97.61** | **121.67** | **34.02** |
| Cooling Towers[b] | 0 | 0 | 0 | 1.91 | 0 |
| **Total Facility Emissions** | **154.8** | **488.1** | **97.61** | **123.6** | **34.02** |

[a]Includes CTG start-up and shutdown emissions

[b]Exempt from BAAQMD permit requirements per Regulation 2-1-128.4.

Table B-12 summarizes the worst-case annual facility emissions that were used as inputs under the air quality impact analysis.

## Table B-12 Worst-Case Annual Facility Emissions[a] (ton/yr)

| **Source** | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG and S-2 HRSG[a] | 92.05 | 263.47 | 69.55 | 70.67 | 22.25 |
| S-3 CTG and S-4 HRSG[a] | 92.05 | 263.47 | 69.55 | 70.67 | 22.25 |
| S-5 Auxiliary Boiler | 2.13 | 7.28 | 0.27 | 1 | 0.54 |
| Total Emissions | **186.23** | **534.22** | **139.37** | **142.34** | **45.04** |
| Cooling Towers[b] | 0 | 0 | 0 | 1.91 | 0 |
| **Total Facility Emissions** | **186.23** | **534.22** | **139.37** | **144.25** | **45.04** |

[a]Includes CTG start-up and shutdown emissions

[b]Exempt from BAAQMD permit requirements per Regulation 2-1-128.4.

The maximum hourly and daily regulated air pollutant emission rates by source for baseload operation (excluding CTG start-ups and shutdowns) are summarized in Table B-13.

## Table B-13 Maximum Hourly and Daily Baseload Regulated Air Pollutant Emission Rates
**(Excluding CTG Start-up and Shutdown Emissions)**

| | $NO_2$ | **CO** | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG and S-2 HRSG Combined[a] | | | | | |
| lb/hr | 18.1 | 26.55 | 3.43 | 17 | 5.57 |
| lb/day | 435.6 | 637.4 | 82.32 | 408 | 133.76 |
| S-3 CTG and S-4 HRSG Combined[a] | | | | | |
| lb/hr | 18.1 | 26.55 | 3.43 | 17 | 5.57 |
| lb/day | 435.6 | 637.4 | 82.32 | 408 | 133.76 |
| S-5 Auxiliary Boiler | | | | | |
| lb/hr | 2.85 | 9.7 | 0.36 | 1.33 | 0.72 |
| lb/day | 68.3 | 233 | 8.75 | 31.9 | 17.2 |

[a]Based upon a maximum combined heat input rate for each CTG and associated HRSG of 2,012 MM BTU/hr and 24 hr/day operation

***The maximum daily regulated air pollutant emissions per source including CTG start-up and shutdown emissions are shown in Table B-14.***

## Table B-14 Maximum Daily Regulated Air Pollutant Emissions By Source (lb/day)

| | $NO_2$[c] | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG & S-2 HRSG[a] | 688.4 | 2,656.5 | 551.17 | 408 | 133.76 |
| S-3 CTG & S-4 HRSG[a] | 688.4 | 2,656.5 | 551.17 | 408 | 133.76 |
| S-5 Auxiliary Boiler[b] | 68.3 | 233 | 8.75 | 31.9 | 17.2 |

[a]based upon one 1 hour hot startup, 22.5 hours of full load operation @ 2,012 MM BTU/hr, and one 0.5 hour shutdown in one day. For example, $NO_x$ emissions are calculated as follows:

223 lb/SU + 58 lb/SD + (2,012 MM BTU/hr)(0.009 lb $NO_x$/MM BTU)(22.5 hr/day) = 688.4 lb $NO_x$/day

[b]based upon 24 hour/day operation of the Auxiliary Boiler at its maximum rated heat input of 266 MM BTU/hr

***Table B-15 summarizes the worst-case daily regulated air pollutant emissions from permitted sources for the purposes of the air quality impact analysis. The total emission rates shown were used to model the emission concentrations for compliance with the 24-hour ambient air quality standards for $PM_{10}$ and $SO_2$. Because the turbine $PM_{10}$ and $SO_2$ emission rates are a function of fuel use only, and start-up and shutdown emission rates are based upon the worst-case assumption of full load fuel usage, the worst-case 8-hour $SO_2$ and $PM_{10}$ emission rates are independent of start-up type.***

***Table B-15***
***Worst-Case Regulated Air Pollutant Emissions over a 24-hour Period (lb)***

| | $NO_2$[e] | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG Hot Start-up | 223 | 1821 | 239 | 17 | 5.6 |
| S-1 CTG & S-2 HRSG Baseload Operation[a] | 407.4 | 597.5 | 181.1 | 382.5 | 125.4 |
| S-3 CTG Hot Start-up[b] | 223 | 1821 | 239 | 17 | 5.6 |
| S-3 CTG & S-4 HRSG Baseload Operation[c] | 416.5 | 610.8 | 185.1 | 391 | 128.2 |
| S-5 Auxiliary Boiler[d] | 68.3 | 233 | 8.75 | 31.9 | 17.2 |
| S-1 CTG Shutdown | 58 | 238 | 253 | 8.5 | 2.8 |
| Total | **1396.2** | **5321.3** | **1105.95** | **847.9** | **284.8** |

[a]based upon 22.5 hours baseload operation at maximum combined heat input of 2,012 MM BTU/hr

[b]occurs in second hour of 24-hr period

[c]based upon 23 hours baseload operation at maximum combined heat input of 2,012 MM BTU/hr

[d]based upon 24 hour operation at maximum rated heat input of 266 MM BTU/hr

[e]as $NO_2$

***Table B-16 summarizes the worst-case 8-hour regulated air pollutant emissions from permitted sources for the purposes of the air quality impact analysis. The total emission rates shown were used to model the emission concentrations for compliance with the 8-hour ambient air quality standards for CO, $SO_2$, and $NO_2$. Based upon a screening impact analysis of turbine emission rates and stack characteristics, it was determined that the worst-case impacts for CO and $NO_2$ over an 8-hour averaging period occur under hot start-up mode at an ambient temperature of 30°F. Because $SO_2$ emission rates are a function of fuel use only, and start-up and shutdown emission rates are based upon full load fuel usage, the worst-case 8-hour $SO_2$ emission rate is independent of start-up type.***

***Table B-16 Worst-Case Regulated Air Pollutant Emissions over an 8-hour Period (lb)***

| | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG Hot Start-up | 223 | 1821 | 239 | 17 | 5.6 |
| S-1 CTG & S-2 HRSG Baseload Operation[a] | 126.75 | 185.9 | 56.3 | 119 | 39 |
| S-3 CTG Hot Start-up[b] | 223 | 1821 | 239 | 17 | 5.6 |
| S-3 CTG & S-4 HRSG Baseload Operation[c] | 108.64 | 159.35 | 48.3 | 102 | 33.44 |
| S-5 Auxiliary Boiler[d] | 22.77 | 77.67 | 2.92 | 10.6 | 5.73 |
| Total | **681.4** | **4064.9** | **585.5** | **265.6** | **89.37** |

[a]based upon 7 hours of baseload operation at maximum combined heat input of 2,012 MM BTU/hr

[b]occurs in second hour of 8-hour period

[c]based upon 6 hours of baseload operation at maximum combined heat input of 2,012 MM BTU/hr

[d]based upon 8-hour operation at maximum heat input rate of 266 MM BTU/hr

***Table B-17 summarizes the worst-case 1-hour regulated air pollutant emissions from permitted sources for the purposes of the air quality impact analysis. The total emission rates shown were used to model the emission concentrations for compliance with the 1-hour ambient air quality standards for CO, $SO_2$, and $NO_2$. Based upon a screening impact analysis of turbine emission rates and stack characteristics, it was determined that the worst-case impacts for CO and $NO_2$ over a 1-hour period occur when one turbine is in cold start-up mode while a second operates at 100% load at an ambient temperature of 30°F. Because $SO_2$ emission rates are a function of fuel use only, and start-up and shutdown emission rates are based upon full load fuel usage, the worst-case 1-hour $SO_2$ emission rate is independent of start-up type.***

***Table B-17 Worst-Case Regulated Air Pollutant Emissions over a 1-hour Period (lb)***

| | $NO_2$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG Cold Start-up[a] | 225.7 | 2,527 | 274.4 | 17 | 5.6 |
| S-3 CTG & S-4 HRSG Baseload Operation[b] | 18.1 | 26.56 | 8.05 | 17 | 5.6 |
| S-5 Auxiliary Boiler[c] | 22.77 | 77.67 | 2.92 | 10.6 | 5.73 |
| Total | **266.6** | **2,631.2** | **285.4** | **44.6** | **16.93** |

[a]based upon first hour of 217 minute cold start as estimated by Westinghouse

[b]based upon 1 hour of baseload operation at maximum combined heat input of 2,012 MM BTU/hr

[c]based upon 1 hour operation at maximum heat input rate of 266 MM BTU/hr

## B-8.0 Maximum Facility Emissions During Commissioning Period

***Table B-18 summarizes the worst-case 1-hour and 8-hour emission rates for the PDEF during the commissioning period, when the oxidation catalysts and SCR systems will not be installed and operational. These emission rates were used as inputs in air quality impact models that were used to determine if the PDEF would contribute to an exceedance of the 1-hour State $NO_2$ ambient air quality standard, the 1-hour State and Federal $NO_2$ and CO standards, and the 8-hour Federal CO standard during the commissioning period.***

# Table B-18

***Worst-Case Short-Term $NO_2$ and CO Emissions from CTGs during Commissioning Period (lb)***

| | $NO_2$ | | CO | |
|---|---|---|---|---|
| 1-hour Emission Rates[a] | lb/hr | g/s | lb/hr | g/s |
| S-1 CTG | 315 | 39.7 | 2,527 | 318.4 |
| S-3 CTG | 315 | 39.7 | 2,527 | 318.4 |
| 8-hour Emission Rates[b] | | | | |
| S-1 CTG & S-2 HRSG | N/A | N/A | 490.5 | 61.8 |
| S-3 CTG & S-4 HRSG | N/A | N/A | 490.5 | 61.8 |

[a]based upon simultaneous, unabated cold start of CTGs

[b]based upon simultaneous, unabated cold start of CTGs, followed by 100% load, unabated operation of CTGs and HRSGs at maximum combined heat input rate of 2,012 MM BTU/hr

## Worst-Case 1-hour Emission Rates

Assumes unabated cold start of CTG

- Total Duration of cold start: 217 minutes
- During first 30 minutes, CT is ramped up to 100% RPM
- During next 20 minutes, CT is held at 25% load
- During next 52 minutes, CT is held at 50% load
- During next 30 minutes, ST is ramped up to 100% RPM

**NITROGEN OXIDES (as $NO_2$)**

The following CTG Cold Start-up emission rates are from Westinghouse

| | |
|---|---|
| maximum $NO_x$ emissions during first 30 minutes: | 205 lbs |
| maximum uncontrolled $NO_x$ emissions during next 20 minutes: | 4.2 lb/min |
| maximum uncontrolled $NO_x$ emissions during next 127 minutes: | 2.6 lb/min |
| maximum uncontrolled $NO_x$ emissions during next 40 minutes: | 1.5 lb/min |

**$NO_2$** = 205 lb + (20 min)(4.2 lb/min) + (10 min)(2.6 lb/min)
= **315 lb/hr**

**CARBON MONOXIDE**

| | |
|---|---|
| maximum CTG CO emissions during first 30 minutes: | 1,803 lbs |
| maximum CTG CO emissions during next 20 minutes: | 32.6 lb/min |
| maximum CTG CO emissions during next 127 minutes: | 7.2 lb/min |
| maximum CTG CO emissions during next 40 minutes: | 0.6 lb/min |

**CO** = 1,803 lb + (20 min)(32.6 lb/min) + (10 min)(7.2 lb/min)
= **2,527 lb/hr**

## Worst-Case 8-hour CO Emission Rate

Assumes unabated cold start of CTG, followed by 100% load, unabated operation of CTGs and HRSGs at maximum combined heat input rate of 2,012 MM BTU/hr

- Total Duration of cold start: 217 minutes
- During first 30 minutes, CT is ramped up to 100% RPM
- During next 20 minutes, CT is held at 25% load
- During next 52 minutes, CT is held at 50% load
- During next 30 minutes, ST is ramped up to 100% RPM

**CARBON MONOXIDE**

Cold Start-up Emission Rates:

| | |
|---|---|
| maximum CTG CO emissions during first 30 minutes: | 1,803 lbs |
| maximum CTG CO emissions during next 20 minutes: | 32.6 lb/min |
| maximum CTG CO emissions during next 127 minutes: | 7.2 lb/min |
| maximum CTG CO emissions during next 40 minutes: | 0.6 lb/min |

combined CO emission rate from CTG/HRSG at maximum combined heat input rate of 2,012 MM BTU/hr: 106 lb/hr

**CO** = 1,803 lb + (20 min)(32.6 lb/min) + (127min)(7.2 lb/min) + (40 min)(0.6 lb/min)
(263 min)(hr/60 min)(106 lb/hr)
= **3,858 lb/8-hr period**
**= 482.25 lb/hr**
**= 60.75 g/s**

The applicant used a higher emission rate of **490.5 lb/hr** or **61.8 g/s**.

# Appendix C

## Emission Offsets

Pursuant to District Regulation 2, Rule 2, Section 302, offsets are required only for permitted sources. Therefore, emission offsets will be required for the POC, $NO_x$, and $PM_{10}$ emission increases associated with S-1 CTG, S-2 HRSG, S-3 CTG, S-4 HRSG, and S-5 Auxiliary Boiler only. Emission offsets will not be required for the $PM_{10}$ emissions attributed to the exempt cooling towers.

As of the date of this FDOC, a portion of emission reduction credits (ERCs) to be provided by the applicant have not been officially banked since they have not cleared the 30-day public review and comment period. However, we expect that the ERCs will be banked and issued. In accordance with current District policy, the applicant must demonstrate control of valid ERCs through options contracts or equivalent binding legal documents prior to the issuance of the Authority to Construct for the facility and must provide the actual banking certificates prior to the issuance of the permit to operate. Pursuant to District Regulation 2-3-405, the District will issue the Authority to Construct after the CEC certifies the PDEF.

## Table C-1 Emission Offset Summary

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Calculated Facility Emissions[a] (ton/yr) | 154.8 | 488.1 | 97.61 | 121.91 | 34.02 |
| Facility Permit Limits (ton/yr) | 153.2 | 487.5 | 97.61 | 123.55 | 39.86 |
| Offsets Required | Yes | No | Yes | Yes | No |
| Offset Ratio | 1.15:1.0[b] | N/A | 1.15:1.0[b] | 1.0:1.0 | N/A |
| Offsets Required (tons) | **177[c]** | **0** | **112.25** | **123.55[d]** | **0** |

[a]sum of S-1 CTG, S-2 HRSG, S-3 CTG, S-4 HRSG, and S-5 Auxiliary Boiler emissions

[b]Pursuant to District Regulation 2-2-302, the applicant must provide emission offsets at a ratio of 1.15 to 1.0 since the proposed facility $NO_x$ and POC emissions from permitted sources will each exceed 50 tons per year

[c]currently, PDEF is proposing to provide 177 tons of $NO_x$ offsets

[d]currently, PDEF is proposing to provide 124 tons of $PM_{10}$ offsets; 25.87 tons of the $PM_{10}$ increase will be offset with $SO_2$ offsets at a ratio of 4:1 (103.5 tons of $SO_2$) pursuant to District Regulation 2-2-303.1. The balance of 98.13 tons per year will be offset directly with $PM_{10}$ ERCs

# Appendix D

## Health Risk Assessment

As a result of the combustion of natural gas at the CTGs, HRSGs, and auxiliary boiler and the use of water treatment chemicals at the cooling towers, the proposed Pittsburg District Energy Facility will emit the toxic air contaminants summarized in Table 2, "Maximum Facility Toxic Air Comtaminant (TAC) Emissions". In accordance with the requirements of CEQA, the BAAQMD Risk Management Policy, and CAPCOA guidelines, the impact on public health due to the emission of these compounds was assessed utilizing the air pollutant dispersion model ISCST3 and the multi-pathway cancer risk and hazard index model ACE.

The public health impact of the carcinogenic compound emissions is quantified through the increased carcinogenic risk to the maximally exposed individual (MEI). A multi-pathway risk assessment was conducted that included both inhalation and noninhalation pathways of exposure, including the mother's milk pathway. Per the BAAQMD Risk Management Policy, a project which results in an increased cancer risk to the MEI of less than one in one million is considered to be not significant and is therefore acceptable.

The public health impact of the noncarcinogenic compound emissions is quantified through the acute and chronic hazard indices which is the ratio of the expected concentration of a compound to the acceptable concentration of the compound. When more than one toxic compound is emitted, the hazard indices of the compounds are summed to give the total hazard index. The acute hazard index quantifies the magnitude of the adverse health affects caused by a brief (no more than 24 hours) exposure to a chemical or group of chemicals. The chronic hazard index quantifies the magnitude of the adverse health affects from prolonged exposure to a chemical caused by the accumulation of the chemical in the human body. Per the BAAQMD Risk Management Policy, a project with a total hazard index of 1.0 or less is considered to be not significant and the resulting impact on public health is deemed acceptable.

The results of the health risk assessment performed by the Pittsburg District Energy Facility are summarized in Table D-1.

## Table D-1
## Health Risk Assessment Results

| Multi-pathway Carcinogenic Risk (risk in one million) | Noncarcinogenic Chronic Hazard Index | Noncarcinogenic Acute Hazard Index |
|---|---|---|
| 0.5 | 0.018 | 0.042 |

In accordance with the BAAQMD Risk Management Policy, the increased carcinogenic risk and acute and chronic hazard indices attributed to this project are considered to be not significant since they are each less than 1.0. Therefore, the PDEF project is deemed to be in compliance with the BAAQMD Risk Management Policy.

# Appendix E

## SUMMARY OF AIR QUALITY IMPACT ANALYSIS FOR THE PITTSBURG DISTRICT ENERGY FACILITY

## BACKGROUND

Enron Capital and Trade Resources Corporation has submitted a permit application (# 18595) for a proposed 500-MW combined cycle power plant, the Pittsburg District Energy Facility. The facility is to be composed of two natural gas-fired turbines, each with a heat recovery steam generator and steam turbine generator. An auxiliary natural gas fired boiler will be used as backup steam source. The proposed project will result in an increase in air pollutant emissions of $NO_2$, CO, $PM_{10}$ and $SO_2$ triggering regulatory requirements for an air quality impact analysis.

## AIR QUALITY IMPACT ANALYSIS REQUIREMENTS

Requirements for air quality impact analysis are given in the District's New Source Review (NSR) Rule: Regulation 2, Rule 2.

The criteria pollutant annual worst case emission increases for the Project are listed in Table E-1, along with the corresponding significant emission rates for air quality impact analysis.

Table E-1
Comparison of Proposed Project's Annual Worst Case Emissions
to Significant Emission Rates for Air Quality Impact Analysis

| Pollutant | Proposed Project's Emissions (tons/year) | Significant Emission Rate (tons/year) (Reg-2-2-304 to 2-2-306) |
|---|---|---|
| $NO_x$ (as $NO_2$) | 183 | 100 |
| CO | 530 | 100 |
| $PM_{10}$ | 144 | 100 |
| $SO_2$ | 44.5 | 100 |

Table E-1 indicates that the proposed project emissions exceed the significant emission levels for nitrogen oxides ($NO_x$), carbon monoxide (CO), and fine particulate matter ($PM_{10}$), The detailed requirements for air quality impact analysis for these pollutants are given in Sections 304, 305 and 306 of the District's NSR Rule.

The District's NSR Rule also contains requirements for certain additional impact analyses associated with air pollutant emissions. An applicant for a permit that requires an air quality impact analysis must also, according to Section 417 of the NSR Rule, provide an analysis of the impact of the source and source-related growth on visibility, soils and vegetation.

## AIR QUALITY IMPACT ANALYSIS SUMMARY

The required contents of an air quality impact analysis are specified in Section 414 of Regulation 2 Rule 2. According to subsection 414.1, if the maximum air quality impacts of a new or modified stationary source do not exceed significance levels for air quality impacts, as defined in Section 2-2-233, no further analysis is required. (Consistent with EPA regulations, it is assumed that emission increases will not interfere with the attainment or maintenance of AAQS, or cause an exceedance of a PSD increment if the resulting maximum air quality impacts are less than specified significance levels). If the maximum impact for a particular pollutant is predicted to exceed the significance level for air quality impacts, a full impact analysis is required involving estimation of background pollutant concentrations and, if applicable, a PSD increment consumption analysis.

### *Air Quality Modeling Methodology*

Maximum ambient concentrations of $NO_x$, CO and $PM_{10}$ were estimated for various plume dispersion scenarios using established modeling procedures. The plume dispersion scenarios addressed include simple terrain impacts (for receptors located below stack height), complex terrain impacts (for receptors located at or above stack height), impacts due to building downwash, and impacts due to inversion breakup and shoreline fumigation.

Emissions from the turbines will be exhausted from two 150 foot exhaust stacks. Emissions from the auxiliary boiler are exhausted through a 100 foot stack. The project also includes a cooling tower (comprised of 6 cells) with a release height of 44 feet. Because the facility will be dispatchable, the worst case emission rates varied with each averaging period. Table E-2 contains the emission rates used in each of the modeling scenarios: turbine commissioning, start-up, maximum 1-hour, maximum 8-hour, maximum 24-hour, and maximum annual average. Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation. The 1-hour $NO_x$ and CO emissions are based on simultaneous cold startup of both turbines with no controls. The 8-hour CO emissions are based on simultaneous cold start-up over a 3-hour period with the remainder of the 5-hour period at 100 percent load with no controls. Start-up is the beginning of any of the subsequent duty cycles to bring the facility from idle status up to power production

The applicant used the EPA models SCREEN3 and ISCST3. Because the exhaust stacks are less than Good Engineering Practice (GEP) stack height, ambient impacts due to building downwash were evaluated. Because complex terrain was located nearby, complex terrain impacts were considered. Inversion breakup fumigation was evaluated using the SCREEN3 model. Shoreline Fumigation was evaluated using Screen3 and the Offshore Coastal Dispersion (OCD) model.

### *Air Quality Modeling Results*

The maximum predicted ambient impacts of the various modeling procedures described above are summarized in Table E-3 for the averaging periods for which AAQS and PSD increments have been set. Shown in Figure 1 are the locations of the maximum modeled impacts.

Also shown in Table E-3 are the corresponding significant ambient impact levels listed in Section 233 of the District's NSR Rule. In accordance with Regulation 2-2-414, no further analysis is required for the $PM_{10}$ modeled impacts. However, the 1-hour $NO_2$ and 1-hour CO modeled impacts based upon commissioning emission rates and shoreline fumigation conditions are both over the significant air quality impact level requiring further analyses. The 1-hour $NO_2$ and 1-hour CO modeled impacts are then added to the background concentrations for those pollutants to determine if any ambient air quality standard will be violated. See Table E-5 for pollutant background concentrations and Table E-6 for a comparison of total project impacts with applicable ambient air quality standards.

Table E-2

Averaging Period Emission Rates Used in Modeling Analysis (g/s)

| Pollutant Source | Max (1-hour) | Commissioning[1] | | Start-up[2] (1-hour) | Maximum (8-hour) | Maximum (24-hour) | Maximum Annual Average |
|---|---|---|---|---|---|---|---|
| | | (1-hour) | (8-hour) | | | | |
| $NO_2$ | | | | | | | |
| Turbine 1 | 2.20 | 39.7 | n/a | 28.4 | n/a | n/a | 2.61 |
| Turbine 2 | 2.20 | 39.7 | | 2.21 | | | 2.61 |
| Boiler | 0.367 | | | 0.367 | | | 0.0628 |
| CO | | | | | | | |
| Turbine 1 | 3.20 | 318 | 61.8 | 318 | 55.4 | n/a | n/a |
| Turbine 2 | 3.20 | 318 | 61.8 | 3.20 | 54.2 | | |
| Boiler | 1.23 | | | 1.23 | 1.23 | | |
| $PM_{10}$ | | | | | | | |
| Turbine 1 | n/a | n/a | n/a | n/a | n/a | 2.15 | 2.04 |
| Turbine 2 | | | | | | 2.15 | 2.04 |
| Cooling Tower | | | | | | 0.0554 | 0.0483 |
| Boiler | | | | | | 0.163 | 0.0278 |

[1] Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation. The 1-hour $NO_x$ and CO emissions are based on simultaneous cold start-up of both turbines with no controls. The 8-hour CO emissions are based on simultaneous cold start-up over a 3-hour period with the remainder of the 5-hour period at 100 percent load with no controls. [2]Start-up is the beginning of any of the subsequent duty cycles to bring the facility from idle status up to power production.

Table E-3

Maximum Predicted Ambient Impacts of Proposed Project ($\mu g/m^3$)
[Overall maximum in bold type]

| Pollutant | Averaging Time | Commissioning Maximum Impact | Maximum Modeled Impact | Shoreline Fumigation Impact | Significant Air Quality Impact Level |
|---|---|---|---|---|---|
| $NO_2$ | 1-hour | **288** | 119 | 215 | 19 |
| | annual | - | **0.16** | - | 1.0 |
| CO | 1-hour | 2492 | 1251 | **3421** | 2000 |
| | 8-hour | 238 | 214 | **417** | 500 |
| $PM_{10}$ | 24-hour | - | **2.9** | 2.4 | 5 |
| | annual | - | **0.35** | - | 1 |

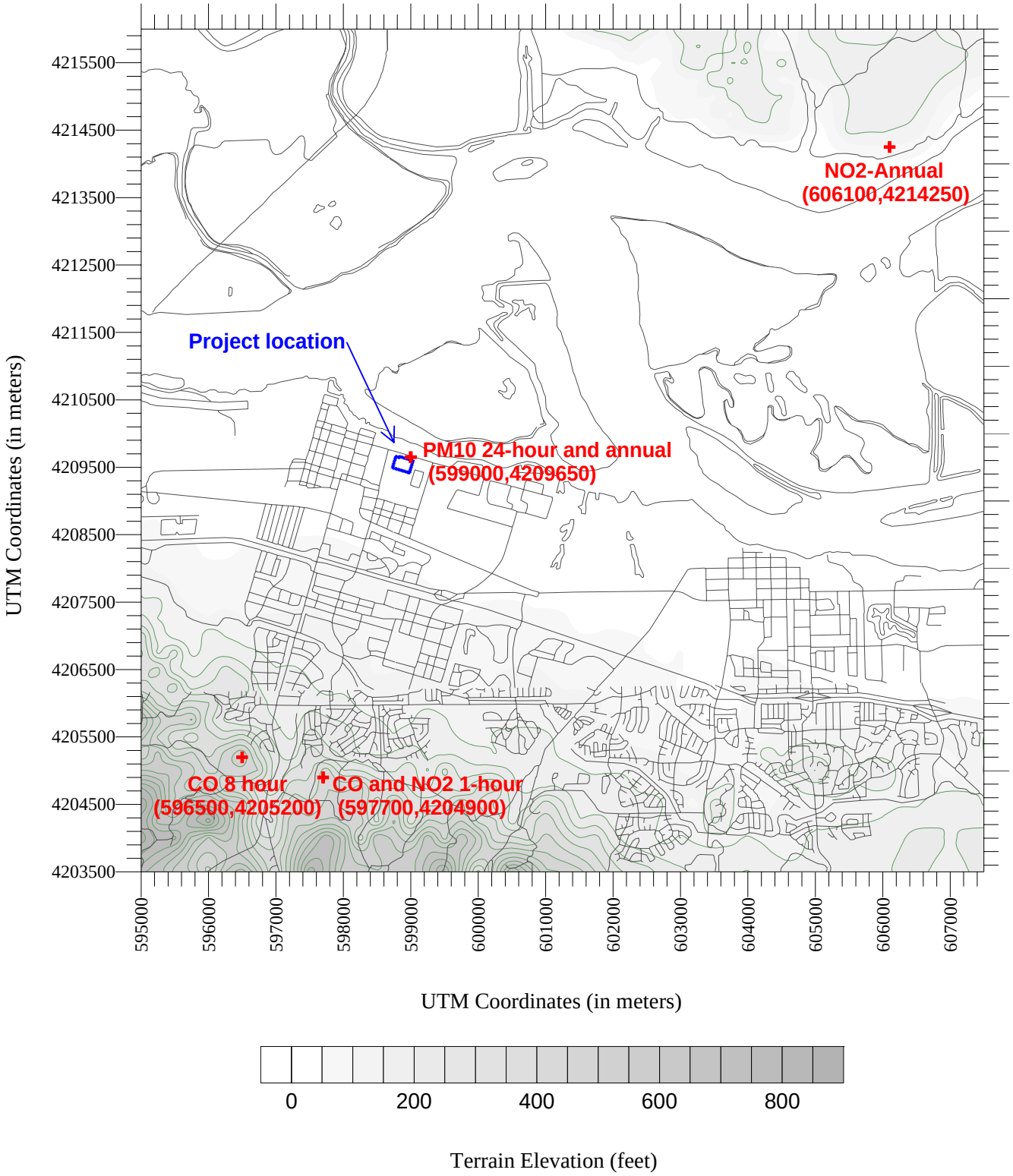


Figure 1. Location of project maximum impacts.

***Background Air Quality Levels***

Regulation 2-2-111 of the NSR rule entitled PSD monitoring exemption, exempts an applicant from the requirement of monitoring background concentrations in the impact area (section 414.3) provided the impacts from the proposed project are less than specified levels. Table E-4 lists the applicable exemption standards and the maximum impacts from the proposed facility. As shown, all modeled impacts are below the preconstruction monitoring threshold.

Table E-4
PSD Monitoring Exemption Levels and Maximum Impacts from the Proposed Project for $NO_2$ and CO ($\mu g/m^3$)

| Pollutant | Averaging Time | Exemption Level | Maximum Impacts from Proposed Project |
|---|---|---|---|
| $NO_2$ | **Annual** | 14 | 0.16 |
| CO | 8-hour | 575 | 417 |

Three District operated monitoring stations, Pittsburg, Concord, and Bethel Island were chosen as representative of the background $NO_2$, and CO concentrations. Table E-5 contains the concentrations measured at the three sites for the past 3 years.

Table E-5
Background $NO_2$, and CO Concentrations ($\mu g/m^3$) at Pittsburg, Concord and Bethel Island Monitoring Sites for the Past Three Years (maximums are outlined)

| | $NO_2$ | | CO | |
|---|---|---|---|---|
| Monitor | Highest 1-hour average | Annual average | Highest 1-hour average | Highest 8-hour average |
| Pittsburg | | | | |
| 1995 | 150.4 | 32.0 | 7000 | 3267 |
| 1996 | 131.6 | 30.1 | 8167 | 3383 |
| 1997 | 131.5 | 26.3 | 7000 | 3850 |
| Concord | | | | |
| 1995 | 169.2 | 37.6 | 7000 | 3267 |
| 1996 | 150.4 | 33.8 | 7000 | 3383 |
| 1997 | 150.4 | 32.0 | 7000 | 3617 |
| Bethel Island | | | | |
| 1995 | 112.8 | 20.7 | 3500 | 2217 |
| 1996 | 112.8 | 20.7 | 3500 | 1750 |
| 1997 | 94.0 | 20.7 | 2333 | 1983 |

Table E-6 contains the comparison of the ambient standards with the proposed project impacts added to the maximum background concentrations. National and California ambient $NO_2$ and

CO standards are not exceeded from the proposed project. Therefore, in accordance with subsection 414.1, only a visibility, soils and vegetation impact analysis is further required.

Table E-6
California and National Ambient Air Quality Standards and
Ambient Air Quality Levels from the Proposed Project ($\mu g/m^3$)

| Pollutant | Averaging Time | Maximum Background | Maximum Project Impact | Maximum Project Impact Plus Maximum Background | California Standards | National Standards |
|---|---|---|---|---|---|---|
| $NO_2$ | 1-hour<br>annual | 169<br>37.6 | 288<br>0.16 | 457<br>38 | 470<br>--- | ---<br>100 |
| CO | 1-hour<br>8-hour | 8167<br>3850 | 3421<br>417 | 11,588<br>4,267 | 23,000<br>10,000 | 40,000<br>10,000 |

**VISIBILITY, SOILS AND VEGETATION IMPACT ANALYSIS**

Visibility impacts were assessed using EPA's VISCREEN visibility screening model. The analysis shows that the proposed project will not cause any impairment of visibility at Point Reyes, the nearest Class I area.

Vegetation and soils in the project study area were inventoried. Maximum project $NO_2$, CO and $PM_{10}$ concentrations will not result in significant soil and/or vegetation impacts.

**CONCLUSIONS**

The results of the air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable AAQS for $NO_2$, CO and $PM_{10}$. The applicant's analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.

**C. Supplemental Information**

In a memorandum dated March 29, 2002, David Wampler of EPA Region IX identified information that EPA wished to see included in the statement of basis for this facility. That information is presented below, along with information regarding other changes in this action.

**I. Standard Conditions**

This section contains administrative requirements and conditions that apply to all facilities. If the Title IV (Acid Rain) requirements for certain fossil-fuel fired electrical generating facilities or the accidental release (40 CFR § 68) programs apply, the section will contain a standard conditions pertaining to these programs. Many of these conditions derive from 40 CFR § 70.6, Permit Content, which dictates certain standard conditions that must be placed in the permit. The language that the District has developed for many of these requirements has been adopted into the BAAQMD Manual of Procedures, Volume II, Part 3, Section 4, and therefore must appear in the permit.

The standard conditions also contain references to BAAQMD Regulation 1 and Regulation 2. These are the District's General Provisions and Permitting rules.

Access to Records

The following condition I.E.1 was added to all permits in response to a public comment because BAAQMD Regulations 1-441 and 2-6-409.4, and 40 CFR 70.6(c) (2) require access to records.

1. The permit holder must provide any information, records, and reports requested or specified by the APCO. (Regulation 1-441, Regulation 2-6-409.4)

Accidental Release

Standard Condition I. K, has been imposed because the facility stores more than 20,000 pounds of aqueous ammonia that is 20% ammonia or higher and therefore is subject to 40 CFR 68, Accidental Release. This ammonia is used by the selective catalytic reduction system for control of nitrogen oxides. The ammonia storage tank is exempt from BAAQMD permits pursuant to BAAQMD Regulation 2-1-123.2 but is subject to this applicable requirement in the Major Facility Review permit.

Conditions to Implement Regulation 2, Rule 7, Acid Rain

The facility is subject to the acid rain requirements because the 2 turbines and 2 heat recovery steam generators are considered utility units as defined in 40 CFR 70.2. The definition of utility unit is a "…unit owned or operated by a utility: (1) that serves a generator in any state that produces electricity for sale…" A utility means "any person that sells electricity."

Therefore, the facility is subject to the Acid Rain regulations in 40 CFR 72 through 78. BAAQMD Regulation 2, Rule 7, Acid Rain, adopts the Acid Rain regulations by reference.

In response to public comment, the Acid Rain sources named in Standard Condition I.L.5 were corrected from " Boilers S-1, S-2, S-3, S-4, S-5, S-6, and S-7" to " S-1 and S-3, Turbines, and S-2 and S-4, Heat Recovery Steam Generators."

Changes in this action
The dates of the regulations in Standard Condition I.A have been updated.

The following language was added to Standard Condition I.B: "If the permit renewal has not been issued by [ ], but a complete application for renewal has been submitted in accordance with the above deadlines, the existing permit will continue in force until the District takes final action on the renewal application." This is the "application shield" pursuant to BAAQMD Regulation 2-6-407.

## II. Equipment

This section of the permit lists all permitted or significant sources. Each source is identified by an S and a number (e.g., S24).

Significant sources are those sources that have a potential to emit of more than 2 tons of a "regulated air pollutant," as defined in BAAQMD Rule 2-6-222, per year or 400 pounds of a "hazardous air pollutant," as defined in BAAQMD Rule 2-6-210, per year. There is one exempt significant source at this facility, the cooling tower, which has a potential to emit of about 4.6 tons PM10 per year.

Each of the permitted sources has previously been issued a permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. These permits are issued in accordance with state law and the District's regulations. The capacities in the permitted sources table are the maximum allowable capacities for each source, pursuant to Standard Condition I.J and Regulation 2-1-301.

Changes in this action
The addition of emergency generators, S-6 and S-7, is proposed in this action. These engines were exempt from permits when first installed, but are now subject to permits. The size of the engines is 300 and 927 bhp, respectively.

S8, Cooling Tower, which is now a significant source, has been added. In Application 1272, the cooling tower was increased to an eight-cell design and the maximum potential to emit for PM10 was increased to 4.57 tons per year. Although it is exempt from District permits, any source at a Major Facility Review facility that emits more than 2 tons per year of a regulated air pollutant is considered a significant source that needs to be included in the Major Facility Review permit. Addition of this source will be proposed during this action.

## III. Generally Applicable Requirements

This section of the permit lists requirements that generally apply to all sources at a facility including insignificant sources and portable equipment that may not require a District permit. If a generally applicable requirement applies specifically to a source that is permitted or significant, the standard will also appear in Section IV and the monitoring for that requirement will appear in Sections IV and VII of the permit. Parts of this section apply to all facilities (e.g., particulate, architectural coating, odorous substance, and sandblasting standards). In addition,

standards that apply to insignificant or unpermitted sources at a facility (e.g., refrigeration units that use more than 50 pounds of an ozone-depleting compound) are placed in this section.

In response to public comment, BAAMQD Condition 16676, part 54 to Section VI, Permit Conditions, was added. It reads:

> 54. The Owner/Operator shall submit a Preplanned Abatement Strategy as described in BAAQMD Regulation 4, Air Pollution Episode Plan, within 120 days after issuance of the Title V permit. After the plan has been approved by the APCO, the owner/operator shall keep records of implementation on an event basis. (Basis: BAAQMD Regulation 4)

Since it applies to the facility as a whole, not a particular source, the citation was added to Section III, Generally Applicable Requirements.

Changes in this action

Language has been added to Section III to clarify that this section contains requirements that may apply to temporary sources. This provision allows contractors that have "portable" equipment permits that require them to comply with all applicable requirements to work at the facility on a temporary basis, even if the permit does not specifically list the temporary source. Examples are temporary sand-blasting or soil-vapor extraction equipment.

Section III has been modified to say that SIP standards are now found on EPA's website and are not included as part of the permit.

The dates and SIP status of the rules in Table III have been updated and/or corrected.

Regulation 8, Rule 16, Solvent Cleaning Operations, has been added to Table III. See discussion in Section C.IV.

## IV. Source-Specific Applicable Requirements

Section IV of the permit contains citations to all of the applicable requirements. The text of the requirements is found in the regulations, which are readily available on the District's or EPA's websites, or in the permit conditions, which are found in Section VI of the permit. All monitoring requirements are cited in Section IV. Section VII is a cross-reference between the limits and monitoring requirements. A discussion of monitoring is included in Section C.VII of this permit evaluation/statement of basis.

### Complex Applicability Determinations

An analysis of the effect of the following complex requirements is contained in the original FDOC.

- Best Available Control Technology
- Offsets
- PSD
- CEQA

- Toxic Risk Management Policy
- BAAQMD Regulation 1-301, Public Nuisance
- Regulation 2, Rule 1, Sections 301 and 302
- Regulation 2, Rule 3: Power Plants
- Regulation 7: Odorous Substances
- Regulation 9, Rule 1, Sulfur Dioxide
- Regulation 9, Rule 7, Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
- Regulation 9, Rule 9, Nitrogen Oxides from Stationary Gas Turbines

BAAQMD Regulation 1-520.1
This requirement applies to S2 and S4, HRSGs, and S5, because these sources are steam generators with a capacity larger than 250 MMbtu/hr. This regulation is a requirement for NOx, and CO2 or O2 monitors.

Regulation 6
All sources are subject to 6-301, Ringelmann No. 1 Limitation, except S-6 and S-7, which are subject to 6-303, Ringelmann No. 2 Limitation, because they are standby sources of motive power.

All sources are subject to 6-305, Visible Particles.

Regulation 6-310, Particulate Weight Limitation, applies to the engines and cooling towers.

Regulation 6-310, Particulate Weight Limitation, applies to the turbines, whereas 6-310.3, Particulate Weight Limitation for Heat Transfer Operations, applies to the HRSGs. Because they share the same stack, the turbines and HRSGs are subject to both standards.

Regulation 6-401, Appearance of Emissions, applies to sources that do not burn natural gas. Therefore, it applies to S-6, Diesel Fire Pump Engine, and S-8, Cooling Tower. Because all of the other sources burn natural gas, they are not subject to 6-401. Therefore, it will be deleted from the tables for the turbines, HRSGs, and auxiliary boiler.

Regulation 8, Organic Compounds
The FDOC stated that the facility was exempt from Regulation 8, Rule 2, Miscellaneous Operations, per 8-2-110 since natural gas will be fired exclusively at the PDEF. However, this is strictly true for the combustion sources.

Painting at the facility is governed by BAAQMD Regulation 8, Rule 3, Architectural Coatings. Since architectural coating is exempt from permits pursuant to BAAQMD Regulation 2-1-113.2.5, this rule has been placed in Section III, Generally Applicable Requirements. This rule has no provision for cleanup solvent and the facility has no permits for solvent cleaning operations. Therefore, any use of solvent or coatings, except for architectural coatings, must comply with the provisions for exempt sources in Regulation 2, Rule 1, General Requirements, and Regulation 8, Rule 16, Solvent Cleaning Operations. Following is a list of these restrictions: BAAQMD Regulation 2-1-118.4: The facility may use cold cleaners containing solutions with a VOC content less than or equal to 0.42 lb/gal.

BAAQMD Regulation 2-1-118.5: The facility may use heated solutions containing less than 2.5% by weight VOC
BAAQMD Regulation 2-1-118.6: The facility may use equipment or operations which use unheated solvent and which contains less than 1 gallon of solvent or has a liquid surface area of less than 1 $ft^2$.
BAAQMD Regulation 2-1-118.7: The facility may use one solvent cold cleaner that is used for surface preparation, cleaning, or stripping with solvents or solutions that does not meet a VOC limit of 0.42 lb/gal, if the solvent loss does not exceed 20 gallons per year.
BAAQMD Regulation 2-1-118.9: The facility may use up to 20 gallons solvent per year or emit less than 150 lb/year of VOC from all wipe cleaning operations. Any wipe-cleaning use is subject to recordkeeping pursuant to BAAQMD Regulation 8, Rule 16.
BAAQMD Regulation 2-1-118.10: The facility may use aerosol cans for solvent cleaning or surface preparation.
BAAQMD Regulation 2-1-119.2.1: The facility may use up to 30 gallons coating per year facility-wide or emit less than 150 lb/year of VOC from all coating operations other than those subject to BAAQMD Regulation 8, Rule 3.

Regulations 2, Rule 1, and 8, Rule 3 are already in Section III, Generally Applicable Requirements. Regulation 8, Rule 16, will be added to this section.

Regulation 9, Rule 1, Sulfur Dioxide
The following sources burn natural gas and are subject to Sections 9-1-301 and 9-1-302: S1 though S5, S7.

S6 burns diesel fuel and is subject to Sections 9-1-301 and 9-1-304.

BAAQMD Regulation 9, Rule 3, Nitrogen Oxides from Heat Transfer Operations
The limit in Section 9-3-303 of this regulation applies to new heat transfer operations with a capacity higher than 250 MMbtu/hr, therefore it applies to S2 and S4, Heat Recovery Steam Generators. Section 9-3-601, Determination of Nitrogen Oxides, refers to the test method. Because there is no periodic monitoring requirement, however, 9-3-601 is not an applicable requirement. The method is listed in Section VIII, Test Methods.

In this action, the citation of BAAQMD Regulation 9-3-303 has been corrected. It formerly read "9-303." Due to BAAQMD Regulation 1-107, Combination of Emissions, BAAQMD Regulation 9-3-303 has been added to the Section IV and VII tables for S1 and S3, Turbines.

The FDOC originally stated that BAAQMD Regulation 9, Rule 3 did not apply to the HRSGs because their capacity was under 250 MMbtu/hr. Since the capacity was increased to 333 MMbtu/hr via Application 1272, they are subject.

Manual of Procedures, Volume V, Continuous Emission Monitoring Policy and Procedures
Volume V applies generally to the continuous emission monitors at the facility, except that no monitoring for H2S or opacity is required.

New Source Performance Standards and Turbines, HRSDs, and Auxiliary Boiler

These sources burn natural gas exclusively, therefore any requirements that concern other fuels do not apply.

Applicability of 40 CFR 60, Subpart D to HRSGs and Auxiliary Boiler
The HRSGs are not subject to 40 CFR 60, Subpart D, because any source that is subject to Subpart Da is not subject in accordance with Section 60.40(e).

The Auxiliary Boiler is not subject to 40 CFR 60, Subpart D, because 40 CFR 60.40b(j) exempts sources built after June 19, 1986 that are subject to Subpart Db.

Applicability of 40 CFR 60, Subpart Da to HRSGs and Auxiliary Boiler
The HRSGs are subject to 40 CFR 60, Subpart Da, because they are electric utility steam generating units that combust more than 250 MMbtu/hr. S5, Auxiliary Boiler, is not subject to Da because it is not an electric utility steam generating unit. The purpose of S5 is to supply steam to USS-POSCO, a separate company, when the turbines and HRSGs are not operating.

The averaging time for SO2 in 40 CFR 60.43a(g) is a rolling 24-hour period in the BAAQMD. The District has written this shorter averaging time into the rule that accepts delegation of the New Source Performance Standards and EPA has granted delegation. This averaging period is more stringent than EPA standard and therefore is acceptable.

The NOx standard of 0.20 lb/MMbtu in 40 CFR 60.44a(a)(1) does not apply because it is superseded by 40 CFR 60.44a(d)(1) and (2) for sources built after July 9, 1997. 40 CFR 60.44a(a) states that the standards apply "…except as provided under paragraphs (b) and (d)…", which are more stringent. In this action, this standard has been deleted from the permit.

The NOx reduction standard of 25% in 40 CFR 60.44a(a)(2) does not apply because it is superseded by 40 CFR 60.44a(d)(1) and (2) for sources built after July 9, 1997. 40 CFR 60.44a(a) states that the standards apply "…except as provided under paragraphs (b) and (d)…", which are more stringent. In this action, this standard has been deleted from the permit.

The NOx standard of 1.6 lb/MW-hr in 40 CFR 60.44a(d)(1) applies to all sources that are subject to the standard that were built after July 9, 1997.

40 CFR 60.46a(a) states that compliance with the 0.03 lb particulate/MMbtu limit in Section 60.42a(a)(1) is equivalent to compliance with the 99% reduction requirement in 60.42a(a)(2) for solid fuels and 30% reduction requirement in 60.42a(a)(3) for solid fuels. Since these sources do not burn liquid or solid fuels, Section 60.46a(a) will be deleted in this action.

40 CFR 60.46a(b) states that compliance with the 0.2 lb NOx/MMbtu limit in Section 60.44a(a) is equivalent to compliance with the 25% reduction requirement in 60.44a(a)(2) for gaseous fuels. Since Section 60.44a(a)(2) does not apply, Section 60.46a(b) does not apply.

The standards listed in 40 CFR 60.46a(e) apply only for sulfur dioxides since the standards in 40 CFR 60.46a(k) apply specifically for duct burners for NOx. Compliance with this condition is demonstrated on a 24-hour basis in the BAAQMD, which is more stringent than the EPA requirements.

The standards in 40 CFR 60.46a(f) and (g) apply only for sulfur dioxides since the standards in 40 CFR 60.46a(k) apply specifically for duct burners for NOx. Compliance with this condition is demonstrated on a 24-hour basis in the BAAQMD, which is more stringent than the EPA requirements. There also are no reductions required so compliance with the reduction calculation strategy for SO2 is not applicable.

Sections 60.47a(c) through (n) do not apply because the HRSGs are duct burners and are exempt from continuous monitoring for NOx pursuant to Section 60.47a(o). In this action, Section 60.47a(f) has been deleted from the permit and Section 60.47a(o) has been added to the permit.

40 CFR 60.49a(a) is the requirement to submit results of performance tests. Since continuous monitoring is not required, the part regarding submittal of data for the performance evaluation of the continuous monitors does not apply.

The requirements to submit data regarding continuous monitors in 40 CFR 60.49a(b), (c), (f), (g), (h), and (j) do not apply because continuous monitoring is not required pursuant to 40 CFR 60.47a(o), and will be deleted in this action. References to 40 CFR 60.49a(b), (c), (f), (g), and (h) will be deleted in this action.

The requirements for additional reporting during exceedances of the SO2 limits in 40 CFR 60.49a(d) apply. However, it is impossible to exceed the SO2 limit while burning natural gas. The reporting requirement in 40 CFR 60.49a(i) will be retained due to this requirement.

Applicability of 40 CFR 60, Subpart Db to HRSGs

The HRSGs are exempt from this standard pursuant to 40 CFR 60.40b(e), which exempts sources that are subject to Subpart Da.

Applicability of 40 CFR 60, Subpart Db to S5, Auxiliary Boiler

This subpart applies to S5 because it is a steam generating unit with a capacity over 100 MMbtu/hr that was built after June 19, 1984. Following is an explanation of the specific sections that apply.

The NOx limit in Section 60.44b(a)(4) was not in the permit because the limit in 60.44b(l)(1) appeared to supersede the limit. In this action, the citation has been included. This change does not affect emissions because the limits are the same.

The citation for the NOx limit in Section 60.44b(l)(1) has been moved 5 rows down so that the citations are in the proper order. This section applies because the source was built after July 9, 1997.

The requirement in Section 60.44b(h) stating that the NOx limit applies at all times is applicable.

Section 60.44b(i) stating that compliance is determined on a 30-day basis was omitted because in this District, compliance is determined on a 24-hour basis. In this action, the section will be included with a note that compliance is determined on a 24-hour basis.

Section 60.44b(j) does not apply because it applies only to sources that run for only 10% of the year. Therefore, the section has been deleted in this action.

The particulate and opacity limits part of Section 60.46b(a) do not apply because the source is not subject to particulate limits. The NOx part does apply and will be added in this action.

Sections 60.46b(b) and (d) do not apply because the source is not subject to particulate limits.

Section 60.46b(c) and (e) require performance testing for NOx and do apply. Section 60.46b(c) will be added in this action although it is superfluous since it refers to Section 60.46b(e), which also requires testing and is in the permit.

Section 60.46b(e)(1) applies because it describes performance testing for NOx. The 30- day testing is not required since the limit set by the BAAQMD is an hourly lb/hr limit which is demonstrated during source testing and is more stringent than the limit contained in 60.44b(l).

Section 60.46b(e)(3) applies because it applies to sources with a capacity over 250 MMbtu/hr that burn natural gas. It will be added in this action. The section requires compliance over a rolling 30-day period. In this District, compliance is determined on a calendar day basis, which is more stringent. The 30- day testing is not required since the limit applies on a 24-hour basis in the Bay Area.

The requirements for continuous emission monitoring for NOx in Sections 60.48b(b) through (e) have been subsumed by the monitoring requirement in BAAQMD Condition 16676, part 6, to comply with the 9 ppmv @ 3% O2 BACT limit.

The requirement for standby monitoring for NOx in Section 60.48b(f) applies because the monitoring in Subpart Db cannot be subsumed by the monitoring in BAAQMD Condition 16676, part 6, when the monitoring is not operating.

The requirement for initial notification in Section 60.49b(a) will be deleted in this action because this event has passed.

The requirement for submittal of the initial performance test report in Section 60.49b(b) will be deleted in this action because this event has passed. The requirement for submittal of a performance evaluation for the CEM does not apply because the continuous emission monitoring requirement has been subsumed.

The facility is subject to the requirement to submit records of fuel usage in Section 60.49b(d).

The requirements for reports of continuous emission monitoring for NOx in Sections 60.49b(g)(1), (2), (3), (4), (6), (7), (8), (9), and (10) have been subsumed by the monitoring requirement in BAAQMD Condition 16676, part 6, to comply with the 9 ppmv @ 3% O2 BACT limit. These sections have been deleted in this action and only Section 60.49b(g)(5) has been retained.

The requirements for reports of days where data has not been obtained in Section 60.49b(g)(5) applies because the monitoring in Subpart Db cannot be subsumed by the monitoring in BAAQMD Condition 16676, part 6, when the monitoring is not operating, and therefore the reports of no monitoring cannot be subsumed.

Sections 60.49b(h)(2) and (4), and 60.49b(i) do not apply because continuous emission monitoring for NOx in have been subsumed by the monitoring requirement in BAAQMD Condition 16676, part 6, to comply with the 9 ppmv @ 3% O2 BACT limit.

Section 60.49b(i) applies because 60.48b applies. It will be added in this action.

The records retention requirement in Section 60.49b(o) applies and is in the permit.

Sections 60.49b(s) through (u) apply to specific facilities and do not apply to this facility.

Applicability of 40 CFR 60, Subparts Da and GG to Turbines and HRSGs

S1, Turbine, shares a stack with S3, Heat Recovery Steam Generator (HRSG). S2, Turbine, shares a stack with S4, Heat Recovery Steam Generator. Therefore, they are subject to BAAQMD Regulation 1-107, which reads:

> **Combination of Emissions:** Where air contaminants from two or more sources are combined prior to emission and there are no adequate and reliable means to establish the nature, extent and quantity of emission from each source, District Regulations shall be applied to the combined emission as if it originated in a single source. Such emissions shall be subject to the most stringent limitations and requirements of District Regulations applicable to any of the sources whose air contaminants are so combined.

Therefore, the turbines are subject to the HRSG standards and vice versa. This means that all sources are subject to the applicable emission limitations in both Subparts Da and GG of the New Source Performance Standards (40 CFR 60).

Because BAAQMD Regulation 1-107 applies, the following citations have been added to S1 and S3, Turbines that were omitted in error: 40 CFR 60.43a(g); 60.44a(d)(2); 60.46a(b) and (c); 60.48a; 60.49a(a), (d), and (i).

Applicability of BAAQMD Regulations 6-310 and 6-310.3 to Turbines and HRSGs

BAAQMD Regulations 6-310.3 applies to heat transfer operations such as HRSGs. The standard limits particulate matter to 0.15 grain/dscf @ 6% oxygen. Since the turbines share stacks with the HRSGs, they are also subject to this standard and the HRSGs are subject to the general standard, BAAQMD Regulations 6-310, which is 0.15 grain/dscf without a correction for concentration of oxygen.

In response to public comment, BAAQMD Regulations 6-301 and 9-1-301 were designated as "federally enforceable."

Applicability of 40 CFR 60, Subpart GG to S1 and S3, Turbines

The turbines are subject to Subpart GG because they have a heat input greater than 10 MMbtu/hr and were built after October 3, 1977. Following is an explanation of the specific sections that apply.

The NOx limit in 40 CFR 60.332(a)(1) applies. Section 60.332(b) states that turbines with a heat input greater than 100 MMbtu/hr are subject to Section 60.332(a)(1). Section 60.332(b) is not in the permit because it is redundant but will be added in this action. The NOx limit in Section 60.332(a)(1) is determined by a calculation using the following equation:

STD = (0.0075 x (14.4/Y)) + F

where STD is the limit

F is an optional factor for fuel-bound nitrogen

Y is the manufacturer's rated heat rate at manufacturer's rated load (kilojoules per watt hour) or actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility.

The owner/operator will not use "F". The manufacturer's heat rate is 1,929 MMbtu/hr. Lower heating value is approximately 90% of the higher heating value—1,736 MMbtu/hr. Converting to kilojoules @ 1.055 kilojoule/btu, the result is 1,831 million kilojoule/hr. The peak load is 170 MW. Therefore, "Y" is (1,831 million kilojoule/hr)/170 million watt-hr) = 10.7734

and

STD = (0.0075 x (14.4/10.7734) = 0.0100 or 100 ppm @ 15% O2, dry

The facility has chosen option (b) for the SO2 limit in Section 60.333, which is a limit on sulfur content in fuel of 0.8% by weight. A "(b)" was added to the citation in this action.

EPA published changes to the monitoring provisions of Subpart GG on July 8, 2004. The original permit subsumed the fuel nitrogen monitoring for NOx in Section 60.334(b)(2) with the requirement in BAAQMD Condition 16676, part 39, for continuous monitoring to ensure compliance with the 2.5 ppmv NOx at 15% O2 BACT limit. The fuel sulfur monitoring in Section 60.334(b)(2) was subsumed with the requirement in BAAQMD Condition 16676, part 14, to burn natural gas that contained less than 1 grain sulfur/100 cubic feet, with a monthly analysis. The turbines were not subject to the water-to-fuel monitoring in Section 60.334(a) because water injection was not used for control.

Subpart GG now requires no fuel sulfur monitoring if the source burns natural gas as defined by Section 331(u) and if the facility has a current, valid purchase contract, tariff sheet or transportation contract for the fuel specifying that the maximum total sulfur content is 20.0 grains/100 scf or less or complies with the Part 75 Appendix D requirements. This facility complies with the Part 75 requirements because the owner/operator analyzes a sample of the natural gas monthly to comply with the 1 grain per 100 scf limit in BAAQMD Condition 16676, part 14.

Subpart GG now requires no fuel nitrogen monitoring if the facility has not used a NOx emission allowance for fuel bound nitrogen as defined in section 60.332(a)(4). Since the facility has not used a NOx emission allowance, the nitrogen monitoring no longer applies and it is not necessary to subsume this monitoring using the permit shield. This citation will be deleted from the permit shield.

Following are the new monitoring citations based on the revisions of July 8, 2004.

The fuel sulfur and nitrogen monitoring in 40 CFR 60.334(b)(2) has been changed to 40 CFR 60.334(h). As stated above, fuel nitrogen monitoring is not required if the facility has not used a

NOx emission allowance for fuel bound nitrogen as defined in section 60.332(a)(4). The exemption from fuel nitrogen monitoring, Section 334(h)(2), has been placed in the permit. Fuel sulfur monitoring is not required if the source burns natural gas as defined by Section 331(u) and if the facility has a current, valid purchase contract, tariff sheet or transportation contract for the fuel specifying that the maximum total sulfur content is 20.0 grains/100 scf or less or has representative fuel sampling data, such as the data required by 40 CFR 75. The requirements for the contract, tariff sheet, or transportation contract, or representative fuel sampling data, Sections 60.334(h)(3)(i) and (ii), respectively, have been placed in the permit.

The facility has chosen the monitoring option in Section 60.334(c), which allows the facility to use a CEM that complies with Section 60.334(b).

The sulfur monitoring in Section 60.334(h)(1) does not apply because the sources will comply by burning natural gas as defined by Section 331(u) and by having a current, valid purchase contract, tariff sheet or transportation contract for the fuel specifying that the maximum total sulfur content is 20.0 grains/100 scf or less, pursuant to Section 60.334(h)(3)(i) or has representative fuel sampling data pursuant to Section 60.334(h)(3)(ii). In the original permit, the sulfur monitoring was subsumed by the requirement to burn PUC quality natural gas. This requirement has been deleted from the permit shield.

The fuel nitrogen monitoring in Section 60.334(h)(2) is not required if the facility has not used a NOx emission allowance for fuel bound nitrogen as defined in section 60.332(a)(4).

The requirement for excess emissions reports in Section 60.334(j)(1) applies because the facility is monitoring NOx emissions. This section sets the averaging time at 4 hours.

The facility will be subject to the new requirement, Section 60.334(5) regarding deadlines for excess emissions reports.

When the permit was originally issued, Section 60.335, Test methods and procedures, was cited in its entirety. Since this section has changed, it has been analyzed to determine whether any parts do not apply.

Subsection 60.335(b)(4) does not apply because NOx is not controlled by water or steam injection.

Subsections 60.335(b)(5) and (9) do not apply because the owner/operator has not used a NOx emission allowance for fuel bound nitrogen as defined in section 60.332(a)(4).

Sections 60.335(b)(6) and (7) will apply because the facility will be required to certify the CEMS for Subpart GG.

Section 60.335(b)(8) does not apply because the owner/operator is not monitoring parameters for compliance.

Sections 60.335(b)(9), (10), and (11) do not apply because the owner/operator will not test fuel for nitrogen or sulfur content.

Section 60.335(c)(1) is optional and will be placed in the permit.

Since the owner/operator has taken the option to use a CEM to comply with the NOx monitoring requirement, the sources are also subject to Appendix B and Appendix F to 40 CFR Part 60.

The above sections have also been placed in the tables for the HRSGs because the turbines and HRSGs are subject to the same standards pursuant to BAAQMD Regulation 1-107.

MACT and 112(j) (Case-by-case MACT)

The facility was not subject to a case-by-case MACT determination pursuant to 112(g)(2)(B) of the Clean Air Act because it is not a major source of hazardous air pollutants (HAP). MACT is the maximum achievable control technology emission limitation that has not yet been promulgated by US EPA.

The HAPs emissions calculations were updated in the evaluation of Application 1272.

The total potential to emit for HAPs is about 11 tons per year. The highest potential to emit for a single HAP is the potential to emit for hexane, which is about 4.2 tons per year.

Since the potential to emit for HAPs is lower than 10 tons per year of a single HAP and less than 25 tons per year of a combination of HAPs, the facility is not a major source of HAPs and is not subject to any MACT standards.

Accidental Release

Ammonia storage at this facility is subject to 40 CFR 68, Accidental Release, because the facility stores more than 20,000 pounds of aqueous ammonia that is 20% ammonia or higher.

Title IV, 40 CFR 72 through 78 (Acid Rain)

The facility is subject to the acid rain requirements because the 2 turbines and 2 heat recovery steam generators are considered utility units as defined in 40 CFR 70.2. The definition of utility unit is a "…unit owned or operated by a utility: (1) that serves a generator in any state that produces electricity for sale…" A utility means "any person that sells electricity."

Therefore, the facility is subject to 40 CFR 72 through 78.

Other changes in this action

Section IV has been modified to say that SIP standards are now found on EPA's website and are not included as part of the permit.

BAAQMD Condition 16676, part 34, has been changed to non-federally enforceable in the Section IV tables for S1 and S3, Gas Turbines, S4, Heat Recovery Steam Generator, and S5, Auxiliary Boiler. The District intended to make this correction in 2001, but omitted the correction in error.

The corresponding citations in Section VII were originally designated as non-federally enforceable. In addition, BAAQMD Condition 16676, parts 34, 37, and 42 in Section VI will be designated as non-federally enforceable so that the permit is consistent.

Section IV tables are proposed for diesel fire pump and emergency generator, S-6 and S-7, are proposed in this action. These engines were exempt from permits when first installed, but are now subject to permits. They are subject to BAAQMD Regulation 6, Particulate Matter and Visible Emissions, and BAAQMD Regulation 9, Sulfur Dioxide. They are not subject to the limits in BAAQMD Regulation 9, Rule 8, Nitrogen Oxides And Carbon Monoxide From Stationary Internal Combustion Engines pursuant to the limited exemption in Section 9-8-110. Instead they are subject to the hours of operation limits and recordkeeping.

A Section IV table is proposed for S-8, Cooling Tower, in this action. This is a significant source, but unpermitted source. It is subject to BAAQMD Regulation 6, Particulate Matter.

Obsolete parts of Condition 16676 were deleted in this action. The detail is in Section C.VI of this statement of basis.

The owner/operator has agreed to delete Part 22 of Condition 16676. This condition allowed the facility some flexibility regarding NOx emissions during transient, non-steady state operating conditions and has never been used.

Part 53 of Condition 16676 was deleted from Section IV tables in this action. This requirement to submit an Acid Rain application was deleted from the permit conditions at initial issuance of the permit because the requirement had been fulfilled.

## V. Schedule of Compliance

A schedule of compliance is required in all Title V permits pursuant to BAAQMD Regulation 2-6-409.10 which provides that a major facility review permit shall contain the following information and provisions:

"409.10 A schedule of compliance containing the following elements:

- 10.1 A statement that the facility shall continue to comply with all applicable requirements with which it is currently in compliance;
- 10.2 A statement that the facility shall meet all applicable requirements on a timely basis as requirements become effective during the permit term; and
- 10.3 If the facility is out of compliance with an applicable requirement at the time of issuance, revision, or reopening, the schedule of compliance shall contain a plan by which the facility will achieve compliance. The plan shall contain deadlines for each item in the plan. The schedule of compliance shall also contain a requirement for submission of progress reports by the facility at least every six months. The progress reports shall contain the dates by which each item in the plan was achieved and an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted."

Since the District has not determined that the facility is out of compliance with an applicable requirement, the schedule of compliance for this permit contains only sections 2-6-409.10.1 and 2-6-409.10.2.

Since the facility had no compliance history at the time of permit issuance, a review of compliance was not prepared for initial issuance. The purpose of this reopening is not to review compliance, so no report has been prepared at this time. A review will be prepared at the time of permit renewal in 2006.

## VI. Permit Conditions

During the Title V permit development, the District has reviewed the existing permit conditions for clarity and enforceability. Each permit condition is identified with a unique numerical identifier, up to five digits.

When necessary to meet Title V requirements, additional monitoring, recordkeeping, or reporting were added to the permit.

All changes to existing permit conditions were clearly shown in "strike-out/underline" format in the proposed permit. When the permit was issued, all 'strike-out" language was deleted and all "underline" language was retained, subject to consideration of comments received.

The existing permit conditions are derived from previously issued District Authorities to Construct (A/C) or Permits to Operate (P/O). Permit conditions may also be imposed or revised as part of the annual review of the facility by the District pursuant to California Health and Safety Code (H&SC) § 42301(e), through a variance pursuant to H&SC § 42350 et seq., an order of abatement pursuant to H&SC § 42450 et seq., or as an administrative revision initiated by District staff. After issuance of the Title V permit, permit conditions are revised using the procedures in Regulation 2, Rule 6, Major Facility Review.

The regulatory basis is listed following each condition. The regulatory basis may be a rule or regulation. The District is also using the following terms for regulatory basis:

- BACT: This term is used for a condition imposed by the Air Pollution Control Officer (APCO) to ensure compliance with the Best Available Control Technology in Regulation 2-2-301.
- Cumulative Increase: This term is used for a condition imposed by the APCO which limits a source's operation to the operation described in the permit application pursuant to BAAQMD Regulation 2-1-403.
- Offsets: This term is used for a condition imposed by the APCO to ensure compliance with the use of offsets for the permitting of a source or with the banking of emissions from a source pursuant to Regulation 2, Rules 2 and 4.
- PSD: This term is used for a condition imposed by the APCO to ensure compliance with a Prevention of Significant Deterioration permit issued pursuant to Regulation 2, Rule 2.
- TRMP: This term is used for a condition imposed by the APCO to ensure compliance with limits that arise from the District's Toxic Risk Management Policy.

Additional monitoring has been added, where appropriate, to assure compliance with the applicable requirements.

The original permit conditions were based on a Final Determination of Compliance that was prepared for the California Energy Commission pursuant to Application 18595. This application was superseded by Application 1272. Applications 18595 and 1272 are attached to this document and form part of this statement of basis.

Following are explanations for changes made during the Title V issuance.

BAAQMD Condition 16676, parts 14 and 25

A sulfur content limit was added to BAAQMD Condition 16676, parts 14 and 25, when the Major Facility Review permit was proposed because the original FDOC contained the limit. Monitoring for the limit in the form of fuel certification was added during review of the permit pursuant to BAAQMD Regulation 2-6-503. The wording of the conditions as proposed is shown below:

14. The Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-1, S-2, S-3, and S-4 shall maintain monthly certifications of gas sulfur content from the gas vendor. (BACT for $SO_2$ and $PM_{10}$)

25. The Auxiliary Boiler (S-5) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-5 shall maintain monthly certifications of gas sulfur content from the gas vendor. (BACT for $SO_2$ and $PM_{10}$)

The District has imposed certification of fuel sulfur as monitoring in many cases. However, all previous cases concerned liquid or solid fuels with intermediate storage. In this case, the vendor was not willing to supply a fuel certification. Therefore, the monitoring was changed to more rigorous monitoring: a requirement that the facility perform the sampling and analysis. The conditions now read:

14. The Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-1, S-2, S-3, and S-4 shall sample and analyze the gas from each supply source at least once every 30 consecutive days to determine the sulfur content of the gas. (BACT for $SO_2$ and $PM_{10}$)

25. The Auxiliary Boiler (S-5) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-5 shall sample and test the gas from each supply source at least once every 30 consecutive days to determine the sulfur content of the gas. (BACT for $SO_2$ and $PM_{10}$)

BAAQMD Condition 16676, part 22(g)

The following language was added at the end of BAAQMD Condition 16676, part 22(g) to require revision of the Title V permit if the data collection and record-keeping requirements are revised to enable proper documentation of transient, non-steady state conditions.

(g) The Title V operating permit shall be amended as necessary to reflect the data collection and recordkeeping requirements established under 22(g)(ii).

BAAQMD Condition 16676, part 23

A letter designation has been added to each limit in part 23 as shown below to distinguish between the limits in subsequent citations.

| | Start-Up (lb/start-up) | Shutdown (lb/shutdown) |
|---|---|---|
| (a) Oxides of Nitrogen (as $NO_2$) | 240 | 20 |
| (b) Carbon Monoxide (CO) | 2514 | 44.1 |
| (c) Precursor Organic Compounds (as $CH_4$) | 48 | 8 |

BAAQMD Condition 16676, part 28(h)

A grammatical correction was made to this condition, as shown below:

(h) Ammonia ($NH_3$) emissions at P-3 shall not exceed 10 ppmv, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. This ammonia concentration shall be verified by the continuous recording of the ammonia injection rate at the A-5 SCR System. The correlation between the auxiliary boiler heat input rate, A-5 SCR System ammonia injection rate, and corresponding ammonia emission concentration at P-3 shall be determined in accordance with permit condition 38. (TRMP)

BAAQMD Condition 16676, parts 34, 37, and 42 (change in this action)

BAAQMD Condition 16676, parts 34, 37, and 42 in Section VI have been designated as non-federally enforceable so that the permit is consistent. These conditions have been designated as non-federally enforceable in Section VII and in some tables in Section IV. Since these concern limits that were imposed on toxic air contaminants by the state program, they are not federally enforceable. All citations in Sections IV and VI have been corrected so that the permit is now consistent in this regard. The District promised to make this correction in the District's letter of 8/27/01 to Ken Kloc of the Environmental Law and Justice Center at Golden Gate University in San Francisco and omitted the correction in error.

BAAQMD Condition 16676, part 34(f)

The following language was added at the end of BAAQMD Condition 16676, part 34(f) to require revision of the Title V permit if the carcinogenic compound emission limits listed above are adjusted.

(f) Both of these risk analyses shall be submitted to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will satisfy the conditions stated in parts (d) and (e) above, the District

and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. The Title V operating permit shall be amended to reflect these adjustments. (TRMP)

BAAQMD Condition 16676, part 36
The reference to part 23 has been changed to part 23(c) because the condition refers to monitoring for the POC limit in part 23(c), not the NOx and CO limits in 23(a) and (b).

BAAQMD Condition 16676, part 42(b)
In response to public comment, the facility is not allowed to discontinue testing for benzene, formaldehyde, and PAH's after three annual tests show compliance with the limits. Instead, the facility may reduce the frequency of testing for the pollutants to once every five years.

BAAQMD Condition 16676, part 47
Part 47 was amended because the ports and platforms have been installed.

48. The Owner/Operator of LMEC maintain ~~shall provide~~ adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall be subject to BAAQMD review and approval. (Regulation 1-501)

BAAQMD Condition 16676, part 53
BAAQMD Condition 16676, part 53 (shown below), was deleted when the Major Facility Review and Acid Rain permit was issued because the condition was no longer valid after issuance of the Title IV permit.

53. Pursuant to 40 CFR Part 72.30(b)(2)(ii) of the Federal Acid Rain Program, the owner/operator of the LMEC shall submit an application for a Title IV operating permit to the BAAQMD. Neither of the gas turbines (S-1 or S-3) may be operated unless a Title IV operating permit has been issued, or within 24 months after the application is received by the BAAQMD, whichever comes first. (40 CFR 72.30(b)(2))

BAAQMD Condition 16676, part 54
In response to public comment, BAAMD Condition 16676, part 54 was added to Section VI, Permit Conditions. It reads:

54. The Owner/Operator shall submit a Preplanned Abatement Strategy as described in BAAQMD Regulation 4, Air Pollution Episode Plan, within 120 days after issuance of the Title V permit. After the plan has been approved by the APCO, the owner/operator shall keep records of implementation on an event basis. (Basis: BAAQMD Regulation 4)

A citation for this condition was placed in Table III, Generally Application Requirements.

Changes in this action
The following note, which is standard in most Title V permits, was added to Section VI:

Any condition that is preceded by an asterisk is not federally enforceable.
In addition, asterisks have been added to the following conditions because the authority for these conditions comes from state, not federal, regulations: BAAQMD Condition 16676, parts 21e, 28h, 34, 37, 38, 41, and 52. These conditions have been designated as non-federally enforceable in Sections IV and VII in most cases. Part 52 has been moved to Condition 19399, part 6, since this is the new condition for S6, Diesel Fire Pump Engine.

Parts of Condition 16676 have become obsolete and deletion is proposed in this action. The commissioning period for the facility is over. Therefore, the definitions of commissioning activities and period have been deleted. The following parts are obsolete and will be deleted: Parts 1-13, which contained the commissioning conditions; Part 48 regarding the installation of equipment for source testing; Parts 49 and 50 regarding the provision of offsets; and Part 51, which required a Title V application.

The owner/operator has agreed to delete Part 22 of Condition 16676. This condition allowed the facility some flexibility regarding NOx emissions during transient, non-steady state operating conditions and has never been used.

Condition 19399 has been added for S-6, Diesel Fire Pump Engine. This engine was permitted via Application 4227, attached, which forms part of this statement of basis. The changes to the permit condition in this action are the addition of a requirement for fuel certification and records, standard monitoring for sulfur in fuel oil, and changing the recordkeeping requirement from 2 years to 5 years, and a change in the basis of parts 4 and 5 from "Recordkeeping" to other bases. Other than BAAQMD Regulation 2-6-503, the District has no general regulation regarding discretionary requirements for recordkeeping. The general authority resides in BAAQMD Regulation 2-1-403, Permit Conditions. The changes to the condition in this action are shown in italics and strikeout. Also, the note in part 1 that states that Regulation 9, Rule 8, Nitrogen Oxides from Stationary Engines, may apply in the future has been deleted, since the rule has been modified to include standby engines. Part 52 of Condition 16676 has been moved to Condition 19399, part 6, since it applies to S6.

Condition 21597 has been added for S-7, Natural-Gas Fired Emergency Generator. This engine was permitted via Application 9497, attached, which forms part of this statement of basis. The changes to the permit condition in this action are changing the recordkeeping requirement from 2 years to 5 years and a change in the basis to part 3. BAAQMD Regulation 1-441 is not the proper basis for a recordkeeping requirement, so it has been deleted from the basis. The changes to the condition in this action are shown in italics and strikeout.

## VII. Applicable Limits and Compliance Monitoring Requirements

This section of the permit is a summary of numerical limits and related monitoring requirements for each source. The summary includes a citation for each monitoring requirement, frequency of monitoring, and type of monitoring. The applicable requirements for monitoring are completely contained in Sections IV, Source-Specific Applicable Requirements, and VI, Permit Conditions, of the permit.

The District has reviewed all monitoring and has determined the existing monitoring is adequate with the following exceptions.

The tables below contain only the limits for which there is no monitoring or inadequate monitoring in the applicable requirements. The District has examined the monitoring for other limits and has determined that monitoring is adequate to provide a reasonable assurance of compliance. Calculations for potential to emit will be provided in the discussion when no monitoring is proposed due to the size of a source.

Monitoring decisions are typically the result of a balancing of several different factors including: 1) the likelihood of a violation given the characteristics of normal operation, 2) degree of variability in the operation and in the control device, if there is one, 3) the potential severity of impact of an undetected violation, 4) the technical feasibility and probative value of indicator monitoring, 5) the economic feasibility of indicator monitoring, and 6) whether there is some other factor, such as a different regulatory restriction applicable to the same operation, that also provides some assurance of compliance with the limit in question.

These factors are the same as those historically applied by the District in developing monitoring for applicable requirements**.** It follows that, although Title V calls for a re-examination of all monitoring**,** there is a presumption that these factors have been appropriately balanced and incorporated in the District's prior rule development and/or permit issuance. It is possible that, where a rule or permit requirement has historically had no monitoring associated with it, no monitoring may still be appropriate in the Title V permit if, for instance, there is little likelihood of a violation**.** Compliance behavior and associated costs of compliance are determined in part by the frequency and nature of associated monitoring requirements. As a result, the District will generally revise the nature or frequency of monitoring only when it can support a conclusion that existing monitoring is inadequate**.**

## NOX Sources

| S# & Description | Emission Limit Citation | Federally Enforceable Emission Limit | Monitoring |
|---|---|---|---|
| S1 and S3, Turbines<br>S2 and S4, HRSG | NSPS<br>40 CFR 60.44a(d)(1) | 1.6 lb/MW-hr | Monitoring requirement subsumed by monitoring for BACT limit. See Permit Shield. |
| S5, Auxiliary Boiler | NSPS<br>40 CFR 60.44b (a)(4) | 0.2 lb/MM BTU except during start-up, shutdown, or malfunction | Monitoring requirement subsumed by monitoring for BACT limit. See Permit Shield. |

**NOx Discussion:**

All sources with NOx limits are equipped with CEMs. In the case of the above limits, the monitoring in the standard has been subsumed by monitoring for the BACT NOx limit. See Section C.X for details.

## CO Sources

**CO Discussion:** All CO limits are contained in permit conditions, which also contain adequate monitoring. All sources with CO limits are equipped with CEMs.

## $SO_2$ Sources

| S# & Description | Emission Limit Citation | Federally Enforceable Emission Limit | Monitoring |
|---|---|---|---|
| S1 and S3, Turbines<br>S2 and S4, HRSG<br>S5, Auxiliary Boiler<br>S6, Engine<br>S7, Engine | BAAQMD 9-1-301 | Ground level concentrations of SO2 shall not exceed: 0.5 ppm for 3 consecutive minutes AND 0.25 ppm averaged over 60 consecutive minutes AND 0.05 ppm averaged over 24 hours | None |
| S1 and S3, Turbines<br>S2 and S4, HRSG<br>S5, Auxiliary Boiler<br>S7, Engine | BAAQMD 9-1-302 | 300 ppm (dry) | None |
| S6, Engine | BAAQMD 9-1-304 | Sulfur content of fuel < 0.5% by weight | Fuel certification |

## $SO_2$ Sources

| S# & Description | Emission Limit Citation | Federally Enforceable Emission Limit | Monitoring |
|---|---|---|---|
| S1 and S3, Turbines<br>S2 and S4, HRSG | NSPS<br>40 CFR 60.43a<br>(b)(2) | 0.2 lb/MM BTU, 24 hr average<br>except during startup, shutdown | None |

**SO2 Discussion:**

BAAQMD Regulation 9-1-301

Area monitoring to demonstrate compliance with the ground level SO2 concentration requirements of Regulation 9-1-301 is at the discretion of the APCO (per BAAQMD Regulation 9-1-501). This facility does not have equipment that emits large amounts of SO2 and therefore is not required to have ground level monitoring by the APCO. Appendix A of the FDOC contains calculations of SO2 concentrations at the larger sources: S1 and S3, Turbines; S2 and S4, HRSGs; and S5, Auxiliary Boiler. At the sulfur limit of 1 grain/100 scf, the SO2 concentrations are expected to be about 1 ppmv. This concentration could not cause an exceedance of the 9-1-301 limit.

All facility combustion sources are subject to the SO2 emission limitations in District Regulation 9, Rule 1 (ground-level concentration and emission point concentration). In EPA's June 24, 1999 agreement with CAPCOA and ARB, "Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP", EPA has agreed that natural-gas-fired combustion sources do not need additional monitoring to verify compliance with Regulation 9, Rule 1, since violations of the regulation are unlikely. Therefore, no monitoring is necessary for this requirement for S1 and S3, Turbines, S2 and S4, HRSGs, S5, Auxiliary Boiler, and S7, Natural-gas Fired Engine.

S6, Fire Pump Diesel Engine, is subject to the 0.5% by weight fuel sulfur limit in Section 9-1-304. A requirement for certification of the sulfur in fuel, the standard monitoring for this standard, has been imposed on this source.

40 CFR 60, Subpart Da, imposes no SO2 monitoring for natural gas fired sources because non-compliance with the 0.2 lb/MMbtu limit while burning natural gas would be impossible. SO2 emissions are directly proportional to the sulfur in fuel at a 2:1 ratio. The facility is subject to a 1 grain/100 scf limit for sulfur in natural gas. Each scf of natural gas is worth 1050 btu. There are 7,000 grains/lb. The maximum emission rate is:

(lb/7000 gr) x (1 gr S/100 scf) x (scf/1050 btu) x (2 lb SO2/lb S) x 1 MM
= 0.0027 lb/MMbtu

Therefore, no monitoring for the standard is necessary.

PM Sources

| S# & Description | Emission Limit Citation | Federally Enforceable Emission Limit | Monitoring |
|---|---|---|---|
| S1 and S3, Turbines<br>S2 and S4, HRSG<br>S5, Auxiliary Boiler | BAAQMD Regulation 6-301 | Ringelmann 1.0 | None |
| S6, Engine<br>S7, Engine | BAAQMD Regulation 6-303 | Ringelmann 2.0 | None |
| S8, Cooling Tower | BAAQMD Regulation 6-301 | Ringelmann 1.0 | None |
| S1 and S3, Turbines<br>S2 and S4, HRSGs | BAAQMD Regulation 6-310 | 0.15 gr/dscf | None |
| S6, Engine<br>S7, Engine | BAAQMD Regulation 6-310 | 0.15 gr/dscf | None |
| S8, Cooling Tower | BAAQMD Regulation 6-310 | 0.15 gr/dscf | None |
| S1 and S3, Turbines<br>S2 and S4, HRSG<br>S5, Auxiliary Boiler | BAAQMD Regulation 6-310.3 | 0.15 gr/dscf at 6% O2 | None |
| S8, Cooling Tower | BAAQMD Regulation 6-311 | $4.10P^{0.67}$ lb/hr, where P is process weight, ton/hr | None |
| S1 and S3, Turbines<br>S2 and S4, HRSG | NSPS<br>40 CFR 60.42a(b) | < 20% opacity, 6 minute average, except one six minute period/hr up to 27% opacity | None |

**PM Discussion:**

BAAQMD Regulation 6 "Particulate Matter and Visible Emissions"

Visible Emissions

BAAQMD Regulation 6-301 limits visible emissions to no darker than 1.0 on the Ringelmann Chart (except for periods or aggregate periods less than 3 minutes in any hour). Visible emissions are normally not associated with combustion of gaseous fuels, such as natural gas. Sources S1 through S5 burn natural gas exclusively, therefore, per the EPA's June 24, 1999 agreement with CAPCOA and ARB titled "Summary of Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP", no monitoring is required to assure compliance with this limit for these sources.

BAAQMD Regulation 6-303 limits visible emissions to no darker than 2.0 on the Ringelmann Chart (except for periods or aggregate periods less than 3 minutes in any hour). S-6 and S-7 are engines used solely as a standby source of motive power, and therefore, are subject to this less stringent opacity standard. Additional monitoring is not

warranted for these engines because they operate infrequently and they are expected to comply with the standard.

As shown below, the grain loading for the cooling tower is approximately 0.00011 gr/cf. The grain loading is so low that visible emissions are not expected from this source. Therefore, no monitoring for opacity has been required.

Particulate Weight Limitation

BAAQMD Regulation 6-310 limits filterable particulate (FP) emissions from any source to 0.15 grains per dry standard cubic foot (gr/dscf) of exhaust volume. Section 310.3 limits filterable particulate emissions from "heat transfer operations" to 0.15 gr/dscf @ 6% $O_2$. These are the "grain loading" standards.

Exceedances of the grain loading standards are normally not associated with combustion of gaseous fuels, such as natural gas. Sources S1 through S5 burn natural gas exclusively, therefore, per the EPA's July 2001 agreement with CAPCOA and ARB entitled "CAPCOA/CARB/EPA Region IX Recommended Periodic Monitoring for Generally Applicable Grain Loading Standards in the SIP: Combustion Sources: Summary of Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP", no monitoring is required to assure compliance with this limit for these sources.

Additional monitoring for the grain-loading requirement has not been imposed on S-6 or S-7, Engines, because they are operated infrequently.

As shown in the following calculation, the worst-case grain loading from the Cooling Tower is much less than 0.15 grains per dscf. Therefore, no monitoring is required to ensure compliance with this limit for this source.

| | |
|---|---|
| Design air flow | 11,334,760 cf/min or 680,085,600 cf/hr |
| Hourly particulate emissions (from Application 1272) | 1.043 lb/hr |
| Grains, @ 7000 grains/lb | 7,301 grains/hr |

Approximate grain loading 0.00011 gr/cf

Allowable Rate of Emissions Based on Process Weight Rate

BAAQMD Regulation 6-311 limits particulate emissions from general operations based on the process weight throughput. The only source subject to this standard is the cooling tower. The limit is based on the throughput in pounds. The capacity in gallons is 110,600 gpm. At 8.34 lb/gal, the throughput is 922,400 lb/min or 55,344,000 lb/hr. The limit is 40 lbs for any throughput above 57,320 lb/hr. The hourly emissions, based on Application 1272, are 1.043 lb/hr. Since the margin of compliance is 1 to 40, no monitoring for this standard is required.

## POC Sources

**POC Discussion:** All POC limits are contained in permit conditions, which also contain adequate monitoring-annual source tests, daily records, and daily calculations.

## Ammonia Sources

**Ammonia Discussion:** All ammonia limits are contained in permit conditions, which also contain adequate monitoring. Moreover, the ammonia limits are not federally enforceable.

**Discussion of Other Limits:**
The permit contains other limits, such as HAP limits, hours of operation, and heat input. There is adequate monitoring for these limits in the standards or permit conditions.

In response to public comment, all citations of BAAQMD Regulation 6-301 were designated as "federally enforceable."

Changes in this action
The commissioning period for the facility is over. Therefore, Parts 1-13, which contained the commissioning conditions have been deleted.

The owner/operator has agreed to delete Part 22 of Condition 16676. This condition allowed the facility some flexibility regarding NOx emissions during transient, non-steady state operating conditions and has never been used.

The characterization in the Section VII tables for Sources S1-S4 of the ammonia injection monitor as a CEM has been corrected. This is continuous monitoring of a parameter, not emissions.

The ammonia limit and monitoring in BAAQMD Condition 16676, part 28h, omitted in error, was added to the Section VII table for S5, Auxiliary Boiler.

BAAQMD Regulation 6-304
The Section IV tables for S2 and S4, HRSGs, and S5, Auxiliary Boiler, contain citations of BAAQMD Regulation 6-304. Since it was omitted in error from the Section VII tables for S2 and S4, it will be added in this action.

BAAQMD Regulation 9, Rule 3
The limit in Section 9-3-303 of this regulation applies to new heat transfer operations with a capacity higher than 250 MMbtu/hr, therefore it applies to S2 and S4, Heat Recovery Steam Generators, and S5, Auxiliary Boiler. Due to BAAQMD Regulation 1-107, Combination of Emissions, BAAQMD Regulation 9-3-303 also applies to S1 and S3, Turbines.

In this action, the citation of BAAQMD Regulation 9-3-303, omitted in error, has been added to the Section VII tables for S1 through S4.

In the table for S5, Auxiliary Boiler, citation of 40 CFR 60.44b(a)(1)(ii) has been replaced by 40 CFR 60.44b(a)(4). 40 CFR 60.44b(a)(l)(1), omitted in error, was added to the permit. These changes are not material because they all contain the same limit, 0.2 lb NOx/MMbtu.

40 CFR 60, Subpart Da for Turbines and HRSGs
The averaging time for the limits in this regulation is 24 hours, not 30 days. Therefore, this correction has been made to the Section VII tables for this requirement.

40 CFR 60, Subpart GG for Turbines
The owner/operator has chosen the CEM option for NOx monitoring in Section 60.334(c). Therefore, the NOx monitoring will no longer be subsumed using the permit shield.

## VIII. Test Methods

This section of the permit lists test methods that are associated with standards in District or other rules. It is included only for reference. In most cases, the test methods in the rules are source test methods that can be used to determine compliance but are not required on an ongoing basis. They are not applicable requirements.

If a rule or permit condition requires ongoing testing, the requirement will also appear in Section IV of the permit.

## IX. Title IV Permit

The Title IV Acid Rain permit is contained in the Title V permit. 40 CFR 75 requires that it contain the following elements:

- Statement of Basis
- SO2 allowance allocations and NOx requirements, if any.

- Any comments, notes or justifications regarding permit decisions
- The permit application (attached at the end of the Title V permit)

## X. Permit Shield:

The District rules allow two types of permit shields. The permit shield types are defined as follows: (1) A provision in a major facility review permit explaining that specific federally enforceable regulations and standards do not apply to a source or group of sources, or (2) A provision in a major facility review permit explaining that specific federally enforceable applicable requirements for monitoring, recordkeeping and/or reporting are subsumed because other applicable requirements for monitoring, recordkeeping, and reporting in the permit will assure compliance with all emission limits.

The second type of permit shield is allowed by EPA's White Paper 2 for Improved Implementation of the Part 70 Operating Permits Program. The District uses the second type of permit shield for all streamlining of monitoring, recordkeeping, and reporting requirements in Title V permits. The District's program does not allow other types of streamlining in Title V permits.

This facility has the second type of permit shield.

Following is the detail of the permit shields.

**Table X B - 1**
**Permit Shield for Subsumed Requirements**
**S-1, S-3, TURBINES**
**S-2, S-4, HEAT RECOVERY STEAM GENERATORS**

| Subsumed Requirement Citation | Title or Description | Streamlined Requirements | Title or Description |
|---|---|---|---|
| ~~40 CFR 60.44a(a)(1)~~ | ~~NOx Emission Limit~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |
| ~~40 CFR 60.44a (a)(2)~~ | ~~NOx Reduction Requirement~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |
| ` | New Source NOx Emission Limit **in 40 CFR 60.44a(d)(1)** | BAAQMD Condition 16676, part 39 | Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen |

## Table X B - 1
## Permit Shield for Subsumed Requirements
## S-1, S-3, TURBINES
## S-2, S-4, HEAT RECOVERY STEAM GENERATORS

| Subsumed Requirement Citation | Title or Description | Streamlined Requirements | Title or Description |
|---|---|---|---|
| ~~40 CFR 60.334(b)(2)~~ | ~~Fuel Nitrogen Content monitoring (natural gas)~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |
| ~~40 CFR 60.334(b)(2)~~ | ~~Fuel Sulfur Content monitoring (natural gas)~~ | ~~BAAQMD Condition 16676, part 14~~ | ~~Requirement for exclusive use of natural gas with a maximum sulfur content of 1 gr/100 scf with monthly fuel testing~~ |
| ~~40 CFR 60.334(c)(1)~~ | ~~Periods of excess emissions, NOx~~ | ~~BAAQMD Condition 16676, Part 6~~ | ~~Requirement for continuous emission monitor for NOx~~ |

## ~~Table X B - 2~~
## ~~Permit Shield for Subsumed Requirements~~
## ~~S-2, S-4, HEAT RECOVERY STEAM GENERATORS~~

| ~~Subsumed Requirement Citation~~ | ~~Title or Description~~ | ~~Streamlined Requirements~~ | ~~Title or Description~~ |
|---|---|---|---|
| ~~40 CFR 60.44(a)(1)~~ | ~~NOx Emission Limit~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |
| ~~40 CFR 60.44a(a)(2)~~ | ~~NOx Reduction Requirement~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |
| ~~40 CFR 60.44a(d)(1)~~**~~B AAQMD 2-6-409.2~~** | ~~New Source NOx Emission Limit~~ **~~in 40 CFR 60.44a(d)(1)~~** | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |

~~**Table X B - 2**~~
~~**Permit Shield for Subsumed Requirements**~~
~~**S-2, S-4, HEAT RECOVERY STEAM GENERATORS**~~

| ~~Subsumed Requirement Citation~~ | ~~Title or Description~~ | ~~Streamlined Requirements~~ | ~~Title or Description~~ |
|---|---|---|---|
| ~~40 CFR 60.47a(c)~~ | ~~Continuous Monitoring of Nitrogen Oxides~~ | ~~BAAQMD Condition 16676, part 39~~ | ~~Continuous emission monitoring for 2.5 ppmv limit @ 15% oxygen~~ |

**Table X B - 3**
**Permit Shield for Subsumed Requirements**
**S-5, AUXILIARY BOILER**

| Subsumed Requirement Citation | Title or Description | Streamlined Requirements | Title or Description |
|---|---|---|---|
| ~~40 CFR 60.44b (l)(1)~~ | ~~NOx Emission limitation~~ | ~~BAAQMD Condition 16676, part 40~~ | ~~Continuous emission monitoring for 9.0 ppmv limit @ 3% oxygen~~ |
| 40 CFR 60.47b(b)~~a(c)~~ | Continuous Monitoring of Nitrogen Oxides | BAAQMD Condition 16676, part 6 | Requirement for continuous emission monitor for NOx |

Turbines and HRSGs

In this action, the District has determined that 40 CFR 60.44a(a)(1) and (2) do not apply to the turbines or HRSGs. Therefore, they have been deleted from the permit shield tables.

The entry for 40 CFR 60.44a(d)(1) will be modified because citing the emission limit under the "Subsumed Requirement Citation" makes it appear as if the emission limit is subsumed. In fact, the monitoring, recordkeeping, and reporting requirements are subsumed. Therefore, the emission limit citation will be replaced by the monitoring citation. In this case, the standard requires no monitoring pursuant to Section 60.47a(o) because the HRSGs are duct burners. The monitoring citation for the subsumed monitoring requirement is BAAQMD 2-6-409.2, the periodic monitoring requirement in the District rule. This periodic monitoring requirement has been subsumed by the requirement in BAAQMD Condition 16676, part 39, for continuous monitoring to ensure compliance with the 2.5 ppmv NOx at 15% O2 BACT limit.

This is justified because monitoring for the 2.5 ppmv NOx at 15% O2 BACT limit will ensure compliance with the 1.6 lb NOx/MW-hr in 40 CFR 60.44a(d)(1), as shown below.

> Each turbine/HRSG combination produces 260 MW, therefore the maximum allowable NOx emissions pursuant to 40 CFR 60.44a(d)(1) is 416 lb/hr. This limit does not apply during startup, shutdown, or malfunction, pursuant to 40 CFR 60.46a(c). The maximum emissions based on the BACT limit are calculated as follows:
>
> Gas flow:
> (1,929+333 MMbtu/hr) x (8,710 dscf/MMbtu) x ((20.9)/(20.9-15)) =
> 69,500,000 dscf/hr
>
> Total lb-mol gas using the gas law:
> PV/RT = n
> n = (( 1 atm) x (69,500,000 dscf/hr))/ (0.7302 atm-cf/ lb-mol-$^{o}$R) ((460+68)$^{o}$R)
> = 180,260 lb-mol/hr
>
> At 2.5 ppmv, 4.5 lb-mol NOx/hr are emitted.
>
> Converting to pounds:
> 4.5 lb-mol NOx/hr x (46 lb NOx/lb-mol) = 207 lb NOx/hr
>
> Since the BACT limit is less than half of the limit in 40 CFR 60.44a(d)(1) when both limits are compared on a lb/hr basis, compliance with the less stringent limit is assured by monitoring for the more stringent limit.

Since the monitoring for the turbine NSPS, 40 CFR 60, Subpart GG, has changed, the facility is no longer subject to Section 60.334(b)(2), monitoring of the fuel sulfur content in natural gas. Therefore, the section has been deleted from the permit shield. Section 60.334(c), Periods of excess emissions, NOx, has also been deleted, since this section has changed. The permit shield now subsumes the new Section 60.334(c), which requires a CEM, with the requirement in BAAQMD Condition 16676, part 39, for continuous monitoring to ensure compliance with the 2.5 ppmv NOx at 15% O2 BACT limit. Since the limit in Subpart GG is 100 ppmv @ 15% O2, dry, no demonstration is required to show that continuous emission monitoring for the more stringent limit is assured by continuous emission monitoring for the less stringent limit.

Since the turbines and the HRSGs share the same NOx limits, the permit shield tables for these sources will be combined.

The facility has chosen option (b) for the SO2 limit in Section 60.333, which is a limit on sulfur content in fuel of 0.8% by weight. The "(a)' in this citation was changed to "(b)" in this action. The limit was changed from "0.015% (vol) @15% $O_2$ (dry)" to "no more than 0.8% sulfur by weight in fuel."

<u>40 CFR 60, Subpart GG for Turbines</u>
The owner/operator has chosen the CEM option for NOx monitoring in Section 60.334(c). Therefore, the NOx monitoring will no longer be subsumed using the permit shield.

Auxiliary Boiler

The entry for 40 CFR 60.44b(l)(1) will be modified because citing the emission limit under the "Subsumed Requirement Citation" makes it appear as if the emission limit is subsumed. In fact, the monitoring, recordkeeping, and reporting requirements are subsumed. Therefore, only the monitoring citation will appear. The monitoring citation has been corrected from 40 CFR 60.47a(c) to 40 CFR 48b(b).

This is justified because monitoring for the 9 ppmv NOx at 3% O2 BACT limit will ensure compliance with the 0.2 lb/MMbtu limit in 40 CFR 60.44b(a)(4) and (l)(1), as shown below.

Gas flow/MMbtu:
(MMbtu) x (8,710 dscf/MMbtu) x ((20.9)/(20.9-3)) =
10,170 dscf

Total lb-mol gas using the gas law:
PV/RT = n
n = (( 1 atm) x (10,170 dscf/MMbtu))/ (0.7302 atm-cf/ lb-mol-$^{o}$R) ((460+68)$^{o}$R)
= 26.378 lb-mol/MMbtu

At 9.0 ppmv, 0.0024 lb-mol NOx/MMbtu is emitted.

Converting to pounds:
0.0024 lb-mol NOx/hr x (46 lb NOx/lb-mol) = 0.1092 NOx/MMbtu

Since the BACT limit is about half of the limit in 40 CFR 60.44b(a)(4) and (l)(1) when both limits are compared on a lb/MMbtu basis, compliance with the less stringent limit is assured by monitoring for the more stringent limit.

## XI. Revision History

This section contains the details of issuance and revisions for each permit.

## XII. Glossary

This section contains terms that may be unfamiliar to the general public or EPA.

## XIII. Applicable State Implementation Plan

This section contains EPA's web address for the SIP.

## XIV. Title IV Permit Application

The Title IV Permit Application is considered part of the Title IV permit and therefore, is attached to the permit.

Change in this action

The Title IV Permit Application was omitted in error for the previous issuance. It will be included as part of this action.

**D. Alternate Operating Scenarios:**

No alternate operating scenario has been requested for this facility.

**F. Differences between the Application and the Proposed Permit:**

The District received the Title IV application forms on May 11, 2001. The District received the Title V application forms on June 6, 2001. The District combined the applications into one, Application 2804. This application, along with Applications 18595 and 1272, were the basis for constructing the original Title V permit in 2001. There were no significant differences between the permit and the original applications.

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# APPENDIX A

# GLOSSARY

**ACT**
Federal Clean Air Act

**APCO**
Air Pollution Control Officer

**ARB**
Air Resources Board

**BAAQMD**
Bay Area Air Quality Management District

**BACT**
Best Available Control Technology

**Basis**
The underlying authority which allows the District to impose requirements.

**CAA**
The federal Clean Air Act

**CAAQS**
California Ambient Air Quality Standards

**CAPCOA**
California Air Pollution Control Officers Association

**CEM**
Continuous Emission Monitor

**CEQA**
California Environmental Quality Act

**CFR**
The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

**CO**
Carbon Monoxide

**Cumulative Increase**
The sum of permitted emissions from each new or modified source since a specified date pursuant to BAAQMD Rule 2-1-403, Permit Conditions (as amended by the District Board on 7/17/91) and SIP Rule 2-1-403, Permit Conditions (as approved by EPA on 6/23/95). Cumulative increase is used to determine whether threshold-based requirements are triggered.

**District**
The Bay Area Air Quality Management District

**dscf**

Dry Standard Cubic Feet

**EPA**
The federal Environmental Protection Agency.

**Excluded**
Not subject to any District regulations.

**FDOC**
Final Determination of Compliance (FDOC), prepared pursuant to District Regulation 2, Rule 3, Power Plants.

**Federally Enforceable, FE**
All limitations and conditions which are enforceable by the Administrator of the EPA including those requirements developed pursuant to 40 CFR Part 51, subpart I (NSR), Part 52.21 (PSD), Part 60 (NSPS), Part 61 (NESHAPs), Part 63 (MACT), and Part 72 (Permits Regulation, Acid Rain), including limitations and conditions contained in operating permits issued under an EPA-approved program that has been incorporated into the SIP.

**FP**
Filterable Particulate as measured by BAAQMD Method ST-15, Particulate.

**HAP**
Hazardous Air Pollutant. Any pollutant listed pursuant to Section 112(b) of the Act. Also refers to the program mandated by Title I, Section 112, of the Act and implemented by 40 CFR Part 63.

**HRSG**
Heat Recovery Steam Generator

**Major Facility**
A facility with potential emissions of: (1) at least 100 tons per year of regulated air pollutants, (2) at least 10 tons per year of any single hazardous air pollutant, and/or (3) at least 25 tons per year of any combination of hazardous air pollutants, or such lesser quantity of hazardous air pollutants as determined by the EPA administrator.

**MFR**
Major Facility Review. The District's term for the federal operating permit program mandated by Title V of the Federal Clean Air Act and implemented by District Regulation 2, Rule 6.

**MOP**
The District's Manual of Procedures.

**NAAQS**
National Ambient Air Quality Standards

**NESHAPS**
National Emission Standards for Hazardous Air Pollutants. See in 40 CFR Parts 61 and 63.

**NMHC**
Non-methane Hydrocarbons (Same as NMOC)

**NMOC**
Non-methane Organic Compounds (Same as NMHC)

**NOx**
Oxides of nitrogen.

**NSPS**
Standards of Performance for New Stationary Sources. Federal standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the Federal Clean Air Act, and implemented by 40 CFR Part 60 and District Regulation 10.

**NSR**
New Source Review. A federal program for pre-construction review and permitting of new and modified sources of pollutants for which criteria have been established in accordance with Section 108 of the Federal Clean Air Act. Mandated by Title I of the Federal Clean Air Act and implemented by 40 CFR Parts 51 and 52 and District Regulation 2, Rule 2. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

**Offset Requirement**
A New Source Review requirement to provide federally enforceable emission offsets for the emissions from a new or modified source. Applies to emissions of POC, NOx, PM10, and SO2.

**Phase II Acid Rain Facility**
A facility that generates electricity for sale through fossil-fuel combustion and is not exempted by 40 CFR 72 from Titles IV and V of the Clean Air Act.

**POC**
Precursor Organic Compounds

**PM**
Particulate Matter

**PM10**
Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns

**PSD**
Prevention of Significant Deterioration. A federal program for permitting new and modified sources of those air pollutants for which the District is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the Act and implemented by both 40 CFR Part 52 and District Regulation 2, Rule 2.

**PUC**
Public Utilities Commission (California)

**SIP**
State Implementation Plan. State and District programs and regulations approved by EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the Act.

**SO2**
Sulfur dioxide

**THC**
Total Hydrocarbons (NMHC + Methane)

**Title V**
Title V of the federal Clean Air Act. Requires a federally enforceable operating permit program for major and certain other facilities.

**TOC**
Total Organic Compounds (NMOC + Methane, Same as THC)

**TPH**
Total Petroleum Hydrocarbons

**TRMP**
Toxic Risk Management Plan

**TSP**
Total Suspended Particulate

**VOC**
Volatile Organic Compounds

**Units of Measure:**

| | | |
|---|---|---|
| bhp | = | brake-horsepower |
| btu | = | British Thermal Unit |
| cfm | = | cubic feet per minute |
| g | = | grams |
| gal | = | gallon |
| gpm | = | gallons per minute |
| hp | = | horsepower |
| hr | = | hour |
| lb | = | pound |
| in | = | inches |
| max | = | maximum |
| $m^2$ | = | square meter |
| min | = | minute |
| mm | = | million |
| MMbtu | = | million btu |
| MMcf | = | million cubic feet |
| ppmv | = | parts per million, by volume |
| ppmw | = | parts per million, by weight |
| psia | = | pounds per square inch, absolute |
| psig | = | pounds per square inch, gauge |
| scfm | = | standard cubic feet per minute |
| yr | = | year |

# APPENDIX B

# APPLICATION 1272

**Los Medanos Energy Center; Plant #11866**
**750 East Third Street, Pittsburg CA 95465**
**Application 1272**

## BACKGROUND

The Los Medanos Energy Center (LMEC) is applying for a modification to the Authority to Construct issued under application 18595 for the equipment listed below. Because that authority to construct also served as a federal PSD permit and since the LMEC has not yet been constructed or operated, the modified authority to construct for the LMEC must be reviewed as a "new" application with respect to the PSD impact analysis and is therefore subject to public comment and review.

S-1 Combustion Gas Turbine #1, General Electric Frame 7FA Model PG 7241 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst

S-2 Heat Recovery Steam Generator #1, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst

S-3 Combustion Gas Turbine #2, General Electric Frame 7FA Model PG 7241 or equivalent; 1,929 MM BTU per hour, equipped with dry low-$NO_x$ Combustors, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst

S-4 Heat Recovery Steam Generator #2, equipped with dry low-$NO_x$ Duct Burners, 83 MM BTU per hour, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst

S-5 Auxiliary Steam Boiler, 266 MM BTU per hour, equipped with low-$NO_x$ burners

The original application for this cogeneration facility was submitted by Enron and permitted as the Pittsburg District Energy Facility with the equipment specifications listed above. The "facility" has been purchased by Calpine, which has determined that the following equipment modifications are necessary for its efficient operation.

- The heat input rating of each HRSG duct burner will increase from 83 MM BTU/hr (HHV) to 333 MM BTU/hr (HHV)
- The auxiliary boiler heat input rating will increase from 266 MM BTU/hr (HHV) to 320 MM BTU/hr (HHV) and the boiler will be abated by SCR for $NO_x$ control
- the cooling tower will increase in size from 6 to 8 cells
- A 600 kW (300 hp) fire pump diesel engine (exempt from permit) will be added
- A 600 kW, natural-gas fired emergency generator (exempt from permit) will be added

As a result of these modifications and revised emission specifications, the following changes in operating parameters and emission rates will occur:

- Reduce allowable $NO_x$, CO, and POC emission rates during gas turbine start-ups to levels consistent with those used for the Delta Energy Center. No distinction will be made between hot and cold start-ups – instead, all start-ups will be subject to one set of mass limits for $NO_x$, CO, and POC. $SO_2$ and $PM_{10}$ emission rates (lb/MM BTU), which are not affected during turbine start-up, will not change.
- Allowable heat input rates for HRSG duct burners and auxiliary boiler will increase
- CO, $NO_x$, POC, $PM_{10}$, and $SO_2$ mass emission rates and limits for the gas turbine/HRSGs and the auxiliary boiler will be revised to reflect increased fuel usage and reduced start-up emission rates
- Annual Toxic Air Contaminant emission rates will increase due to increased fuel usage
- Cooling tower TAC emission rates will be revised to reflect Calpine's estimates of water TDS and cooling tower drift rate

Heat Input Rates

Based upon the increases in the rated heat input rates for the HRSG duct burners and auxiliary boiler, the maximum heat input rates for the LMEC will be revised as shown in Table 2 below.

**Table 1 Current Maximum Heat Input Rates**

| **Source** | MM BTU/hour | MM BTU/day | MM BTU/year |
|---|---|---|---|
| Each Gas Turbine | 1,929 | 46,296 | 15,586,320 |
| Each Gas Turbine with HRSG Duct Burner Firing | 2,012 | 48,288 | 16,256,960[a] |
| Auxiliary Boiler | 266 | 6,384 | 399,000 |
| CTGs, HRSGs, & Auxiliary Boiler Combined | 4,290 | 102,960 | 32,912,920[b] |

[a]based upon 8,080 hours of simultaneous gas turbine and HRSG duct burner firing per year @ 100% load

[b]limited by permit condition

**Table 2 Revised Maximum Heat Input Rates**

| **Source** | MM BTU/hour | MM BTU/day | MM BTU/year |
|---|---|---|---|
| Each Gas Turbine | 1,925.1 | 46,202.4 | 15,505,200 |
| Each Gas Turbine with HRSG Duct Burner Firing | 2,225.1 | 50,738.4[a] | 17,005,200[b] |
| Auxiliary Boiler | 320 | 7,680 | 480,000[c] |
| CTGs, HRSGs, & Auxiliary Boiler Combined | 4770.2 | 109,156.8 | 34,490,400 |

[a]based upon maximum 16 hr/day gas turine operation with duct burner firing and 8 hr/day gas turbine firing without duct burner at an average heat input rate of 1,892.1 MM BTU/hr

[b]based upon 5000 hours of duct burner firing per year per HRSG and an average gas turbine heat input rate of 1,770 MM BTU/hr for 3,760 hr/year

[c]based upon 1,500 hours per year operation at its maximum firing rate of 320 MM BTU/hr

## CRITERIA-POLLUTANT EMISSION SUMMARY

**Annual Average Project Emissions Increase:**

| Pollutant | lb/day | ton/yr[a] |
|---|---|---|
| $NO_x$ | 123.3 | 22.5 |
| CO | 103.6 | 18.9 |
| POC | 0 | 0 |
| $PM_{10}$ | 44.1 | 8.05 |
| $SO_2$ | 39.7 | 7.25 |
| NPOC | 0 | 0 |

[a]based upon limits in permit condition #33

**Daily Maximum Emissions by Source (lb/day):**

| Source | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ | NPOC |
|---|---|---|---|---|---|---|
| S-1 Gas Turbine | 603.8 | 3,047.6 | 78.5 | 312 | 127.2 | 0 |
| S-2 HRSG | 48 | 70.4 | 8.2 | 52.8 | 14.8 | 0 |
| S-3 Gas Turbine | 603.8 | 3,047.6 | 78.5 | 312 | 127.2 | 0 |
| S-4 HRSG | 48 | 70.4 | 8.2 | 52.8 | 14.8 | 0 |
| S-5 Auxiliary Boiler | 83 | 280.3 | 41.5 | 38.4 | 11 | 0 |

## EMISSION CALCULATIONS

### S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators

Start-Up Emission Rates

Table 3 Current Turbine Start-Up Emission Rates

| Start-Up Type | **$NO_x$** | CO | POC |
|---|---|---|---|
| Cold Start (lb/hr) | 223 | 1821 | 239 |
| Cold Start[a] (lb/start) | 280 | 3,393 | 359 |
| Hot Start[b] (lb/start) | 223 | 1,821 | 239 |

[a]based upon maximum cold start duration of 3 hours

[b]based upon maximum hot start duration of 1 hour

Calpine is proposing to modify the turbine start-up emission rates based upon their vendor guarantees and their best estimates of probable emission rates. The revised emission rates shown in Table 4 were used in the permitting of the Delta Energy Center and Metcalf Energy Center.

Table 4 Revised Turbine Start-Up Emission Rates

| | **$NO_x$** | CO | POC |
|---|---|---|---|
| Start-Up (lb/hr) | 80 | 902 | 16 |
| Start-Up (lb/start-up) | 240 | 2,514 | 48 |

Baseload Emission Factors

**Table 5 Controlled Regulated Air Pollutant Emission Factors (lb/MM BTU)**

| **Pollutant** | **Source** | | | |
|---|---|---|---|---|
| | **CTG** | **HRSG** | **CTG & HRSG Combined** | **Auxiliary Boiler** |
| Nitrogen Oxides (as $NO_2$) | 0.009[a] | 0.009[a] | 0.009[a] | 0.0107 |
| Carbon Monoxide | 0.0132[b] | 0.0132[b] | 0.0132[b] | 0.0365 |
| Precursor Organic Compounds | 0.00136 | 0.01 | 0.0017 | 0.00137 |
| Particulate Matter ($PM_{10}$) | 0.00845 | 0.00845 | 0.00845 | 0.005 |
| Sulfur Dioxide | 0.00277 | 0.00277 | 0.00277 | 0.00277 |

[a]based upon the permit condition emission limit of 2.5 ppmvd $NO_x$ @ 15% $O_2$

[b]based upon the permit condition emission limit of 6 ppmvd CO @ 15% $O_2$

**Table 6 Revised Controlled Regulated Air Pollutant Emission Factors (lb/MM BTU)**

| Pollutant | Source | | | |
|---|---|---|---|---|
| | CTG | HRSG | CTG & HRSG Combined | Auxiliary Boiler |
| Nitrogen Oxides (as $NO_2$) | 0.009[a] | 0.009[a] | 0.009[a] | 0.0108 |
| Carbon Monoxide | 0.0132[b] | 0.0132[b] | 0.0132[b] | 0.0365 |
| Precursor Organic Compounds | 0.0017 | 0.0015 | 0.0017 | 0.0054 |
| Particulate Matter ($PM_{10}$) | 0.0073 | 0.0073 | 0.0073 | 0.005 |
| Sulfur Dioxide | 0.00277 | 0.00277 | 0.00277 | 0.00277 |

[a]based upon the permit condition emission limit of 2.5 ppmvd $NO_x$ @ 15% $O_2$

[b]based upon the permit condition emission limit of 6 ppmvd CO @ 15% $O_2$

Maximum Hourly Emission Rates

**Table 7 Current Maximum Hourly Regulated Air Pollutant Emission Rates (lb/hr)**

| Pollutant | Source | |
|---|---|---|
| | CTG[a] | CTG & HRSG Combined[b] |
| Nitrogen Oxides (as $NO_2$) | 17.36 | 17.5 |
| Carbon Monoxide | 25.46 | 26.56 |
| Precursor Organic Compounds | 2.6 | 3.43 |
| Particulate Matter ($PM_{10}$) | 16.3 | 17.0 |
| Sulfur Dioxide | 5.34 | 5.6 |

[a]maximum heat input rate of 1,929 MM BTU/hr (HHV)

[b]maximum combined heat input rate of 2,012 MM BTU/hr (HHV)

**Table 8 Revised Maximum Hourly Regulated Air Pollutant Emission Rates (lb/hr)**

| Pollutant | Source | |
|---|---|---|
| | CTG | CTG & HRSG Combined |
| Nitrogen Oxides (as $NO_2$) | 17.33 | 20.0 |
| Carbon Monoxide | 25.3 | 29.2 |
| Precursor Organic Compounds | 3.3 | 3.6 |
| Particulate Matter ($PM_{10}$) | 13 | 16.3 |
| Sulfur Dioxide | 5.0 | 5.8 |

Maximum Daily Emission Rates

**Table 9 Maximum Daily Regulated Air Pollutant Emissions By Source (lb/day)**

| | $NO_2$[c] | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG & S-2 HRSG[a] | 688.4 | 2,656.5 | 551.17 | 408 | 133.76 |
| S-3 CTG & S-4 HRSG[a] | 688.4 | 2,656.5 | 551.17 | 408 | 133.76 |
| S-5 Auxiliary Boiler[b] | 68.3 | 233 | 8.75 | 31.9 | 17.2 |

[a]based upon one 1 hour hot startup, 22.5 hours of full load operation @ 2,012 MM BTU/hr, and one 0.5 hour shutdown in one day. For example, $NO_x$ emissions are calculated as follows:

223 lb/SU + 58 lb/SD + (2,012 MM BTU/hr)(0.009 lb $NO_x$/MM BTU)(22.5 hr/day)
= 688.4 lb $NO_x$/day

[b]based upon 24 hour/day operation of the Auxiliary Boiler at its maximum rated heat input of 266 MM BTU/hr

**Table 10 Revised Maximum Daily Regulated Air Pollutant Emissions By Source (lb/day)**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Each Gas Turbine[a] (S-1, S-3) | 603.8 | 3,047.6 | 78.5 | 312 | 127.2 |
| Each HRSG (S-2, S-4) | 48 | 70.4 | 8.2 | 52.8 | 14.8 |
| Each Power Train[b] (S-1 & S-2, S-3 & S-4) | 615.3 | 3,064.5 | 118.9 | 340.4 | 130.5 |
| S-5 Auxiliary Boiler[c] | 83 | 280.3 | 41.5 | 38.4 | 11 |

[a]based upon one 3-hour start-up and 21 hours of baseload operation without duct burner firing @ 1925.1 MM BTU/hr. For example, $NO_x$ emissions are calculated as follows:

240 lb/SU + (1925.1 MM BTU/hr)(0.009 lb $NO_x$/MM BTU)(21 hr/day) = 603.8 lb $NO_x$/day

[b]based upon one 3-hour start-up, 16 hours of full load operation with duct burner firing @ 2,125.1 MM BTU/hr, and 4 hour of baseload operation without duct burner firing @ 1925.1 MM BTU/hr. For example, $NO_x$ emissions are calculated as follows:

240 lb/SU + (2,125.1 MM BTU/hr)(0.009 lb $NO_x$/MM BTU)(16 hr/day) +
(1925.1 MM BTU/hr)(0.009 lb $NO_x$/MM BTU)(4 hr/day) = 615.3 lb $NO_x$/day

[c]based upon 24 hour/day operation of the Auxiliary Boiler at its maximum rated heat input of 320 MM BTU/hr

***Table 11 Worst-Case Daily Facility Regulated Air Pollutant Emissions (lb/day)***

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| S-1 CTG 3-hr Start-up | 240 | 2,514 | 48 | 39 | 15 |
| S-1 CTG Baseload Operation (5 hr/day) | 86.65 | 126.5 | 15 | 65 | 25 |
| S-1 CTG Baseload with S-2 HRSG Duct Burner[a] | 320 | 467.2 | 54.9 | 260.8 | 100.8 |
| S-3 CTG 3-hr Start-up[b] | 240 | 2,514 | 48 | 39 | 15 |
| S-3 CTG Baseload Operation (3 hr/day) | 52 | 75.9 | 9 | 39 | 15 |
| S-3 CTG Baseload with S-4 HRSG Duct Burner[a] | 320 | 467.2 | 54.9 | 260.8 | 100.8 |
| S-5 Auxiliary Boiler[c] | 83 | 280.3 | 41.5 | 38.4 | 11 |
| Total | **1,341.7** | **6,445.1** | **271.3** | **742** | **282.6** |

[a]based upon 16 hours baseload operation with duct burner firing at maximum combined heat input of 2,225.1 MM BTU/hr

[b]occurs in second hour of 24-hr period

[c]based upon 24-hour operation at maximum rated heat input of 320 MM BTU/hr

Annual Emission Rates

Basis:

**5,200 hours of baseload (100% load) operation per CTG per year @ 50°F**
1,664 hours of 60% load operation per CTG per year @ 50°F
312 one hour (hot) CTG start-ups
312 half hour CTG shutdowns per year.

**Table 12 Current Annual Regulated Air Pollutant Emissions for CTGs and HRSGs**

| Source (Operating Mode) | $NO_x$ (lb/yr) | CO (lb/yr) | POC (lb/yr) | $PM_{10}$ (lb/yr) | $SO_2$ (lb/yr) |
|---|---|---|---|---|---|
| S-1 and S-3 CTGs (312 hot start-ups) | 69,576 | 568,152 | 74,568 | 5,304 | 1,747.2 |
| S-1 and S-3 CTGs (312 shutdowns) | 18,096 | 74,256 | 78,936 | 2,652 | 873.6 |
| S-1 and S-3 CTGs (10,400 hrs[a] @ 100% load) | 180,554.4[b] | 264,813[b] | 35,572.2[b] | 176,814.6[d] | 55,570.6[b] |
| S-1 and S-3 CTGs (3,328 hrs[a] @ 60% load) | 37,110.5[c] | 54,428.8[c] | 5,607.8[c] | 56,580.6[d] | 11,421.8[c] |
| Total Emissions (lb/yr) | 305,336.9 | 961,649.9 | 194,684 | 241,351.2 | 69,613.2 |
| (ton/yr) | **152.67** | **480.8** | **97.34** | **120.67** | **34.8** |

[a]total combined firing hours for both turbines

[b]based upon the maximum heat input rate of 1,929 MM BTU/hr for each CTG

[c]based upon the maximum heat input rate of 1,239 MM BTU/hr for each CTG @ 50°F and 60% load

[d]based upon the worst case $PM_{10}$ emission rate of 17 lb/hr at the maximum combined heat input rate of 2,012 MM BTU/hr

Basis:

**3,448 hours of baseload (100% load) operation per CTG per year @ 50°F**
5,000 hours of CTG operation with HRSG duct burner firing per power train per year
312 start-up hours per CTG per year

**Table 13 Revised Annual Regulated Air Pollutant Emissions for CTGs and HRSGs**

| Source (Operating Mode) | $NO_x$ (lb/yr) | CO (lb/yr) | POC (lb/yr) | $PM_{10}$ (lb/yr) | $SO_2$ (lb/yr) |
|---|---|---|---|---|---|
| S-1 and S-3 CTGs (624[a] start-up hours) | 49,920 | 562,848 | 9,984 | 8,112 | 1,560 |
| S-1 and S-3 CTGs (6,896[a] hrs @ 100% load) | 109,853.3[b] | 161,118.1[b] | 20,688 | 89,648 | 34,480[b] |
| S-1 CTG and S-2 HRSG S-3 CTG and S-4 HRSG (10,000[c] hrs) | 186,300[d] | 273,240[d] | 34,300 | 163,000 | 58,000[d] |
| Total Emissions (lb/yr) | 346,073.3 | 997,206.1 | 64,972 | 260,760 | 94,040 |
| (ton/yr) | **173.04** | **498.6** | **32.5** | **130.4** | **47.02** |

[a]total combined firing hours for both turbines

[b]based upon an average heat input rate of 1,770 MM BTU/hr for each CTG

[c]total combined firing hours for both power trains

[d]based upon an average combined heat input rate of 2,070 MM BTU/hr for each power train

**S-5 Auxiliary Boiler**

**Table 14 Current Regulated Air Pollutant Emissions for Auxiliary Boiler**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Emission Factor[a] (lb/MM BTU) | 0.0107 | 0.0365 | 0.00137 | 0.005 | 0.0027 |
| lb/hr[b] | 2.85 | 9.7 | 0.36 | 1.33 | 0.72 |
| lb/day[c] | 68.3 | 233 | 8.75 | 31.9 | 17.2 |
| lb/yr[d] | 4,269.3 | 14,563.5 | 546.6 | 1,995 | 1,077.3 |
| ton/yr | 2.13 | 7.28 | 0.27 | 1 | 0.54 |

[a]$NO_2$ emission factor is based upon BACT specification of 9 ppmv $NO_x$, dry @ 3% $O_2$. CO emission factor is based upon BACT specification of 50 ppmv, dry @ 3 % $O_2$. POC, and $SO_2$ emission factors are from AP-42, Section 1.4, Natural Gas Combustion, Table 1.4-2. $PM_{10}$ emission factor is from AP-42, Table 1.4-1.

[b]based upon maximum heat input of 266 MM BTU/hr

[c]based upon 24 hour per day operation @ 266 MM BTU/hr or 6,384 MM BTU/day

[d]based upon a maximum 1,500 hr/yr operation and a corresponding maximum annual heat input of 399,000 MM BTU/yr

**Table 15 Revised Regulated Air Pollutant Emissions for Auxiliary Boiler**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Emission Factor[a] (lb/MM BTU) | 0.0108 | 0.0365 | 0.0054 | 0.005 | 0.00277 |
| lb/hr[b] | 3.46 | 11.7 | 1.73 | 1.6 | 0.89 |
| lb/day[c] | 83 | 280.3 | 41.5 | 38.4 | 21.3 |
| lb/yr[d] | 5,184 | 17,520 | 2,592 | 2,400 | 1,329.6 |
| ton/yr | 2.6 | 8.76 | 1.3 | 1.2 | 0.66 |

[a]$NO_x$ emission factor is based upon BACT specification of 9 ppmv $NO_x$, dry @ 3% $O_2$. CO emission factor is based upon BACT specification of 50 ppmv, dry @ 3 % $O_2$. POC emission factor is a vendor guarantee. $SO_2$ emission factor is based upon maximum sulfur content of 1 gr/dscf of natural gas. $PM_{10}$ emission factor is from AP-42, Table 1.4-2, "Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion"

[b]based upon maximum heat input of 320 MM BTU/hr

[c]based upon 24 hour per day operation @ 320 MM BTU/hr or 7,680 MM BTU/day

[d]based upon a maximum 1,500 hr/yr operation and a corresponding maximum annual heat input of 480,000 MM BTU/yr

**Table 16 Regulated Air Pollutant Emission Increases for Auxiliary Boiler**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Proposed Emissions (lb/yr) | 5,184 | 17,520 | 2,592 | 2,400 | 1,329.6 |
| Current Emissions (lb/yr) | 4,269.3 | 14,563.5 | 546.6 | 1,995 | 1,077.3 |
| Difference (lb/yr) | 914.7 | 2,956.5 | 2,045.4 | 405 | 252.3 |
| Difference (ton/yr) | 0.457 | 1.48 | 1.02 | 0.2 | 0.126 |

**8-Cell Cooling Tower $PM_{10}$ Emissions**

The cooling tower is exempt from District permit requirements pursuant to Regulation 2-1-128.4. Because the cooling tower $PM_{10}$ emissions are less than 5 tons per year, the cooling tower remains exempt from permit per Regulation 2-1-319.1. It is conservatively assumed that all particulate matter will be emitted as $PM_{10}$. In the original application, the cooling tower $PM_{10}$ emission rate was estimated to be 1.9 tons per year based upon a drift rate of 0.3 gpm and a maximum total dissolved solids level of 2910 mg/l based upon 3 cycles of concentration.

| | |
|---|---|
| Cooling tower circulation rate: | 110,600 gpm |
| *maximum total dissolved solids:* | *3771 ppm (3765 mg/l)* |
| *Drift rate:* | *0.0005 %* |

*Water mass flow rate:*

*(110,600 gal/min)(60 min/hr)(8.34 lb/gal) = 55,344,240 lb/hr*

*Cooling tower drift rate:*

*(55,344,240 lb/hr)(0.000005) = 276.72 lb/hr*

**$PM_{10}$** = (3771 ppm)(276.72 lb/hr)/($10^6$)
= 1.043 lb/hr
**=** *25.04 lb/day* *(24 hr/day operation)*
= 9,136.7 lb/yr (8,760 operating hours per year)
**= *4.57 ton/yr***

Toxic Air Contaminant Emission Rates

The TAC emission rates shown in Table 17 were used as input data for the health risk assessment modeling and are based upon a maximum combined annual heat input of 34,490,400 MM BTU per year for S-1 & S-3 CTGs, S-2 & S-4 HRSGs and an annual heat input of 480,000 MM BTU per year for S-5 Auxiliary Boiler.

**Table 17 Worst-Case TAC Emissions[a] for CTGs, HRSGs, and Auxiliary Boiler**

| Toxic Air Contaminant | Emission Factor (lb/MM BTU) | g/sec | lb/yr |
|---|---|---|---|
| Acetaldehyde[d] | 6.86E-05 | 3.26E-02 | 2,266 |
| Acrolein | 2.37E-05 | 1.1E-02 | 768 |
| Ammonia[b,c] | 1.22E-02 | 5.7 | 396,670 |
| Benzene[d] | 1.36E-05 | 6.18E-03 | 430 |
| 1,3-Butadiene[c,d] | 1.27E-07 | 5.9E-05 | 4.1 |
| Ethylbenzene | 1.79E-05 | 8.38E-03 | 582.5 |
| Formaldehyde[d] | 1.10E-04 | 5.24E-02 | 3,643.4 |
| Hexane | 2.59E-04 | 1.21E-01 | 8,428 |
| Napthalene | 1.66E-06 | 7.81E-04 | 54.3 |
| PAHs[d] | 2.32E-06 | 1.08E-03 | 75.3 |
| Propylene | 7.70E-04 | 3.61E-01 | 25,110 |
| Propylene Oxide[c,d] | 4.78E-05 | 2.21E-02 | 1,535.2 |
| Toluene | 7.10E-05 | 3.37E-02 | 2,346.3 |
| Xylene | 2.61E-05 | 1.28E-02 | 891 |

[a]combined emissions from S-1 & S-3 CTGs, S-2 & S-4 HRSGs, and S-5 Auxiliary Boiler

[b]based upon the worst-case ammonia slip from the SCR system of 10 ppmvd @ 15% $O_2$ and 8,080 hours of operation per CTG at 100% load

[c]emitted from turbines only, not from auxiliary boiler

[d]carcinogenic compounds

**Table 18 Regulated Air Pollutant Emissions for Fire Pump Diesel Engine**

| Pollutant | Emission Factor | | Annual Emissions[a] |
|---|---|---|---|
| | g/bhp-hr | lb/hr | lb/yr |
| Nitrogen Oxides (as $NO_2$) | 5.89 | 3.90 | 390 |
| Carbon Monoxide | 3.55 | 2.35 | 235 |
| Precursor Organic Compounds | 0.73 | 0.48 | 48 |
| Particulate Matter[b] ($PM_{10}$) | 0.25 | 0.17 | 17 |
| Sulfur Dioxide | 0.167 | 0.11 | 11 |

[a]based upon 100 hours of operation per year for exercising

[b]classified as a toxic air contaminant by the ARB

**Table 19 Worst-Case Toxic Air Contaminant Emissions for Fire Pump Diesel Engine**

| Toxic Air Contaminant | Emission Factor[a] (lb/MM BTU) | Annual Emissions[a] (lb/yr) |
|---|---|---|
| Benzene | 9.33E-04 | 0.2 |
| Toluene | 4.09E-04 | 0.09 |
| Xylenes | 2.85E-04 | 0.06 |
| Propylene | 2.58E-03 | 0.54 |
| 1,3-Butadiene | 3.91E-05 | 0.008 |
| Formaldehyde | 1.18E-03 | 0.25 |
| Acetaldehyde | 7.67E-04 | 0.2 |
| Acrolein | 9.25E-05 | 0.02 |
| Total PAHs | 1.68E-04 | 0.035 |

[a]based upon maximum fuel use rate of 2.11 MM BTU/hr and maximum 100 operating hours per year

**Table 20 Worst-Case TAC Emissions for 6-Cell Cooling Tower[a]**

| Toxic Air Contaminant | **Emission Factor** (lb/hr) | **Emission Rate (lb/yr)** | **Risk Screening Trigger Level (lb/yr)** |
|---|---|---|---|
| Aluminum | 4.5E-05 | 0.39 | N/S[b] |
| Arsenic[c] | 1.8E-06 | 0.016 | 0.024 |
| Silver | 2.3E-06 | 0.02 | N/S |
| Barium | 5.4E-06 | 0.05 | N/S |
| Beryllium[c] | 4.5E-06 | **0.04** | **0.015** |
| Cadmium[c] | 4.5E-06 | 0.04 | 0.046 |
| Chloride | 0.1027 | 900 | N/S |
| Hexavalent chromium[c] | 2.3E-06[d] | **0.02** | **0.0014** |
| Copper | 3.2E-06 | 0.028 | 463 |
| Fluoride | 3.2E-04 | 2.8 | N/S |
| Lead[c] | 9.9E-06 | 0.087 | 29 |
| Magnesium | 1.2E-02 | 105 | N/S |
| Manganese | 6.1E-05 | 0.53 | 77 |
| Mercury | 9.1E-08 | 0.0008 | 57.9 |
| Selenium[c] | 3.2E-06 | 0.028 | 96.5 |
| Silica[c] | 1.2E-05 | 0.11 | N/S |
| Sodium hydroxide | 3.2E-06 | 0.028 | 926 |
| Sulfate | 8.8E-02 | 771 | N/S |
| Zinc | 5.6E-06 | 0.05 | 6,760 |

[a]based upon 24 hr/day, 365 day/yr operation of cooling towers at maximum flow rate

[b]none specified

[c]carcinogenic compound

[d]based upon the worst-case assumption that the concentration of hexavalent chromium in cooling tower water equals the detection limit of 0.005 mg/l. Cooling tower water analysis did not detect any measurable quantity of hexavalent chromium

The projected toxic air contaminant emissions from the modified cooling tower are summarized in **Table 21**. The emissions are based upon an water circulation rate of 110,600 gpm, a drift rate of 125.59 l/hr, and 8760 hours of operation per year. As shown, the cooling tower triggers a risk screening analysis pursuant to District regulation 2-1-316 for the compounds shown in bold. These emission rates reflect the increased capacity of the redesigned cooling tower. The only significant change in the emission rates relate to hexavalent chromium. As noted, the hex chrome emission rate is based upon a concentration equal to one half of the detection limit of 0.005 mg/l. This is a reasonable compromise between a concentration of zero and a concentration equal to the detection limit.

**Table 21 Revised Worst-Case TAC Emissions for 8-Cell Cooling Tower**

| Toxic Air Contaminant | **Emission Rate** (lb/hr) | **Annual Emission Rate[a] (lb/yr)** | **Risk Screening Trigger Level (lb/yr)** |
|---|---|---|---|
| Aluminum | 8.31E-05 | 0.73 | N/S[b] |
| Arsenic[c] | 3.32E-06 | 0.003 | 0.024 |
| *(x) Beryllium* | 8.31E-06 | **0.073** | **0.015** |
| **Cadmium[c]** | 8.31E-06 | **0.073** | 0.046 |
| Trivalent chromium[c] | 6.64E-06 | 0.058 | N/S[b] |
| *(xi) Hexavalent chromium* | 2.08E-06[d] | **0.018** | **0.0014** |
| Copper | 5.81E-06 | 0.06 | 463 |
| Cyanide | 8.31E-05 | 0.073 | N/S[b] |
| Lead[c] | 1.83E-05 | 0.16 | 29 |
| Mercury | 1.66E-07 | 0.0015 | 57.9 |
| Nickel | 8.31E-05 | 0.073 | 0.73 |
| Selenium | 5.81E-06 | 0.051 | 96.5 |
| Silver | 4.15E-06 | 0.036 | N/S[b] |
| Zinc | 1.04E-05 | 0.09 | 6,760 |

[a]based upon 24 hr/day, 365 day/yr operation of cooling tower at maximum flow rate with drift rate of 125.59 l/hr

[b]none specified

[c]carcinogenic compound

[d]based upon the assumption that the concentration of hexavalent chromium in cooling tower water equals one half of the detection limit of 0.005 mg/l. Cooling tower water analysis did not detect any measurable quantity of hexavalent chromium

**FACILITY CUMULATIVE INCREASE**
(since April 5, 1991)

| | Current | | Increase | | New Total | |
|---|---|---|---|---|---|---|
| | lb/day | ton/yr | lb/day | ton/yr | lb/day | ton/yr |
| **$NO_x$** | 839.45 | 153.2 | 123.3 | 22.5 | 962.74 | 175.7 |
| **CO** | 2,671.23 | 487.5 | 103.6 | 18.9 | 2,7748 | 506.4 |
| **POC** | 534.85 | 97.61 | 0 | 0 | 534.85 | 97.61 |
| **$PM_{10}$** | 677 | 123.55 | 44.1 | 8.05 | 721.1 | 131.6 |
| **$SO_2$** | 218.41 | 39.86 | 39.7 | 7.25 | 258.14 | 47.11 |
| **NPOC** | 0 | 0 | 0 | 0 | 0 | 0 |

## TOXIC RISK SCREENING ANALYSIS

As shown in Tables 17 through 21, a health risk assessment was triggered for the gas turbines, auxiliary boiler, fire pump diesel engine, and cooling tower based upon the revised plant equipment specifications. The applicant performed and submitted a health risk assessment (HRA) utilizing approved air dispersion modeling procedures. District Toxics Section staff reviewed the analysis and determined that it was acceptable. The results of the HRA are summarized below.

**Table 22 Revised Health Risk Assessment Results for LMEC[a]**

| Multi-pathway Carcinogenic Risk[a] (risk in one million) | Noncarcinogenic Chronic Hazard Index | Noncarcinogenic Acute Hazard Index[b] |
|---|---|---|
| 0.32[c]<br>0.20[d] | 0.01 | 0.08 |

[a]based upon 70 year exposure

[b]for information only; not required under current District Risk Management Policy

[c]sum of risk from gas turbines, auxiliary boiler, and cooling tower

[d]risk from fire pump diesel engine particulate emissions

As shown, the increased carcinogenic risk posed by the LMEC ($0.52/10^6$) is less than one in one million and the chronic hazard index is less than 1.0. In accordance with the District risk management policy, the impact on public health is not significant and the project is therefore acceptable.

Because the carcinogenic risk posed by the fire pump diesel engine is less than one in one million, the engine remains exempt from permit per Regulation 2-1-114.2.3.1.

## BACT ANALYSIS

The Los Medanos Energy Center will continue to satisfy the BACT requirement of NSR for $NO_x$, CO, $PM_{10}$, POC, and $SO_2$ by meeting the emission limitations established by permit condition #16676 in the FDOC.

## OFFSET ANALYSIS

**Table 23 Original Emission Offset Summary**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Calculated Facility Emissions[a] (ton/yr) | 154.8 | 488.1 | 97.61 | 121.91 | 34.02 |
| Facility Permit Limits (ton/yr) | 153.2 | 487.5 | 97.61 | 123.55 | 39.86 |
| Offsets Required | Yes | No | Yes | Yes | No |
| Offset Ratio | 1.15:1.0[b] | N/A | 1.15:1.0[b] | 1.0:1.0 | N/A |
| Offsets Required (tons) | **176.18** | **0** | **112.25** | **123.55** | **0** |
| Offsets Surrendered (tons) | **176.18** | **0** | **112.25** | **98.13** | **101.68[c]** |

[a]sum of S-1 CTG, S-2 HRSG, S-3 CTG, S-4 HRSG, and S-5 Auxiliary Boiler emissions

[b]pursuant to District Regulation 2-2-302, the applicant must provide emission offsets at a ratio of 1.15 to 1.0 since the proposed facility $NO_x$ and POC emissions from permitted sources will each exceed 50 tons per year

[c]LMEC provided 101.68 tons of $SO_2$ offsets to offset the outstanding 25.87 tons of $PM_{10}$ at a ratio of 4:1 pursuant to District Regulation 2-2-303.1

**Table 24 Revised Emission Offset Summary**

| | $NO_x$ | CO | POC | $PM_{10}$ | $SO_2$ |
|---|---|---|---|---|---|
| Calculated Facility Emissions[a] (ton/yr) | 175.64 | 507.36 | 33.8 | 131.6 | 47.11 |
| Facility Permit Limits (ton/yr) | 175.7 | 506.4 | 33.9 | 131.6 | 47.11 |
| Offsets Required | Yes | No | Yes | Yes | No |
| Offset Ratio | 1.15:1.0[b] | N/A | 1.0:1.0 | 1.0:1.0 | N/A |
| Offsets Required (tons) | **202.06** | **0** | **33.9** | **131.6** | **0** |
| Offsets Surrendered (tons) | **176.18** | **0** | **112.25** | **98.13** | **101.68[c]** |
| Outstanding Offsets Req'd | **25.88** | **0** | **(78.35)[d]** | **8.05** | **0** |
| Banking Certificate 659 | **0** | **0** | **0** | **0** | **30.4** |
| Banking Certificate 660 | **39.55** | **0** | **0** | **0** | **5.92** |

[a]sum of S-1 CTG, S-2 HRSG, S-3 CTG, S-4 HRSG, and S-5 Auxiliary Boiler emissions

[b]pursuant to District Regulation 2-2-302, the applicant must provide emission offsets at a ratio of 1.15 to 1.0 since the proposed facility $NO_x$ emissions from permitted sources will exceed 50 tons per year

[c]LMEC provided 101.68 tons of $SO_2$ offsets to offset 25.87 tons of $PM_{10}$ at a ratio of 4:1 pursuant to District Regulation 2-2-303.1

[d]POC offsets to be refunded to applicant based upon revised emission rates and permit condition limits

As indicated above, the outstanding $PM_{10}$ offset quantity required is calculated to be 131.6 – 98.13 – 101.68/4 = 8.05 tons of $PM_{10}$. This outstanding balance will be offset with 32.2 tons of $SO_2$ offsets at a ratio of 4 to 1 which will come from banking certificates 659 and 660. These certificates are owned by Calpine Construction Finance Co, L.P. and were derived from banking certificate 629 which originated from the shutdown of an Owens-Brockway glass plant located in Antioch.

Because the POC emission rates and corresponding enforceable permit condition limits have been revised downward to conform with current BACT specifications, 78.35 tons per year of POC offsets will be refunded to the applicant pursuant to Regulation 2-2-422.

## PSD IMPACT ANALYSIS

The applicant has performed a PSD impact analysis for the LMEC under the revised plant configuration and demonstrated through modeling that the project will not cause or contribute to an exceedance of any applicable ambient air quality standard. The impact analysis was reviewed and approved by Dr. Glen Long of the District Planning division. See attached summary (model2.doc) for further detail.

### Short-Term Impact Analysis

Permit condition 23 currently limits gas turbine start-up emission rates in pounds per hour and in pounds per start-up. Calpine has requested the removal of the lb/hr limits and the revision of the lb/start-up limits to those given in Table 4. To insure that the short-term impacts of the gas turbine under start-up conditions do not cause or contribute to an exceedance of the 1-hour CO and $NO_2$ ambient air quality standards, Calpine modeled the short-term (1-hour average) impacts under the following operating scenario:

- One turbine in start-up mode
  ($NO_x$ emission rate of 240 lb/hr and CO emission rate of 2,514 lb/hr)
- <u>One turbine operating at baseload</u>
- Auxiliary boiler operating at full load

Per CEC recommendations, the turbine stack characteristics corresponding to minimum load operation were used to approximate stack characteristics during a turbine start-up. The results of the modeling show that the short-term impacts during start-up will not cause or contribute to an exceedance of the 1-hour CO and 1-hour $NO_2$ ambient air quality standards. The short-term

impact analysis submitted by Calpine was reviewed and approved by Dr. Glen Long of the District Planning division.

**FEE SUMMARY**

| Source | Fee Schedule | Filing Fee | Initial Fee | Late Fee | Permit to Operate Fee | Source Sub-Total |
|---|---|---|---|---|---|---|
| **S-2 HRSG #1 Duct Burner** | C | $198.00 | $16,800.00 | $0.00 | $100.00 | $16,998.00 |
| **S-4 HRSG #2 Duct Burner** | C | $198.00 | $16,800.00 | $0.00 | $100.00 | $16,998.00 |
| **S-5 Auxiliary Boiler** | C | $198.00 | $17,920.00 | $0.00 | $100.00 | $18,118.00 |
| | | | | | **Grand Total** | **$52,114.00** |
| | | | | | **Amount Paid** | **$52,114.00** |
| | | | | | **Log Number** | **24109** |

**STATEMENT OF COMPLIANCE**

All statements of compliance made in the FDOC issued on June 10, 1999 remain in effect. Any changes to those statements resulting from the proposed modifications to the facility are described below.

The Los Medanos Energy Center will **not** be located within 1000 feet of the outer boundary of the nearest school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

A revised PSD impact analysis was submitted by the applicant to assess the impact resulting from the modified Los Medanos Energy Center and the addition of the fire pump diesel engine. As discussed in the attached summary prepared by Dr. Glen Long of the District Planning Division, the modified LMEC will not cause or contribute to an exceedance of any applicable state or federal air quality standard.

A Toxics Risk Screening Analysis was performed for the gas turbines, auxiliary boiler, fire pump diesel engine, and cooling tower for the compounds listed in Tables 17 through 21. As discussed earlier, the chronic hazard index was determined to be less than 1.0 and the increased carcinogenic risk was determined to be less than one in one million, over a 70-year exposure. Therefore, the public health risk posed by the modified LMEC is not significant and is therefore acceptable pursuant to the District Toxic Risk Management Policy.

Pursuant to Regulation 2-2-405, this authority to construct will be subject to a 30-day public comment period. Pursuant to Regulation 2-2-406, the information submitted by the applicant, the District's analysis, and the APCO's preliminary decision to grant the authority to construct will be made available for public inspection at District headquarters.

**PERMIT CONDITIONS**

Condition #16676 shall be modified as shown below:

## Pittsburg District Energy Facility

### *(xii) Permit Conditions*

**Definitions:**

| | |
|---|---|
| Clock Hour: | Any continuous 60-minute period beginning on the hour. |
| Calendar Day: | Any continuous 24-hour period beginning at 12:00 AM or 0000 hours. |
| Year: | Any consecutive twelve-month period of time |
| Heat Input: | All heat inputs refer to the heat input at the higher heating value (HHV) of the fuel, in BTU/scf. |
| Rolling 3-hour period: | Any three-hour period that begins on the hour and does not include start-up or shutdown periods. |
| Firing Hours: | Period of time during which fuel is flowing to a unit, measured in fifteen minute increments. |
| MM BTU: | million british thermal units |
| Gas Turbine Start-up Mode: | The lesser of the first 120 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 21(b) and 21(d). |
| Gas Turbine Shutdown Mode: | The lesser of the 30 minute period immediately prior to the termination of fuel flow to the Gas Turbine or the period of time from non-compliance with any requirement listed in Conditions 21(a) through 21(f) until termination of fuel flow to the Gas Turbine. |
| Auxiliary Boiler Start-up: | The lesser of the first 120 minutes of continuous fuel flow to an Auxiliary Boiler after fuel flow is initiated; or the period of time from fuel flow initiation until the Boiler achieves two consecutive CEM data points in compliance with the emission concentration limits of conditions 27(b) and 27(d). |
| Auxiliary Boiler Shutdown: | The lesser of the 30 minute period immediately prior the termination of fuel flow to the Auxiliary Boiler; or the period of time from non-compliance with any requirement listed in Conditions 27(a) through 27(d) until termination of fuel flow to the auxiliary boiler. |
| Specified PAHs: | The polycyclic aromatic hydrocarbons listed below shall be considered to Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds.<br>Benzo[a]anthracene<br>Benzo[b]fluoranthene |

Benzo[k]fluoranthene
Benzo[a]pyrene
Dibenzo[a,h]anthracene
Indeno[1,2,3-cd]pyrene

| | |
|---|---|
| Corrected Concentration: | The concentration of any pollutant (generally $NO_x$, CO, or $NH_3$) corrected to a standard stack gas oxygen concentration. For emission point P-1 (Gas Turbine S-1 and HRSG S-2) and emission point P-2 (Gas Turbine S-3 and HRSG S-4) the standard stack gas oxygen concentration is 15% $O_2$ by volume on a dry basis. For emission point P-3 (Auxiliary Boiler S-5), the standard stack gas oxygen concentration is 3% $O_2$ by volume on a dry basis. |
| Commissioning Activities: | All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the PDEF construction contractor to insure safe and reliable steady state operation of the gas turbines, heat recovery steam generators, steam turbine, auxiliary boiler, and associated electrical delivery systems. |
| Commissioning Period: | The Period shall commence when all mechanical, electrical, and control systems are installed and individual system start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The period shall terminate when the plant has completed performance testing, is available for commercial operation, and has initiated sales to the power exhange. |
| Precursor Organic Compounds (POCs): | Any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate |
| CEC CPM: | California Energy Commission Compliance Program Manager |

**Conditions for the Commissioning Period**

1. The owner/operator of the ~~Pittsburg District Energy Facility (PDEF)~~ **Los Medanos Energy Center (LMEC)** shall minimize emissions of carbon monoxide and nitrogen oxides from S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators (HRSG), and S-5 Auxiliary Boiler to the maximum extent possible during the commissioning period. Conditions 1 through 13 shall only apply during the commissioning period as defined above. Unless otherwise indicated, Conditions 14 through 51 shall apply after the commissioning period has ended.

2. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the combustors of S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators, and S-5 Auxiliary Boiler shall be tuned to minimize the emissions of carbon monoxide and nitrogen oxides.

3. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, A-1 & A-3 SCR Systems and A-2 & A-4 Oxidation Catalysts shall be installed, adjusted, and operated to minimize the emissions of

carbon monoxide and nitrogen oxides from S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators.

4. Coincident with the steady-state operation of A-1 & A-3 SCR Systems and A-2 & A-4 Oxidation Catalysts pursuant to conditions 3, 8, and 9, the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) shall comply with the $NO_x$ and CO emission limitations specified in conditions 21(a) through 21(d).

5. The owner/operator of the ~~PDEF~~ **LMEC** shall submit a plan to the District Permit Services Division and the CEC CPM at least four weeks prior to first firing of S-1 and S-3 Gas Turbines describing the procedures to be followed during the commissioning of the turbines, HRSGs, auxiliary boiler, and steam turbine. The plan shall include a description of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but not be limited to, the tuning of the Dry-Low-$NO_x$ combustors, the installation and operation of the SCR systems and oxidation catalysts, the installation, calibration, and testing of the CO and $NO_x$ continuous emission monitors, and any activities requiring the firing of S-1 and S-3 Gas Turbines and S-2 and S-4 HRSGs without abatement by the SCR Systems or oxidation catalysts.

6. During the commissioning period, the owner/operator of the ~~PDEF~~ **LMEC** shall demonstrate compliance with conditions 11 and 12 through the use of properly operated and maintained continuous emission monitors and recorders for the following parameters:

   firing hours
   fuel flow rates
   stack gas nitrogen oxide emission concentrations,
   stack gas carbon monoxide emission concentrations
   stack gas oxygen concentrations.

   The monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for S-1 and S-3 Gas Turbines, S-2 and S-4 HRSGs, and S-5 Auxiliary Boiler. The owner/operator shall use District-approved methods to calculate heat input rates, nitrogen oxide mass emission rates, carbon monoxide mass emission rates, and $NO_x$ and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to District personnel upon request.

7. The District-approved continuous monitors specified in condition 6 shall be installed, calibrated, and operational prior to first firing of S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators, and S-5 Auxiliary Boiler. After first firing of the turbines and auxiliary boiler, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of CO and $NO_x$ emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval.

8. The total number of firing hours of S-1 Gas Turbine and S-2 Heat Recovery Steam Generator without abatement of nitrogen oxide and carbon monoxide emissions by A-1 SCR System

   and A-2 Oxidation Catalyst shall not exceed 250 hours during the commissioning period. Such operation of S-1 Gas Turbine and S-2 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without SCR and oxidation catalysts in place. Upon completion of these activities, the owner/operator shall

provide written notice to the District Permit Services and Enforcement Divisions and the unused balance of the 250 firing hours without abatement shall expire.

9. The total number of firing hours of S-3 Gas Turbine and S-4 Heat Recovery Steam Generator without abatement of nitrogen oxide and carbon monoxide emissions by A-3 SCR System and A-4 Oxidation Catalyst shall not exceed 250 hours during the commissioning period. Such operation of S-3 Gas Turbine and S-4 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without SCR and oxidation catalysts in place. Upon completion of these activities, the owner/operator shall provide written notice to the District Permit Services and Enforcement Divisions and the unused balance of the 250 firing hours without abatement shall expire.

10. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, $PM_{10}$, and sulfur dioxide that are emitted by S-1, S-2, S-3, S-4, and S-5 during the commissioning period shall accrue towards the consecutive twelve month emission limits specified in condition 32.

11. Combined pollutant emissions from S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators shall not exceed the following limits during the commissioning period. These emission limits shall include emissions resulting from the start-up and shutdown of S-1 & S-3 Gas Turbines.

| | | |
|---|---|---|
| $NO_x$ (as $NO_2$) | ~~1,360~~ **3,511** pounds per calendar day | 616 pounds/hour |
| CO | ~~6,800~~ **10,848** pounds per calendar day | 5,053.8 pounds/hour |
| POC (as $CH_4$) | 720 pounds per calendar day | |
| $PM_{10}$ | 816 pounds per calendar day | |
| $SO_2$ | 268 pounds per calendar day | |

12. Pollutant emissions from S-5 Auxiliary Boiler shall not exceed the following limits during the commissioning period. These emission limits shall include emissions that occur during S-5 Auxiliary Boiler start-ups.

| | | |
|---|---|---|
| $NO_x$ (as $NO_2$) | ~~69.8~~ **268** pounds per calendar day | ~~2.91~~ **21** pounds per hour |
| CO | 233.8 pounds per calendar day | ~~9.74~~ **14** pounds per hour |
| POC (as $CH_4$) | ~~8.64~~ **16** pounds per calendar day | |
| $PM_{10}$ | ~~31~~ **60** pounds per calendar day | |
| $SO_2$ | ~~3.6~~ **8** pounds per calendar day | |

12. Prior to the end of the Commissioning Period, the Owner/Operator shall conduct a District and CEC approved source test using external continuous emission monitors to determine compliance with condition 23. The source test shall determine $NO_x$, CO, and POC emissions during start-up and shutdown of the gas turbines. The POC emissions shall be analyzed for methane and ethane to account for the presence of unburned natural gas. The source test shall include a minimum of three start-up and three shutdown periods. Twenty calendar days

before the execution of the source tests, the Owner/Operator shall submit to the District and the CEC Compliance Program Manager (CPM) a detailed source test plan designed to satisfy the requirements of this condition. The District and the CEC CPM will notify the Owner/Operator of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The Owner/Operator shall

incorporate the District and CEC CPM comments into the test plan. The Owner/Operator shall notify the District and the CEC CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CEC CPM within 30 days of the source testing date.

**Conditions for the Gas Turbines (S-1 & S-3) and the Heat Recovery Steam Generators (HRSGs) (S-2 & S-4).**

14. The Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall be fired exclusively on natural gas ~~with a maximum sulfur content of 1 grain per 100 standard cubic feet~~. (BACT for $SO_2$ and $PM_{10}$)

15. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed ~~2,012~~ **2,225.1** MM BTU per hour, averaged over any rolling 3-hour period. (PSD for $NO_x$)

16. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed ~~48,288~~ **50,738.4** MM BTU per calendar day. (PSD for $PM_{10}$)

17. The combined cumulative heat input rate for both Gas Turbines (S-1 and S-3) and both HRSGs (S-2 and S-4) shall not exceed ~~32,500,000~~ **34,010,400** MM BTU per year. (Offsets)

18. The HRSG duct burners shall not be fired unless its associated Gas Turbine is in operation. (BACT for $NO_x$, CO, POC)

19. The Gas Turbine (S-1) and HRSG (S-2) shall be abated by the properly operated and properly maintained Oxidizing Catalyst (~~A-1~~**A-2**) and Selective Catalytic Reduction System (~~A-2~~**A-1**), in series. (BACT for $NO_x$ and CO)

20. The Gas Turbine (S-3) and HRSG (S-4) shall be abated by the properly operated and properly maintained Oxidizing Catalyst (~~A-3~~**A-4**) and Selective Catalytic Reduction System (~~A-4~~**A-3**), in series. (BACT for $NO_x$ and CO)

21. The owner/operator of the Gas Turbines (S-1 and S-3) and HRSGs (S-2 and S-4) shall meet all of the requirements listed in (a) through ~~(f)~~**(h)** below, except during a Gas Turbine Start-up or a Gas Turbine Shutdown. (BACT, PSD, and Toxic Risk Management Policy)

    (a) Nitrogen oxide emissions at P-1 (the combined exhaust point for the S-1 Gas Turbine and the S-2 HRSG after control by the A-1 SCR System and A-2 Oxidation Catalyst) shall not exceed ~~17.5~~**20.0** pounds per hour, calculated as $NO_2$, nor 0.009 lbs/MM BTU of natural gas fired. Nitrogen oxide emissions at P-2 (the combined exhaust point for

    the S-3 Gas Turbine and the S-4 HRSG after control by the A-3 SCR System and A-4 Oxidation Catalyst) shall not exceed ~~17.5~~**20.0** pounds per hour, calculated as $NO_2$, nor 0.009 lbs/MM BTU of natural gas fired. (PSD for $NO_x$)

    (b) The nitrogen oxide concentration at P-1 and P-2 each shall not exceed 2.5 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any 1-hour period. (BACT for $NO_x$)

(c) Carbon monoxide emissions at P-1 and P-2 each shall not exceed ~~26.56~~**29.2** pounds per hour, ~~n~~or 0.0132 lb/MM BTU of natural gas fired. (PSD for CO)

(d) The carbon monoxide concentration at P-1 and P-2 each shall not exceed 6 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for CO)

(e) Ammonia ($NH_3$) emissions at P-1 and P-2 each shall not exceed 10 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous records of the ammonia injection rate to A-1 and ~~A-2~~**A-3** SCR Systems. The correlation between the gas turbine and HRSG heat input rates, A-1 and ~~A-2~~**A-3** SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1 and P-2 shall be determined in accordance with permit condition ~~37~~**38**. (TRMP for $NH_3$)

(f) Precursor organic compound (POC) emissions at P-1 and P-2 each shall not exceed ~~3.43~~**3.8** pounds per hour, nor 0.0017 lb/MM BTU of natural gas fired. (BACT)

**(g) Sulfur dioxide ($SO_2$) mass emissions at P-1 and P-2 each shall not exceed 6.2 pounds per hour or 0.00277 lb/MM BTU of natural gas fired. (BACT)**

**(h) Particulate matter ($PM_{10}$) mass emissions at P-1 and P-2 each shall not exceed 16.3 pounds per hour or 0.0073 lb/MM BTU of natural gas fired. (BACT)**

22. The following conditions shall apply to $NO_x$ emissions resulting from or attributable to transient, non-steady state operating conditions. (BACT for $NO_x$)

(a) CEM $NO_x$ emission concentration data points that result from or are attributable to transient, non-steady state conditions shall not be subject to the emission limitations specified in Condition 21(b). In any event, the nitrogen oxide concentration at P-1 and P-2 each shall not exceed 2.5 ppmv, corrected to 15% $O_2$, on a dry basis, averaged over any rolling 3-hour period. All CEM $NO_x$ emission concentration data points shall be utilized when determining compliance with this emission concentration limit.

(b) The emission limitation specified in Condition 22(a) shall be valid for a period not to exceed 24 months from the end of the Commissioning period. At such time the emission limitation specified in Condition 21(b) shall apply for all operating conditions except gas turbine start-up and shutdown periods, unless specific transient, non-steady state conditions are identified pursuant to conditions 22(f) and (g).

(c) Definitions

A transient, non-steady state condition shall occur when the following conditions exist:

1) One or more equipment design features is unable to support rapid changes in operation and respond to and adjust all operating parameters required to maintain the steady-state NOx emission limit specified in condition 21(b). A change in operation shall be limited to one or more of the following: a change in combustion turbine load greater than 6 MW/minute; a change in SCR system space velocity greater than 50 ft/minute; initiation/shutdown of the evaporative cooler; initiation/shutdown of the duct burners; and a change in duct burner firing rate greater than 600,000 BTU/minute. Additional non-steady state conditions may be defined based upon operational experience and mutual written agreement of the owner/operator, the District, ARB, and EPA.
2) For purposed of this condition, transient, non-steady state conditions shall not include the start-up and shutdown periods that are the subject of condition 23.

(d) The owner/operator shall maintain continuous emission monitor (CEM) data and complete records of plant emission performance under transient, non-steady state conditions. The owner/operator shall record the $NO_x$ emission concentration and document the cause of each transient, non-steady state condition with operational data. A description of the specific parameters that will be monitored to document a transient, non-steady state condition shall be submitted to the District, ARB, and EPA for approval at least 60 days prior to the end of the Commissioning period.

(e) Within 6 months of the end of the Commissioning period, the owner/operator shall compile and submit source test data, using a District-approved test protocol, to assess $NO_x$ emissions under transient, non-steady state conditions. A source test protocol shall be submitted to the District and EPA for approval at least 60 days prior to testing.

(f) Within 15 months of the end of the Commissioning period, the owner/operator shall submit a plan to the District and EPA designed to minimize emissions during transient, non-steady state conditions. The plan shall identify reasonable measures that will be taken to control $NO_x$ emissions. This plan shall be based upon the CEM and source test data developed in accordance with condition 22(e) and actual operating experience during the preceding months of plant operation. The plan shall be developed in consultation with the manufacturers selected for the gas turbine, HRSG, control systems, and air pollution control units. After the plan has been approved by the District and EPA, the owner/operator shall use the procedures described in the plan to minimize $NO_x$ emissions during transient, non-steady state conditions.

(g) On a semi-annual basis, for the first 24 months after the end of the Commissioning period, the owner/operator shall provide a report to the District with continuous emission monitoring and source test data developed in accordance with this condition. The District will use the data and related operating experience to establish maximum $NO_x$ emission limits for transient, non-steady state conditions for the following 6 month period. The District will consider operations at similar (e.g., electrical generation and fuel-type) facilities in determining the revised emission limits. In no

event shall the $NO_x$ emission limits established pursuant to section (g) be less than the $NO_x$ emission limits specified in Condition 21(b). In addition, if appropriate, on a

semi-annual basis the district will use all data and related operating experience to establish (i) a revised definition of transient, non-steady state conditions to which the $NO_x$ emission limitations established pursuant to this section (g) shall apply, and (ii) the data collection and recordkeeping requirements that the owner/operator shall use to document the occurrence of transient non-steady state conditions.

23. The pollutant emission rates from each of the Gas Turbines (S-1 and S-3) during a start-up or shutdown shall not exceed the limits established below. ~~These limits apply to any 60-minute period, not a three-hour average.~~ (PSD)

| | ~~Start-Up (lbs/hr)~~ | ~~Shutdown (lbs/hr)~~ |
|---|---|---|
| ~~Oxides of Nitrogen (as $NO_2$)~~ | ~~223~~ | ~~58~~ |
| ~~Carbon Monoxide (CO)~~ | ~~1821~~ | ~~238~~ |
| ~~Precursor Organic Compounds (as $CH_4$)~~ | ~~239~~ | ~~253~~ |

| | Start-Up (lb/start-up) | Shutdown (lb/shutdown) |
|---|---|---|
| Oxides of Nitrogen (as $NO_2$) | 240 | 20 |
| Carbon Monoxide (CO) | 2,514 | 44.1 |
| Precursor Organic Compounds (as $CH_4$) | 48 | 8 |

Within three months of the end of the Commissioning period, the owner/operator shall submit a plan designed to minimize emissions during the transient conditions encountered during gas turbine start-ups and shutdowns. This plan shall indicate what steps will be taken to start controlling $NO_x$ emissions as soon as feasible, including when ammonia can be fed to the SCR system without producing ammonia slip in excess of 10 ppmvd @ 15% $O_2$. This plan shall be based upon the experience gathered from the source tests performed per condition #13 and actual operating experience gained during the first six-months of operation. This plan shall also be developed in consultation with the manufacturers of the gas turbines, HRSGs, control systems, and air pollution control units. This plan shall be submitted to the CEC CPM for approval. After the plan has been approved, the owner/operator shall use the procedures included in the plan to minimize $NO_x$ emissions during gas turbine start-ups and shutdowns.

Within 24 months of the end of the Commissioning period, the owner/operator shall submit a report to the District and the CEC CPM that establishes reasonable maximum hourly mass emission rates for start-up and shutdown conditions. The revised mass emission rates shall be based upon source test and continuous emission monitoring data. Pending approval of the District and the CEC CPM, these revised mass emission rates shall be established as new emission limitations that will supersede the limits included in this condition.

24. The Gas Turbines (S-1 and S-3) shall not be in start-up mode simultaneously. (PSD)

**Conditions for the Auxiliary Boiler (S-5)**

25. The Auxiliary Boiler (S-5) shall be fired exclusively on natural gas. ~~with a maximum sulfur content of 1 grain per 100 standard cubic feet.~~ (BACT for $SO_2$ and $PM_{10}$)

26. The heat input rate to the Auxiliary Boiler (S-5) shall not exceed ~~266~~**320** million BTU per hour, averaged over any rolling 3-hour period. (Cumulative Increase)

27. The cumulative heat input rate to the Auxiliary Boiler (S-5) shall not exceed ~~399,000~~**480,000** million BTU per year. (Cumulative Increase)

28. The owner/operator of the Auxiliary Boiler (S-5) shall meet all of the requirements listed in (a) through ~~(d)~~**(g)** below, except during an Auxiliary Boiler Start-up or an Auxiliary Boiler Shutdown. (BACT, PSD)

    (a) Nitrogen oxide emissions at P-3 (the exhaust point for the Auxiliary Boiler) shall not exceed ~~2.9~~**3.5** pounds per hour, calculated as $NO_2$. (PSD for $NO_x$)

    (b) The nitrogen oxide concentration at P-3 shall not exceed 9.0 ppmv, measured as $NO_x$, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for $NO_x$)

    (c) Carbon monoxide emissions at P-3 shall not exceed ~~9.8~~**11.8** pounds per hour. (PSD for CO)

(d) The carbon monoxide concentration at P-3 shall not exceed 50 ppmv, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. (BACT for CO)

    (e) Precursor organic compound (POC) emissions at P-3 shall not exceed 0.36 pounds per hour. **(cumulative increase)**

    **(f) Sulfur dioxide ($SO_2$) mass emissions at P-3 shall not exceed 0.5 pounds per hour. (cumulative increase)**

    **(g) Particulate matter ($PM_{10}$) mass emissions at P-3 shall not exceed 1.6 pounds per hour. (cumulative increase)**

    **(h) Ammonia ($NH_3$) emissions at P-3 shall not exceed 10 ppmv, corrected to 3% $O_2$, on a dry basis, averaged over any rolling 3-hour period. This ammonia concentration shall be verified by the continuous recording of the ammonia injection rate at the A-5 SCR System. The correlation between the auxiliary boiler heat input rate, A-5 SCR System ammonia injection rate, and corresponding ammonia emission concentration at P-3 shall be determined in accordance with permit condition 38. (TRMP)**

29. The Auxiliary Boiler (S-5), its burners, combustion chamber, and exhaust system shall be designed and constructed so that the boiler can be retrofitted with ~~an SCR system and/or~~ an oxidizing catalyst in the event the Auxiliary Boiler cannot consistently comply with the emission limitations specified in condition 28. (BACT for ~~$NO_x$ and~~ CO)

**Conditions for All Sources**
**(S-1, S-2, S-3, S-4, and S-5)**

30. The combined heat input rate to the Gas Turbines (S-1 and S-3), HRSGs (S-2 and S-4), and Auxiliary Boiler (S-5) shall not exceed ~~102,960~~**109,157** million BTU per calendar day. (PSD, CEC Offsets)

31. The cumulative heat input rate to the Gas Turbines (S-1 and S-3), HRSGs (S-2 and S-4), and Auxiliary Boiler (S-5) combined shall not exceed ~~32,900,000~~**34,490,400** million BTU per year. (Offsets)

32. Total combined emissions from the Gas Turbines, HRSGs, and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine Start-ups, Gas Turbine Shutdowns, Auxiliary Boiler Start-ups, and Auxiliary Boiler Shutdowns, shall not exceed the following limits during any calendar day:

| | | |
|---|---|---|
| (a) | ~~1190~~**1,342** pounds of $NO_x$ (as $NO_2$) per day | (CEQA) |
| (b) | ~~5224~~**6,445** pounds of CO per day | (PSD) |
| (c) | ~~892~~**271.3** pounds of POC (as $CH_4$) per day | (CEQA) |
| (d) | ~~842~~**742** pounds of $PM_{10}$ per day | (PSD) |
| (e) | ~~272.4~~**282.6** pounds of $SO_2$ per day | (BACT) |

During days with two cold start-ups (the Gas Turbines have been out of service for more than 72 hours) daily combined $NO_x$ emissions (as $NO_2$) from the Gas Turbines, HRSGs, and Auxiliary Boiler (S-1, S-2, S-3, S-4, and S-5) shall not exceed 1330 pounds per day. The number of days where the combined $NO_x$ emissions are greater 1190 lb/day and less than 1330 lb/day shall be limited to 10 per consecutive twelve month period.

33. Cumulative emissions from the Gas Turbines, HRSGs, and the Auxiliary Boiler combined (S-1, S-2, S-3, S-4, and S-5), including emissions generated during Gas Turbine Start-ups, **and** Gas Turbine Shutdowns, ~~Auxiliary Boiler Start-ups, and Auxiliary Boiler Shutdowns,~~ shall not exceed the following limits during any consecutive twelve-month period:

(a) ~~153.2~~**175.7** tons of $NO_x$ (as $NO_2$) per year (Offsets, PSD)

| | | |
|---|---|---|
| (b) | ~~487.5~~**506.4** tons of CO per year | (Cumulative Increase) |
| (c) | ~~97.61~~**33.9** tons of POC (as $CH_4$) per year | (Offsets) |
| (d) | ~~123.55~~**131.6** tons of $PM_{10}$ per year | (Offsets, PSD) |
| (e) | ~~39.86~~**47.11** tons of $SO_2$ per year | (Cumulative Increase) |

34. The maximum projected annual toxic air contaminant emissions from the Gas Turbines, HRSGs, and the Auxiliary Boiler combined (S-1, S-2, S-3, S-4, and S-5) shall not exceed the following limits:

(a) ~~3,668~~**3,817** pounds of formaldehyde per year
(b) ~~441.7~~**460.9** pounds of benzene per year
(c) ~~76.2~~**78.5** pounds of Specified polycyclic aromatic hydrocarbons (PAHs) per year

unless the owner/operator meets the requirements of (d), (e), and (f) below:

(d) The owner/operator shall perform a health risk assessment using the emission rates determined by source test and the most current Bay Area Air Quality Management District (District) approved procedures and unit risk factors in effect at the time of the analysis. The calculated excess cancer risk shall not exceed 1.0 in one million.

(e) The owner/operator shall perform a second risk analysis using the emission rates determined by source test and the procedures and unit risk factors in effect when the Determination of Compliance was issued. The calculated excess cancer risk shall not exceed 1.0 in one million.

(f) Both of these risk analyses shall be submitted to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will satisfy the conditions stated in parts (d) and (e) above, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (TRMP)

35. The owner/operator shall demonstrate compliance with conditions 15 through 18, 21(a) through 21(d), 23, 24, 26, 28(a) through 28(d), 32(a), 32(b), 33(a), and 33(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment Start-up and Shutdown periods) for all of the following parameters:

(a) Firing Hours and Fuel Flow Rates for each of the following sources: S-1 and S-2 combined, S-3 and S-4 combined, and S-5.

(b) Oxygen ($O_2$) Concentrations, Nitrogen Oxides ($NO_x$) Concentrations, and Carbon Monoxide (CO) Concentrations at each of the following exhaust points: P-1, P-2 and P-3.

(c) Ammonia injection rate at A-1 and ~~A-2~~**A-3** SCR Systems

The owner/operator shall record all of the above parameters every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total Firing Hours, the average hourly Fuel Flow Rates, and pollutant emission concentrations.

The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

(c) Heat Input Rate for each of the following sources: S-1 and S-2 combined, S-3 and S-4 combined, and S-5.

(d) Corrected $NO_x$ concentrations, $NO_x$ mass emissions (as $NO_2$), corrected CO concentrations, and CO mass emissions at each of the following exhaust points: P-1, P-2, and P-3.

For each source, source grouping, or exhaust point, the owner/operator shall record the parameters specified in conditions 35(c) and 35(d) at least once every 15 minutes (excluding normal calibration periods). As specified below, the owner/operator shall calculate and record the following data:

(e) total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.

(f) on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and associated HRSG combined, the Auxiliary Boiler, and all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(g) the average $NO_x$ mass emissions (as $NO_2$), CO mass emissions, and corrected $NO_x$ and CO emission concentrations for every clock hour and for every rolling 3-hour period.

(h) on an hourly basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine and associated HRSG combined, the Auxiliary Boiler, and all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(i) For each calendar day, the average hourly Heat Input Rates, Corrected $NO_x$ emission concentrations, $NO_x$ mass emissions (as $NO_2$), corrected CO emission concentrations,

and CO mass emissions for each Gas Turbine and associated HRSG combined and the Auxiliary Boiler.

(j) on a daily basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and cumulative total CO mass emissions, for each calendar year for all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(1-520.1, 9-9-501, BACT, Offsets, NSPS, PSD, Cumulative Increase)

36. To demonstrate compliance with conditions 23, 32(c) through 32(e), and 33(c) through 33(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter ($PM_{10}$) mass emissions (including condensable particulate matter), and Sulfur Dioxide ($SO_2$) mass emissions from each power train and the auxiliary boiler. The owner/operator shall use the actual Heat Input Rates calculated pursuant to condition 35, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:

(a) For each calendar day, POC, $PM_{10}$, and $SO_2$ Emissions shall be summarized for: each power train (Gas Turbine and its respective HRSG combined); the Auxiliary Boiler; and the five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(b) on a daily basis, the cumulative total POC, $PM_{10}$, and $SO_2$ mass emissions, for each year for all five sources (S-1, S-2, S-3, S-4, and S-5) combined.

(Offsets, PSD, Cumulative Increase)

37. To demonstrate compliance with Condition 34, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Formaldehyde, Benzene, and Specified PAH's. Maximum projected annual emissions shall be calculated using the maximum Heat Input Rate of ~~32,912,920~~**39,390,400** MM BTU/year and the highest emission factor (pounds of pollutant per MM BTU of Heat Input) determined by any source test at the Gas Turbine, HRSG, or Auxiliary Boiler. (TRMP)

38. Within 60 days of start-up of the ~~PDEF~~**LMEC**, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 **and P-3** to determine the corrected ammonia ($NH_3$) emission concentration to determine compliance with condition 21(e) **and 27(g)**. The source test shall determine the correlation between the heat input rates of the gas turbine and associated HRSG, A-1 or ~~A-2~~**A-3** SCR System ammonia injection rate, and the corresponding $NH_3$ emission concentration at emission point P-1 or P-2 **and the correlation between the heat input rate of the auxiliary boiler, A-5 SCR System ammonia injection rate, and the corresponding $NH_3$ emission concentration at emission point P-3**. The source test shall be conducted over the expected operating range of the turbine (at a minimum, 60%, 80%, and 100% load) to establish the range of ammonia injection rates necessary to achieve $NO_x$ emission reductions while maintaining ammonia slip levels. Continuing compliance with condition 21(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate. (TRMP)

39. Within 60 days of start-up of the ~~PDEF~~**LMEC** and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1 and P-2 while each Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum load to determine compliance with Conditions 21(a), (b), (c), (d), ~~&~~ (f)**, (g), & (h)**

and while each Gas Turbine and associated Heat Recovery Steam Generator are operating at minimum load to determine compliance with Conditions 21(c), (d), & (f) and to verify the accuracy of the continuous emission monitors required in condition 35. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and emissions, methane, ethane, and particulate matter ($PM_{10}$) emissions including condensable particulate matter. (BACT, offsets)

40. Within 60 days of start-up of the ~~PDEF~~**LMEC** and on an annual basis thereafter, the owner/operator shall conduct a District approved source test on exhaust point P-3 while the Auxiliary Boiler (S-5) is operating at maximum allowable operating rates to determine compliance with the emission limitations of Condition 28(a) through 28(d) and to verify the accuracy of the continuous emission monitors required in condition 35. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and emissions, and particulate matter ($PM_{10}$) emissions including condensable particulate matter. (BACT, offsets)

41. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CEC CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the Owner/Operator shall measure the contribution of condensable PM (back half) to the total $PM_{10}$ emissions. However, the Owner/Operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. Source test results shall be submitted to the District and the CEC CPM within 30 days of conducting the tests. (BACT)

42. Within 60 days of start-up of the ~~PDEF~~**LMEC** and on an biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 while the Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum allowable operating rates to demonstrate compliance with Condition 34. Unless the requirements of condition 42(b) have been met, the owner/operator shall determine the formaldehyde, benzene, and Specified PAH emission rates (in pounds/MM BTU). If any of the above pollutants are not detected (below the analytical detection limit), the emission concentration for that pollutant shall be deemed to be one half (50%) of the detection limit concentration. (TRMP)

    (a) The owner/operator shall calculate the maximum projected annual emission rate for each pollutant by multiplying the pollutant emission rate (in pounds/MM BTU; determined by source testing) by ~~32,912,920~~**34,490,400** MM BTU/year.

    (b) If three consecutive biennial source tests demonstrate that the emission rates calculated pursuant to part (a) for any of the compounds listed below are less than the annual emission rates shown, then the owner/operator may discontinue future testing for that pollutant:

| | | |
|---|---|---|
| Benzene | ≤ | 221 pounds/year |
| Formaldehyde | ≤ | 1,834 pounds/year |

Specified PAH's ≤ 38 pounds/year

(TRMP)

43. The owner/operator shall submit all reports (including, but not limited to monthly CEM reports, monitor breakdown reports, emission excess reports, equipment breakdown reports, etc.) as required by District Rules or Regulations and in accordance with all procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual. (Regulation 2-6-502)

44. The owner/operator shall maintain all records and reports on site for a minimum of 5 years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emissions, monitor excesses, breakdowns, etc.), source test and analytical records, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Regulation 2-6-501)

45. The owner/operator shall notify the District and the CEC CPM of any violations of these permit conditions. Notification shall be submitted in a timely manner, in accordance with all applicable District Rules, Regulations, and the Manual of Procedures. Not withstanding the notification and reporting requirements given in any District Rule, Regulation, or the Manual of Procedures, the owner/operator shall submit written notification (facsimile is acceptable) to the Enforcement Division within 96 hours of the violation of any permit condition. (Regulation 2-1-403)

46. The stack heights of the emission points P-1 and P-2 shall be at least 150 feet above mean sea level (approximately 138.8 feet above grade level at the stack base). The stack height of the emission point P-3 shall be at least 100.6 feet above mean sea level (approximately 88.6 feet above grade level at the stack base). (PSD, TRMP)

47. The Owner/Operator of ~~PDEF~~**LMEC** shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall be subject to BAAQMD review and approval. (Regulation 1-501)

48. Within 180 days of the issuance of the Authority to Construct, the Owner/Operator shall contact the BAAQMD Technical Services Division regarding requirements for the continuous monitors, sampling ports, platforms, and source tests required by Conditions 38, 39, 40, and 42. All source testing and monitoring shall be conducted in accordance with the BAAQMD Manual of Procedures. (Regulation 1-501)

49. Prior to the issuance of the BAAQMD Authority to Construct for the ~~Pittsburg District Energy Facility~~**Los Medanos Energy Center**, the Owner/Operator shall demonstrate that valid emission reduction credits in the amount of ~~176.18~~**25.88** tons/year of Nitrogen Oxides, ~~112.25 tons/year of Precursor Organic Compounds,~~ and ~~123.55~~**8.05** tons/year of $PM_{10}$ or equivalent as defined by District Regulations 2-2-302.1, 2-2-302.2, and 2-2-303.1 are under their control through option to purchase contracts or equivalent binding legal documents. (Offsets)

50. Prior to the issuance of the BAAQMD Permit to Operate for the Pittsburg District Energy Facility, the Owner/Operator shall provide emission reduction credits in the amount of

~~176.18~~**25.88** tons/year of Nitrogen Oxides, ~~112.25 tons/year of Precursor Organic Compounds,~~ and ~~123.55~~**8.05** tons/year of $PM_{10}$ or equivalent as defined by District Regulations 2-2-302.1, 2-2-302.2, and 2-2-303.1. (Offsets)

51. Pursuant to BAAQMD Regulation 2, Rule 6, section 404.1, the owner/operator of ~~PDEF~~**LMEC** shall submit an application to the District for a Federal (Title V) Operating Permit within 12 months of the date of issuance of the BAAQMD Permit to Operate for the ~~PDEF~~**LMEC**. (Regulation 2-6-404.1)

52. The heat input to the fire pump diesel engine resulting from maintenance and testing activities shall not exceed 211 MM BTU totaled over any consecutive twelve month period. (TRMP)

**RECOMMENDATION**

- Issue a **modifed, conditional Authority to Construct** for the following sources:

**S-1 Combustion Gas Turbine #1, General Electric Frame 7FA Model PG 7241 or equivalent; 1,925.1 MM BTU per hour (HHV), equipped with dry low-$NO_x$ Combustors, abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst**

**S-2 Heat Recovery Steam Generator #1, equipped with dry low-$NO_x$ Duct Burners, 333 MM BTU per hour (HHV), abated by A-1 Selective Catalytic Reduction System and A-2 Oxidation Catalyst**

**S-3 Combustion Gas Turbine #2, General Electric Frame 7FA Model PG 7241 or equivalent; 1,925.1 MM BTU per hour (HHV), equipped with dry low-$NO_x$ Combustors, abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst**

**S-4 Heat Recovery Steam Generator #2, equipped with dry low-$NO_x$ Duct Burners, 333 MM BTU per hour (HHV), abated by A-3 Selective Catalytic Reduction System and A-4 Oxidation Catalyst**

**S-5 Auxiliary Steam Boiler, 320 MM BTU per hour (HHV), equipped with low-$NO_x$ burners, abated by A-5 Selective Catalytic Reduction System**

- Issue a **letter of exemption** for the following equipment:

***Fire Pump Diesel Engine, Cummins Model 6CTA8.3-F3; 300 bhp, 2.11 MM BTU/hr heat input***

**(exempt per Regulation 2-1-114.2.3.1)**

***Emergency Generator, Caterpillar Model G3512 90 LE, natural gas fired, 600 KW, 6.44 MM BTUhr heat input***

**(exempt per Regulation 2-1-114.2.3.1)**

**8-Cell Cooling Tower**

**(exempt per Regulation 2-1-128.4)**

- Issue a **banking certificate** in the amount of **78.35 tons per year of POC** emission reduction credits to Calpine Corporation.

**By:** _____ _____

**Air Quality Engineer II** **Date**

# APPENDIX C
# APPLICATION 9497

**Los Medanos Energy Center; Plant #11866**
**750 East Third Street, Pittsburg CA 94565**
**Application 9497**

## BACKGROUND

The Los Medanos Energy Center (LMEC) is applying for a permit to operate for the following equipment:

S-7 Natural-Gas Fired Emergency Generator, Waukesha Model VGF 36GL, Turbocharged, Intercooled, Lean-Burn Internal Combustion Engine, 2197 cubic inch displacement, 925 bhp, 7.1 MM BTU/hr

The engine will be operated to generate electricity for the LMEC when all of the gas turbines are down for maintenance and electricity is not available from PG&E. Because the engines arrived on site prior to September 1, 2001, they are not subject to New Source Review. However, they are subject to the District TRMP since they were brought on site after May 17, 2000.

## CRITERIA-POLLUTANT EMISSION SUMMARY

### Annual Average Project Emissions Increase:

| Pollutant | lb/day | ton/yr |
|---|---|---|
| POC | 0 | 0 |
| $NO_x$ | 0 | 0 |
| $SO_2$ | 0 | 0 |
| CO | 0 | 0 |
| $PM_{10}$ | 0 | 0 |
| NPOC | 0 | 0 |

## EMISSION CALCULATIONS

### S-7 Natural Gas Fired IC Engine

Because the engine was on site prior to September 1, 2001 but after May 17, 2000, the criteria-pollutant emissions are not calculated. However, the maximum TAC emissions are estimated for the purposes of the TRMP.

See attached spreadsheet from applicant for TAC emission calculations.

## FACILITY CUMULATIVE INCREASE
(since April 5, 1991)

Not applicable

### TOXIC RISK SCREENING ANALYSIS

See attached spreadsheet for TAC emission rates. Because none of the estimated emission rates for the TACs listed exceeded their respective risk screening trigger levels, a health risk assessment is not required.

## BACT/OFFSET ANALYSIS

Not applicable

### FEE SUMMARY

| Source | Fee Schedule | Filing Fee | Initial Fee | Late Fee | Permit to Operate Fee | Source Sub-Total |
|---|---|---|---|---|---|---|
| **S-7 Natural Gas IC Engine** | B | $0.00 | $0.00 | $0.00 | $384.00 | $384.00 |
| | | | | | **Grand Total** | **$384.00** |
| | | | | | **Amount Paid** | **$384.00** |
| | | | | | **Log Number** | **J697S** |

## STATEMENT OF COMPLIANCE

**S-7 Natural Gas Fired, Lean-Burn IC Engine** is expected to comply with Regulation 9, Rule 8 section 301.1 with $NO_x$ emissions of less than 56 ppmv @ 15% $O_2$, dry and section 301.3 with CO emissions of less than 2000 ppmv @ 15% $O_2$, dry.

**S-7 Natural Gas Fired, Lean-Burn IC Engine** is subject to the $SO_2$ limitations of 9-1-301 (ground-level concentration) and 9-1-302 (General Emission Limitation). Compliance with both of these requirements is considered very likely since they will be fired exclusively with utility-grade natural gas with a maximum sulfur content of 1 gr/100 scf.

This project is considered to be **ministerial** under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors as outlined in the District Permit Handbook (**chapter 2.3, Internal Combustion Engines)** and therefore is not considered discretionary as defined by CEQA.

The LMEC facility is not located within 1000 feet of the outer boundary of a K-12 school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

As discussed above, a Toxics Risk Screening Analysis was not required due to the emission of the toxic air contaminants listed above. TBACT does not apply.

Offsets, BACT, PSD, NSPS, and NESHAPS do not apply to this project.

## PERMIT CONDITIONS

### Conditions for S-7

1) Hours of Operation: The owner/operator shall operate the emergency standby engine(s) only to mitigate emergency conditions or for reliability-related activities. Operation of the engine for the purpose of mitigating emergency conditions is unlimited. Operation of the engine for the purpose of reliability-related activities is limited to 100 hours per calendar year. [Basis: Regulation 9-8-330]

**"Emergency Conditions" are defined as any of the following:**

**a. Loss of regular natural gas supply**
**b. Failure of regular electric power supply**
**c. Flood mitigation**
**d. Sewage overflow mitigation**
**e. Fire**
**f. Failure of a primary motor, but only for such time as needed to repair or replace the primary motor**
**[Basis: Regulation 9-8-231]**

**"Reliability-related activities" are defined as any of the following:**

**a. Operation of an emergency standby engine to test its ability to perform for an emergency use, or**
**b. Operation of an emergency standby engine during maintenance of a primary motor.**
**[Basis: Regulation 9-8-232]**

**2) The owner/operator shall equip the emergency standby engine with either:**

**a. a non-resettable totalizing meter that measures the hours of operation for the engine; or**
**b. a non-resettable fuel usage meter, the maximum hourly fuel rate shall be used to convert fuel usage to hours of operation.**
**[Basis: Regulation 9-8-530]**

**3) Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 2 years and shall make the log available for District inspection upon request:**

**a. Hours of operation (total)**
**b. Hours of operation (emergency)**
**c. For each emergency, the nature of the emergency condition**
**d. Fuel usage for engine(s) if a non-resettable fuel usage meter is utilized**
**[Basis: Regulations 9-8-530 and 1-441]**

## RECOMMENDATION

Issue a **conditional Permit to Operate** for the following source:

S-7 Natural-Gas Fired Emergency Generator, Waukesha Model VGF36GL, Turbocharged, Intercooled, Lean-Burn Internal Combustion Engine, 2197 cubic inch displacement, 925 bhp, 7.1 MM BTU/hr

## EXEMPT SOURCES

None

**By:** _____ _____

**Air Quality Engineer II** **Date**

# APPENDIX D

# APPLICATION 4227

**Los Medanos Energy Center, LLC; Plant #11866**
**750 East 3rd Street, Pittsburg CA 94565**
**Application 4227**

## BACKGROUND

Los Medanos Energy Center submitted this application for a permit to operate a fire pump diesel engine in response to the recent amendments to the diesel engine exclusions and exemptions. The engine was installed in April of 2000. The engine was originally exempt from permit under the original application (#18595) for the Los Medanos Energy Center. Therefore, the engine is considered a loss of exemption source. Accordingly, the engine is not subject to New Source Review requirements (BACT, cumulative increase, offsets, toxic review, or public notification requirements triggered by proximity to a K-12 school.)

In accordance with current District policy, the operation of each engine will be limited to no more than 100 hr/yr for "discretionary use" (maintenance and testing). The operation of the engines to provide power during emergencies will not be limited.

## CRITERIA-POLLUTANT EMISSION SUMMARY

**Annual Average Project Emissions Increase:**

| Pollutant | lb/day | ton/yr |
|---|---|---|
| POC | 0 | 0 |
| $NO_x$ | 0 | 0 |
| $SO_2$ | 0 | 0 |
| CO | 0 | 0 |
| $PM_{10}$ | 0 | 0 |
| NPOC | 0 | 0 |

## EMISSION CALCULATIONS

See attached spreadsheet; engine emission factors are from Cummins, the engine manufacturer.

## FACILITY CUMULATIVE INCREASE
(since April 5, 1991)

Not applicable

## TOXIC RISK SCREENING ANALYSIS

Not applicable

## BACT/OFFSET ANALYSIS

Not applicable

**FEE SUMMARY**

| Source | Fee Schedule | Filing Fee | Initial Fee | Late Fee | Permit to Operate Fee | Source Sub-Total |
|---|---|---|---|---|---|---|
| S-6 Fire Pump Diesel Engine, 300 bhp | B | $0.00 | $0.00 | $0.00 | $132.00 | $132.00 |
| | | | | | **Grand Total** | **$132.00** |
| | | | | | **Amount Paid** | **$132.00** |
| | | | | | **Log Number** | **H277Y** |

**STATEMENT OF COMPLIANCE**

*S-6 Fire Pump Diesel engine* ***is fired with liquid fuel and therefore is not subject to Regulation 9, Rule 8 ("NOx and CO from Stationary Internal Combustion Engines"). The engine is subject to the SO2 limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). Compliance with both of these requirements is expected since diesel fuel with a 0.05% by weight sulfur is mandated for use in California. Like all sources, the engine is subject to Regulation 6 ("Particulate and Visible Emissions"). The engine is not expected to produce visible emissions or fallout in violation of this regulation and they will be assumed to be in compliance with Regulation 6 pending a regular inspection.***

This project is considered to be **ministerial** under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors as outlined in the District Permit Handbook (**chapter 2.3, Internal Combustion Engines)** and therefore is not considered discretionary as defined by CEQA.

***The public notification requirements of Regulation 2-1-412 are applicable only to the issuance of Authorities to Construct and Permits to Operate for new and modified sources and do not apply to these "loss of exclusion" sources.***

A Toxics Risk Screening Analysis is not required for this “loss of exclusion/exemption” source.

BACT, Offsets, PSD, NSPS, and NESHAPS do not apply to this project.

**PERMIT CONDITIONS**

**Conditions for S-6**

1) The S-6 engine is subject to the requirements of Regulation 9, Rule 1 ("Sulfur Dioxide"), and the requirements of Regulation 6 ("Particulate and Visible Emissions"). These engines may be subject to other District regulations, including

Regulation 9, Rule 8 ("NOx and CO from Stationary Internal Combustion Engines") in the future. [basis: Regulation 9, Rule 1; Regulation 6]

**2) The S-6 engine shall be operated for no more than 100 hours in any consecutive 12 month period for the purpose of reliability-related activities as defined in Regulation 9-8-232. [basis: Regulation 9-8-330.2]**

**3) The S-6 engine may be operated for an unlimited amount of time for the purpose of emergency use as defined in Regulation 9-8-231. [basis: Regulation 9-8-330.1]**

**4) The S-6 engine shall be equipped with a non-resettable totalizing counter which records hours of operation for each engine. [basis: Recordkeeping]**

**5) The following monthly records shall be maintained in a District-approved log for at least 2 years and shall be made available to the District upon request:**

**a) hours of operation for reliability-related activities for S-6 on an individual basis and a description of the activity**
**b) hours of operation under emergency conditions for S-6 on an individual basis and a description of the nature of the emergency condition**
**c) fuel usage at S-6 on an individual basis**
**[basis: Recordkeeping]**

## RECOMMENDATION

Issue a **conditional Permit to Operate** for the following source:

**S-6 Fire Pump Diesel Engine, Cummins Model 6CTA8.3-F3; 300 bhp**

## EXEMPT SOURCES

**None**

**By:** _____ _____

**Air Quality Engineer II** **Date**