

# **Preliminary Determination of Compliance**

## **Pico Power Plant**

Silicon Valley Power  
City of Santa Clara

Bay Area Air Quality Management District  
Application 6481, Plant 14991

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## **I Background**

This is the Preliminary Determination of Compliance (PDOC) for the Pico Power Plant (PPP), a nominal 122-MW, peak-firing capacity of 147 MW, natural-gas fired, combined-cycle on-demand power plant proposed by Silicon Valley Power (SVP), a public utility owned and operated by the City of Santa Clara in Santa Clara County, California. The power plant will be situated on a 2.86-acre site located west of the intersection of Lafayette Street and Duane Avenue and immediately north of SVP's Kifer Receiving Station in the City of Santa Clara. The proposed power plant will be composed of two nominal 50-MW LM6000 PC Sprint combustion gas turbines, two heat recovery steam generators equipped with 136.9 MM BTU/hr duct burners and one nominal 47-MW steam turbine generator. The facility will also include a 3-cell cooling tower.

Pursuant to BAAQMD Regulation 2, Rule 3, Section 403, this document serves as the Preliminary Determination of Compliance (PDOC) document for the California Energy Commission licensing process for the Pico Power Plant. It will also serve as the evaluation report for the BAAQMD Authority to Construct Application #6481.

The PDOC 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 the District's New Source Review rule (Regulation 2, Rule 2). This document includes a health risk assessment that estimates the impact of the project emissions on public health. Permit conditions necessary to insure compliance with applicable rules and regulations and air pollutant emission calculations are also included.

In accordance with BAAQMD Regulation 2, Rule 3, Section 404, the Preliminary Determination of Compliance is subject to the public notice, public inspection, and 30-day public comment period requirements of District Regulation 2, Rule 2, Sections 405 and 406. Accordingly, a notice inviting written public comment will be published in a newspaper of general circulation in the area of the proposed Pico Power Plant. Written comments received will be considered in the preparation of the Final Determination of Compliance (FDOC). The authority to construct will not be issued until after the FDOC has been released and the CEC's final certification of the project has been issued.

## **II Project Description**

### **1. Proposed Equipment**

The applicant is proposing a combined-cycle combustion turbine power generation facility with a maximum electrical output of 147-MW. As proposed, each natural gas fired combustion turbine generator (CTG) will have a nominal electrical output of 50-MW and the steam produced by both heat recovery steam generators (HRSGs) will feed to a single steam turbine generator with a nominal electrical output of 47-MW.

The Pico Power Plant will consist of the following proposed equipment:

- S-1 Combustion Gas Turbine #1, General Electric LM6000 PC SPRINT; 473.7 MM BTU per hour, equipped with water injection, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-2 Heat Recovery Steam Generator #1, equipped with low emission Duct Burners, 136.9 MM BTU per hour, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-3 Combustion Gas Turbine #2, General Electric LM6000 PC SPRINT; 473.7 MM BTU per hour, equipped with water injection, abated by A-3 SCR and A-4 Oxidation Catalyst**
- S-4 Heat Recovery Steam Generator #2, equipped with low emission Duct Burners, 136.9MM BTU per hour, abated by A-3 SCR and A-4 Oxidation Catalyst**
- S-5 Cooling Tower, 3-Cell, 34,980 gallons per minute maximum capacity, equipped with High Efficiency Drift Eliminators**

## **2. Equipment Operating Scenarios**

### *Turbines and Heat Recovery Steam Generators*

As a municipal power plant, market circumstances and demand will dictate the exact operation of the new gas turbine/HRSG power trains. However, the following general operating modes are projected to occur:

- **Base Load**—The facility would be operated at maximum continuous output for as many hours per year as scheduled by load dispatch. During high ambient temperature periods or other periods of high demand, duct firing may be used to increase the plant output at the desired load to meet increased SVP utility system demand.
- **Peak Load**—The facility can provide additional output by duct firing the HRSG and provide additional steam to the steam turbine.
- **Load Following**—The facility would be operated to meet variable SVP load requirements. The generation would be adjusted periodically to the load demand by raising or lowering the output of the combustion turbines.
- **Ancillary Services**---The facility may operate in response to rapid California Independent System Operator (CAISO)-commanded load changes due to sale of spinning reserves or automatic load changes commanded due to sale of regulation services (Automatic Generation Control (AGC)).
- **Partial Shutdown**—At certain times of any given day and any given year, it may be necessary to shut down one gas turbine/HRSG power train. This mode of operation could generally be expected during late evening and early morning hours, when system demand may be low.

- **Full Shutdown**—This would occur if forced by equipment malfunction, fuel supply interruption, transmission line disconnect or market conditions.

#### *HRSG Duct Burner Firing :*

The following projected operating scenario was utilized to estimate maximum annual air pollutant emissions from the new gas turbines and HRSGs.

- 8,256 hours of baseload (100% load) operation per year for each gas turbine
- 1,400 hours of duct burner firing per HRSG per year
- 200 one-hour hot startups per gas turbine per year
- 52 one-hour cold startups per gas turbine per year
- 252 shutdowns per gas turbine per year

### **3. Air Pollution Control Strategies and Equipment**

The proposed Pico Power Plant includes sources that trigger the Best Available Control Technology (BACT) requirement of New Source Review (District Regulation 2, Rule 2, Section 301) for emissions of nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), precursor organic compounds (POCs), sulfur dioxide (SO<sub>2</sub>), and particulate matter of less than 10 microns in diameter (PM<sub>10</sub>). Each source with a pollutant with a highest day emission rate of 10 pounds or more will be subject to BACT for that pollutant.

#### **a. Selective Catalytic Reduction with Ammonia Injection for the Control of NO<sub>x</sub>**

The gas turbines and HRSG duct burners each trigger BACT for NO<sub>x</sub> emissions. The gas turbines will be equipped with water injection, which minimizes NO<sub>x</sub> emissions by lowering peak flame temperature by premixing combustion air with water. The HRSGs will be equipped with duct burners, which are designed to minimize NO<sub>x</sub> emissions. In addition, the combined NO<sub>x</sub> emissions from the gas turbines and HRSGs will be further reduced through the use of selective catalytic reduction (SCR) systems with ammonia injection.

#### **b. Oxidation Catalyst and Good Combustion Practices to control and minimize CO Emissions**

The gas turbines and HRSG duct burners each trigger BACT for CO emissions. The gas turbines are designed to minimize incomplete combustion and CO emissions through good combustion practices. The HRSGs will be equipped with duct burners, which are also designed to minimize CO emissions. Furthermore, the gas turbines and HRSGs will be abated by oxidation catalysts, which will oxidize the CO emissions and create CO<sub>2</sub> and water.

#### **c. Oxidation Catalyst and Good Combustion Practices to control and minimize POC Emissions**



The Gas Turbines and HRSGs each trigger BACT for POC emissions. The gas turbines are designed to minimize incomplete combustion and therefore minimize POC emissions through good combustion practices. The HRSGs will be equipped with duct burners, which are designed to minimize incomplete combustion and therefore minimize POC emissions. Furthermore, the turbines and HRSGs will be abated by oxidation catalysts, which will also reduce POC emissions.

**d. Exclusive Use of Cleaner-burning Natural gas to Minimize SO<sub>2</sub> and PM<sub>10</sub> Emissions**

The gas turbines and HRSG duct burners will burn exclusively PUC-regulated natural gas to minimize SO<sub>2</sub> and PM<sub>10</sub> emissions. Because the SO<sub>2</sub> emission rate is proportional to the sulfur content of the fuel burned and is not dependent upon the burner type or other combustion characteristics, the use of “low sulfur content” natural gas will result in the lowest possible emission of SO<sub>2</sub>. PM<sub>10</sub> emissions are minimized through the use of best combustion practices, "cleaner burning" natural gas, air inlet filters, and lube oil vent coalescers.

**Table 1 Summary of Control Strategies and Emission Limitations for Gas Turbines and Duct Burner-equipped Heat Recovery Steam Generators (HRSGs)**

Source	Control Strategy and Emission Limit				
	NO <sub>x</sub>	CO	POC	PM <sub>10</sub>	SO <sub>2</sub>
Each Gas Turbine & HRSG Power Train	Water Injection/SCR	Turbine Design/ Duct Burner Design/ Oxidation Catalyst	Turbine Design/ Duct Burner Design/ Oxidation Catalyst	PUC-Regulated Natural Gas, air inlet filter, lube oil vent coalescer	PUC-Regulated Natural Gas
	2.0 ppmvd @ 15% O <sub>2</sub>	4.0 ppmvd @ 15% O <sub>2</sub>	2.0 ppmvd @ 15% O <sub>2</sub>	4.3 lb/hr	0.41 lb/hr

**III Facility Emissions**

The facility regulated air 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 2** is a summary of the daily maximum regulated air pollutant emissions for the proposed sources at Pico Power Plant. These emission rates are used to determine if the Best Available Control Technology (BACT) requirement of the District’s New Source Review rule (NSR; Regulation 2, Rule 2) is triggered on a pollutant-specific basis. Pursuant to Regulation 2-2-301.1, any new source that will have POC, NPOC, NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>10</sub>, or CO emissions in excess of 10 pounds per highest day per pollutant are subject to the BACT requirement for that pollutant. Each of these pollutants exceed 10 pounds per highest day with the possible exception of SO<sub>2</sub>. But since the estimated maximum SO<sub>2</sub> is so close to the BACT trigger, and the BACT requirement for PM<sub>10</sub> (which is triggered) and SO<sub>2</sub> are the same, i.e., use of PUC-regulated natural gas, the BACT requirement will also be imposed on SO<sub>2</sub>.

**Table 2 Maximum Daily Regulated Air Pollutant Emissions for**

### Proposed Sources (lb/day)

Source	Pollutant				
	Nitrogen Oxides (as NO <sub>2</sub> )	Carbon Monoxide	Precursor Organic Compounds	Particulate Matter (PM <sub>10</sub> )	Sulfur Dioxide
S-1 Gas Turbine & S-2 HRSG <sup>a</sup>	179.2 <sup>b</sup>	188.7	40.0	95.4	9.1
S-3 Gas Turbine & S-4 HRSG <sup>a</sup>	179.2 <sup>b</sup>	188.7	40.0	95.4	9.1
S-5 Cooling Tower	0	0	0	12.3	0

<sup>a</sup> Emission rates incorporate startup and shutdown emissions, and full load emissions with and without duct burners (see Appendix B).

<sup>b</sup> An additional maximum 6.73 lb NO<sub>2</sub> possible for an infrequent, short term, transient excursion up to 5 ppmvd @ 15 % O<sub>2</sub> for up to one hour (limited to 160 hours between the two power trains annually; < 1% of annual operating hours).

**Table 3** is a summary of the maximum facility toxic air contaminant (TAC) emissions from new sources. 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<sub>2</sub> due to ammonia slip from the A-1 and A-3 SCR Systems. The risk screening trigger levels shown are per the District Toxic Risk Management Policy.

**Table 3 Maximum Facility Toxic Air Contaminant (TAC) Emissions**

Toxic Air Contaminant	Total Project Emissions <sup>a</sup> (lb/yr)	Risk Screening Trigger Level (lb/yr-project)
Acetaldehyde	1,155	72
Acrolein	159.3	3.9
Ammonia	118,805	19,300
Benzene	112.1	6.7
1,3-Butadiene	1.07	1.1
Ethylbenzene	150.9	193,000
Formaldehyde	2,706 <sup>b</sup>	33
Hexane	2,183	83,000
Naphthalene	14.0	270
PAHs		
Anthracene	.28	.044
Benzo (a) anthracene	.19	.044
Benzo (a) pyrene	.118	.044
Benzo (b) fluoranthene	.096	.044
Benzo (e) pyrene	.0046	.044
Benzo (g,h,i) perylene	.116	.044
Benzo (k) fluoranthene	.092	.044
Chrysene	.212	.044
Dibenz (ah) anthracene	.198	.044
Indeno (1,2,3-cd) pyrene	.198	.044
Propylene	6,491	none specified
Propylene Oxide	403.0	52
Toluene	598.6	38,600
Xylenes	220.0	57,900
Arsenic	0.0063	0.024
Cadmium	0.0027	0.046
Trivalent chromium	0.0054	0.0014
Copper	0.016	463
Lead	0.0054	29
Mercury	0.000014	57.9
Nickel	0.038	96.5
Silver	0.0054	none specified
Zinc	0.278	6,760

<sup>a</sup> Total combined emissions for S-1 and S-3 Gas Turbines, S-2 and S-4 HRSGs, and S-5 Cooling Tower.

<sup>b</sup> Reflects 65% by weight formaldehyde emission reduction by oxidation catalysts A-2 and A-4.

**Table 4** is a summary of the maximum annual regulated air pollutant emissions for the facility from proposed permitted sources. Pursuant to the Prevention of Significant Deterioration (PSD) requirements of New Source Review (Regulation 2-2-304.1 and 2-2-305.1), a new major facility with maximum annual pollutant emissions in excess of any of the trigger levels shown must perform modeling to assess the net air quality impact of the proposed facility. Table 4 clearly shows that PSD review is not triggered by the proposed project.

**Table 4**  
**Maximum Annual Facility Regulated Air Pollutant Emissions**

Pollutant	Proposed Source Emissions <sup>a,b</sup> (tons/year)	PSD Trigger <sup>c</sup> (tons/year)
Nitrogen Oxides (as NO <sub>2</sub> )	43.0 <sup>d</sup>	100
Carbon Monoxide	48.1	100
Precursor Organic Compounds	11.9	N/A <sup>e</sup>
Particulate Matter (PM <sub>10</sub> )	32.8	100
Sulfur Dioxide	2.9	100

<sup>a</sup> Emission increases from proposed gas turbines, heat recovery steam generators, and (exempt) cooling tower.

<sup>b</sup> Includes startup and shutdown emissions from gas turbines (52 total cold start-ups and 200 total hot start-ups per year per turbine, plus corresponding shutdowns).

<sup>c</sup> For a new major facility.

<sup>d</sup> Annual limit based upon average NO<sub>x</sub> emission rate of 2.0 ppmvd @ 15% O<sub>2</sub> for gas turbines and HRSGs; includes startup and shutdown emissions, and possible short term transient emissions (maximum 0.54 ton/yr).

<sup>e</sup> There is no PSD requirement for POC because the BAAQMD is designated as nonattainment for the federal 1-hour ambient air quality standard for ozone.

## **IV Statement of Compliance**

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

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

The primary requirements of New Source Review that that need to be considered for the proposed Pico Power Plant facility 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 2-2-404, “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 and is referred to as “BACT 2”. This type of BACT is termed "achieved in practice." The BACT category described in definition (c) is referred to as "technologically feasible/cost-effective" and it must be commercially available, 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 is referred to as “BACT 1.” BACT specifications (for both the "achieved in practice" and “technologically feasible/cost-effective" categories) for various source categories have been compiled in the *BAAQMD BACT/TBACT Workbook: Guidelines for Best Available Control Technology*.

## Gas Turbines and HRSGs

The following section includes BACT determinations by pollutant for the gas turbines and duct burners/HRSG for the proposed Pico Power Plant. Because each gas turbine and its associated duct burners/HRSG will exhaust through a common stack and be subject to combined emission limitations, the BACT determinations will, in practice, apply to each Gas Turbine/duct burners/HRSG (or for simplicity Gas Turbine/HRSG) power train as a combined unit.

The following BACT recommendations for the proposed Pico Power Plant meet or exceed the most recent recommendations adopted by the governing board of the California Air Resources Board (CARB) for large and small electric power generating power plants, as published in *Guidance for Power Plant Siting and Best Available Control Technology* (September 1999) and *Guidance for the Permitting of Electrical Generation Technologies* (July 2002).

### Nitrogen Oxides (NO<sub>x</sub>)

- Combustion Gas Turbines

The GE LM6000 gas turbines to be used in the Pico project are of an “in-between size.” On the one hand, they are the common size and design used in many simple cycle and combined cycle power plants 50 MW and below. On the other hand, SVP is using them as the basic building block for designing the larger 147 MW Pico project, with supplementary duct burners and heat recovery steam generators. However, the LM 6000’s are much smaller and different in performance to the GE Frame 7 units used in the large power plants that have been recently permitted in the 500 to 1100 MW range. Because of the LM 6000’s “in-between size”, the BACT analysis presented here draws upon recent BACT determinations for both below 50 and above 50 MW power plants.

District BACT Guideline 89.1.6 specifies BACT 1 (technologically feasible/cost-effective) for NO<sub>x</sub> for a combined cycle gas turbine with a rated output  $\geq 50$  MW as 2.0 ppmvd @ 15% O<sub>2</sub> averaged over three hours or 2.5 ppmvd @ 15% O<sub>2</sub> averaged over one hour, typically achieved through the use of Selective Catalytic Reduction (SCR) with ammonia injection in conjunction with dry low-NO<sub>x</sub> combustors. The SCAQMD BACT Guideline for gas turbines  $\geq 3$  MW specifies BACT 1 for NO<sub>x</sub> as 2.5 ppmvd, @ 15% O<sub>2</sub> 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<sub>x</sub> concentration of 2.0 ppmvd @ 15% O<sub>2</sub> averaged over three hours as equivalent to 2.5 ppmvd, @ 15% O<sub>2</sub>, averaged over one hour.

The Pico Power Plant applicant originally proposed that each combustion gas turbine power train meet a NO<sub>x</sub> emission concentration limit of 2.5 ppmvd NO<sub>x</sub> @ 15% O<sub>2</sub>, averaged over three hours during all operating modes except gas turbine start-ups and shutdowns. This falls just short of the current District BACT 1 determination and the EPA’s LAER determination for NO<sub>x</sub>, because of the Pico’s longer averaging time. However, the Pico proposal does

meet CARB's published BACT recommendations for combined cycle plants less than 50 MW, the basic building block of the proposed Pico Power Plant. Compliance with this emission limitation would be achieved through the use of water injection to reduce the formation of NO<sub>x</sub> and CO, followed by abatement of NO<sub>x</sub> emissions by a selective catalytic reduction (SCR) system with ammonia injection. The NO<sub>x</sub> emission concentration would be verified by a Continuous Emission Monitor (CEM) located at the common stack for each gas turbine/HRSG power train.

Based upon our review of CEM data for the recently commissioned ANP Blackstone power plant in Massachusetts, a nominal 550-MW combined cycle facility, we have concluded that a NO<sub>x</sub> emission concentration of 2.0 ppmvd, @ 15% O<sub>2</sub>, averaged over one hour, has been established as "achieved-in-practice" BACT for NO<sub>x</sub>. The ANP Blackstone power plant consists of two ABB GT-4 Gas Turbines rated at 180-MW each with unfired heat recovery steam generators. District staff reviewed CEM data for approximately 2,313 firing hours for unit 1 and 2,737 firing hours for unit 2 which occurred from April 2001 to April 2002. With the exception of start-up and shutdown periods and limited, short term NO<sub>x</sub> excursions above 2.0 ppmvd, the NO<sub>x</sub> concentrations were below the 2.0 ppmvd limit by a sufficient margin to demonstrate consistent, continuous compliance. These short term excursions were of limited amplitude, generally less than 30 ppmvd, and attributed to transients caused by rapid operating load changes. Thus a NO<sub>x</sub> limit of 2.0 ppmvd @ 15% O<sub>2</sub>, averaged over one hour was considered as a possible BACT level for the current PPP project.

However, the Pico turbines, GE Model LM6000, at approximately 50 MW are considerably smaller units of different engineering design, and based on the Blackstone experience alone, there is no assurance that 2.0 ppmvd NO<sub>x</sub> could be maintained across all operational modes. First, numerous similar size turbines in simple cycle mode, so-called peaking turbines, have been permitted across California over the last two years at a CARB-recommended BACT level of 5.0 ppmvd, with a few at 2.5 ppmvd. Fortunately, at least one has been permitted as a combined cycle unit with heat recovery and supplementary firing, similar to the Pico proposal. This would be the Valero Cogeneration Plant commissioned just this year at the Valero Refinery in Benicia, California. A review of three months of continuous emission monitoring data, demonstrated continuous performance below 2.0 ppmvd, except for startups and shutdowns, even though the Valero plant was permitted to a 2.5 ppmvd limit, firing natural gas and refinery fuel gas. However, the Valero plant was designed for baseloaded, steady state load operation, with very few load changes and generally gradual ones at that.

The Pico plant is designed for on-demand service with frequent rapid load changes as needed. It is common knowledge among combustion engineering professionals that such rapid load changes can lead to significant spikes or excesses in NO<sub>x</sub> and CO emissions. Controlling emissions using abatement devices down to such low levels as 2.0 ppmvd NO<sub>x</sub> and 4.0 ppmvd CO would stress the control feedback systems even more. At the District's request, staff from the Electricity Office of the CEC reviewed the projected operating duty cycles of the Pico Plant as presented by the City of Santa Clara. CEC staff concluded that large and frequent load changes were quite possible and could be a significant part of Pico's necessary business, especially with the anticipated collaboration with the California Independent System Operator. In light of the limited performance of the Valero plant and

the much greater load change requirements of the Pico plant, District staff concluded that 2.0 ppmvd NO<sub>x</sub> is indeed demonstrated technology for the LM6000 based Pico unit, so long as an allowance could be made for limited short term excursions beyond 2.0 ppmvd. This is simply a recognition that such emissions performance has not been fully demonstrated for this size and class of turbines. As will be shown later, limited excursions of up to an hour duration, not to exceed 5.0 ppmvd, will be permitted for limited, well-defined situations of transients due to unavoidable, rapid load changes and other similar burdens. This will be limited to less than two percent of the operating time. Each excursion will amount to less than seven pounds of NO<sub>x</sub>, which would not be a significant quantity for practically any permitted source, let alone an electric power plant.

A “top-down” BACT analysis for NO<sub>x</sub> has been previously prepared for power plants and is summarized in Appendix D. It is applicable to the present proposed Pico plant because the energy, economic, and environmental impacts would be expected to be even less than those for the larger power plants which were the focus of the top-down BACT study. Furthermore, cost-effectiveness and technical feasibility are not issues because of the demonstrated performance or achieved in practice status shown by the Valero plant, which utilizes gas turbines and heat recovery steam generators of the same class and category as those in the Pico proposal.

- Heat Recovery Steam Generators (HRSGs)

Supplemental heat will be supplied to the HRSGs with duct burners, which are designed to minimize NO<sub>x</sub> emissions. The duct burner exhaust gases will also be abated by the SCR system with ammonia injection and when combined with the gas turbine exhaust, will achieve NO<sub>x</sub> emission concentrations of less than or equal to 2.0 ppmvd @ 15% O<sub>2</sub>, averaged over one hour.

### **Carbon Monoxide (CO)**

BACT for CO will be analyzed within the context of three distinct operating modes for each gas turbine/HRSG power train. The first mode is firing of the gas turbine only over its entire operating range from minimum to maximum load. The second mode includes gas turbine firing at maximum load with HRSG duct burner firing. The third mode includes gas turbine firing at maximum load with HRSG duct burner firing and steam injection power augmentation at the gas turbine combustors. In principal, water injection lowers the post-combustor flame temperature (allowing an increased fuel use rate) and increases mass flow through the turbine blades, which in turn increases gas turbine peak generating capacity during periods of high ambient temperature.

- Combustion Gas Turbines and Heat Recovery Steam Generators (HRSGs)

District BACT Guideline 89.1.6 specifies BACT 2 (achieved in practice) for CO for combined cycle gas turbines with a rated output of  $\geq 50$  MW as a CO emission concentration of  $\leq 4.0$  ppmvd @ 15% O<sub>2</sub>. This BACT specification is based upon the Sacramento Power



Authority (Campbell Soup facility) located in Sacramento County, California. BACT 1 (technologically feasible/cost-effective) is currently not specified. This emission rate limit applies to all operating modes except gas turbine start-up and shutdown. The recently commissioned Valero 51 MW combined cycle plant, with a design configuration similar to the proposed Pico Plant, has a CO permit limit of 6.0 ppmvd when firing natural gas or natural gas/refinery fuel gas. However, recent performance data support the technological feasibility and cost-effectiveness of a 4.0 ppmvd CO limit.

The Pico applicant has agreed to a CO emission limit of 4.0 ppmvd @ 15% O<sub>2</sub>, averaged over any rolling 3-hour period. This satisfies the current BACT 2 limitation as discussed above. Indeed, 4.0 ppmvd could be viewed as BACT 1, technologically feasible/cost-effective, for the LM 6000 size and class of turbine. CARB's *Guidance for the Permitting of Electrical Generation Technologies* in 2002 recommended 6.0 ppmvd for this size and class turbine in combined cycle service. Compliance with the proposed Pico 4.0 ppmvd emission limitation will be achieved through the use of turbine design and good combustion practices. In addition, CO emissions from each turbine and HRSG will be abated through the use of an oxidation catalyst. The CO emission concentration will be verified by a CEM located at the common stack for each gas turbine/HRSG power train.

### **Precursor Organic Compounds (POCs)**

- **Combustion Gas Turbines**

Currently, District BACT Guideline 89.1.6 specifies BACT 2 (achieved in practice) for POC for combined cycle gas turbines with an output rating  $\geq 50$  MW as 2 ppmv, dry @ 15% O<sub>2</sub>, which is typically achieved through the use of dry-low NO<sub>x</sub> combustors and/or an oxidation catalyst. This is based upon the Delta Energy Center and Metcalf Energy Center, which were recently permitted at a POC emission limit of 2 ppmvd @ 15% O<sub>2</sub>. There currently is no BACT 1 (technologically feasible/cost-effective) specification for POC for this category of source. The Valero combined cycle plant was permitted at the equivalent of 2.0 ppmvd.

The applicant has proposed a combined POC emission limitation of 1.2 pounds per hour per gas turbine and 1.56 pounds per hour per turbine/HRSG power train. This is equivalent to 0.00255 lb/MM BTU or an emission concentration of 2 ppmvd @ 15% O<sub>2</sub>. The 0.00255 lb/MM BTU limit applies to the combined exhaust from each gas turbine and corresponding HRSG duct burners. This meets the current BACT 1 specification for POC. Each gas turbine/HRSG pair will achieve this emission limitation through the use of turbine design, good combustion practices, and an oxidation catalyst.

- **Heat Recovery Steam Generators (HRSGs)**

The HRSG duct burners will be of a design which minimizes incomplete combustion and therefore the POC emission rate. As stated above, the applicant has proposed a combined POC emission concentration limit of 2.0 ppmvd @ 15% O<sub>2</sub> for simultaneous firing of the turbine and HRSG duct burners. This meets the current BACT 1 specification for POC.

Each gas turbine/HRSG pair will achieve this emission limitation through the use of turbine/HRSG design, good combustion practices, and an oxidation catalyst.

### **Sulfur Dioxide (SO<sub>2</sub>)**

- Combustion Gas Turbines

District BACT Guideline 89.1.6 specifies BACT 2 (achieved in practice) for SO<sub>2</sub> for combined cycle gas turbines with an output rating of  $\geq 50$  MW as the exclusive use of clean-burning natural gas with a sulfur content of  $\leq 1.0$  grains per 100 scf. The proposed turbines will burn exclusively PUC-regulated natural gas with expected average sulfur content of 4 ppmv as H<sub>2</sub>S or 0.25 gr/100 scf, as H<sub>2</sub>S, which will result in minimal SO<sub>2</sub> emissions. This corresponds to an SO<sub>2</sub> emission factor of 0.000676 lb/MM BTU. This is more stringent than the current BACT 2 specification for SO<sub>2</sub>.

- Heat Recovery Steam Generators (HRSGs)

As is the case for the Gas Turbines, BACT for SO<sub>2</sub> for the HRSG duct burners is the exclusive use of clean-burning natural gas with a sulfur content of 4 ppmv as H<sub>2</sub>S or 0.25 gr/100 scf. The HRSGs will burn exclusively PUC-regulated natural gas with this expected average sulfur content. This corresponds to an SO<sub>2</sub> emission factor of 0.000676 lb/MM BTU. This is more stringent than the current BACT 2 specification for SO<sub>2</sub>.

### **Particulate Matter (PM<sub>10</sub>)**

- Combustion Gas Turbines

District BACT Guideline 89.1.6 specifies BACT for PM<sub>10</sub> for combined cycle gas turbines with rated output of  $\geq 50$  MW as the exclusive use of clean-burning natural gas with a maximum sulfur content of  $\leq 1.0$  grains per 100 scf. The proposed turbines will utilize exclusively PUC-regulated natural gas with average sulfur content of 4 ppmv as H<sub>2</sub>S or 0.25 gr/100 scf, as H<sub>2</sub>S, which will result in minimal direct PM<sub>10</sub> emissions and minimal formation of secondary PM<sub>10</sub> such as ammonium sulfate.

- Heat Recovery Steam Generators (HRSGs)

BACT for PM<sub>10</sub> for the HRSG duct burners is the exclusive use of clean-burning natural gas with a maximum sulfur content of  $\leq 1.0$  grains per 100 scf. The HRSGs will burn exclusively PUC-regulated natural gas with average natural gas sulfur content of 4 ppmv as H<sub>2</sub>S or 0.25 gr/100 scf, which will result in minimal direct PM<sub>10</sub> emissions and minimal formation of secondary PM<sub>10</sub> such as ammonium sulfate.

### **Cooling Tower**

As shown in Table 2, the proposed S-5 Cooling Tower has maximum daily PM<sub>10</sub> emissions of 12.3 pounds and would therefore trigger the BACT requirement of New Source Review. The *BAAQMD BACT/TBACT Workbook* does not specify BACT for PM<sub>10</sub> for wet cooling towers. However, the ARB BACT Clearinghouse cites a BACT specification for PM<sub>10</sub> for the proposed La Paloma power plant cooling tower as the use of drift eliminators with a maximum drift rate of 0.0006%. The cooling towers for the Los Medanos Energy Center, Delta Energy Center, and Metcalf Energy Center will be equipped with drift eliminators with a guaranteed drift rate of 0.0005%. The proposed S-5 Cooling Tower will also be equipped with drift eliminators with a guaranteed drift rate of 0.0005%. This specification would satisfy BACT for PM<sub>10</sub>.

However, the cooling tower is exempt from permit requirements pursuant to Regulation 2-1-128.4, which exempts water cooling towers not used for evaporative cooling of process water, provided the cooling tower can pass a District health risk screening analysis (Regulation 2-1-316), is not a public nuisance (Regulation 2-1-317), does not emit hazardous substances in excess of the quantities listed in Regulation 2-1-318, and does not emit more than 5 tons per year of any regulated air pollutant (Regulation 2-1-319). The proposed cooling tower S-5 meets all these requirements and is therefore exempt from permit requirements.

## **2. Emission Offsets**

### **General Requirements**

Pursuant to Regulation 2-2-302, federally enforceable emission offsets are required for POC and NO<sub>x</sub> (as NO<sub>2</sub>) emission increases from permitted sources at facilities that will emit 15 tons per year or more on a pollutant-specific basis. For facilities that will emit less than 50 tons per year of NO<sub>x</sub> (as NO<sub>2</sub>), offsets must be provided at a ratio of 1.0 to 1.0. Pursuant to Regulation 2-2-302.2, POC offsets may be used to offset emission increases of NO<sub>x</sub> (as NO<sub>2</sub>).

Pursuant to Regulation 2-2-303, emission offsets shall be provided at a ratio of 1.0 to 1.0 for PM<sub>10</sub> and SO<sub>2</sub> emission increases at new facilities that will be permitted to emit 100 tons per year or more on a pollutant-specific basis.

It should be noted that in the case of POC and NO<sub>x</sub> offsets, District regulations do not require consideration of the location of the source of the emission reduction credits relative to the location of the proposed emission increases that will be offset.

## Offset Requirements by Pollutant

The new source emission increases, the applicable offset ratios and the quantity of offsets required are summarized in Table 5.

**Table 5 Emission Offset Summary**

	NO <sub>x</sub> (as NO <sub>2</sub> )	CO	POC	PM <sub>10</sub>	SO <sub>2</sub>
BAAQMD Calculated New Source Emission Increases <sup>a</sup> (ton/yr)	43.0	48.1	11.9	30.5	2.9
Proposed New Source Annual Emission Limits (ton/yr)	43.0	48.1	11.9	30.5	2.9
Offset Requirement Triggered	Yes	No	No	No	No
Offset Ratio	1.0:1.0 <sup>b</sup>	n/a	n/a	n/a	n/a
Offsets Required (tons/yr)	<b>43.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
ERCs to be Provided (tons/yr)	<b>43.0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> Sum of Gas Turbines (S-1, S-3) and HRSGs (S-2, S-4) emission increases; the exempt cooling tower (S-5) emissions are not included. See Appendix B, Table B-7.

<sup>b</sup> Pursuant to District Regulation 2-2-302, emission offsets at a ratio of 1.0 to 1.0 must be provided since the proposed facility NO<sub>x</sub> emissions from all permitted sources will exceed 15 tons per year but will be less than 50 tons per year.

### NO<sub>x</sub> Offsets

Because the Pico Power Plant will emit less than 50 but greater than 15 tons per year of nitrogen oxides (NO<sub>x</sub>, expressed as NO<sub>2</sub>) from permitted sources, the applicant must provide emission reduction credits (ERCs) of NO<sub>x</sub> at a ratio of 1.0 to 1.0 pursuant to District Regulation 2-2-302. As shown in Table 5, 43.0 ton/yr of NO<sub>x</sub> Emission Reduction Credits (ERCs) must be provided by the applicant to offset the new emission increases of the proposed Pico Power Plant. Pursuant to District Regulation, 2-2-302.2, the applicant has the option to provide POC ERCs to offset the proposed NO<sub>x</sub> emission increases at a ratio of 1.0 to 1.0. The applicant is not eligible for credits from the District Small Facilities Banking Account because it has ERCs in its possession.

### POC Offsets

Because the Pico Power Plant will emit less than 15 tons of POC per year, the POC emissions are not required to be offset pursuant to District Regulation 2-2-302.

### PM<sub>10</sub> Offsets

With projected PM<sub>10</sub> emissions from permitted sources less than 100 tons per year, the Pico Power Plant does not trigger the PM<sub>10</sub> offset requirement of District Regulation 2-2-303. Pursuant to District Regulation 2-2-303.1

### SO<sub>2</sub> Offsets

Pursuant to Regulation 2-2-303, emission reduction credits are not required for the proposed SO<sub>2</sub> emission increases associated with this project since the facility SO<sub>2</sub> emissions will not exceed 100 tons per year. Regulation 2-2-303 allows for the voluntary offsetting of SO<sub>2</sub> emission increases of less than 100 tons per year. The applicant has opted not to provide such emission offsets.

### **Offset Package**

**Table 6** summarizes the current offset obligation of the Pico Power Plant and the quantity of valid emission reduction credits (ERCs) under the control of Silicon Valley Power. The emission reduction credits presented in Table 6 exist as federally-enforceable, banked emission reduction credits that have been reviewed for compliance with District Regulation 2, Rule 4, “Emissions Banking”, and were subsequently issued as banking certificates by the BAAQMD under the applications cited in the table footnotes. If the quantity of offsets issued under any certificate exceeded 40 tons per year for any pollutant, the application was subject to the public notice and public comment requirements of District Regulation 2-4-405. Accordingly, such applications were reviewed by the California Air Resources Board, U.S. EPA, and adjacent air pollution control districts to help ensure that all applicable federal, state, and local regulations were satisfied.

As indicated below, Silicon Valley Power currently owns sufficient valid emission reduction credits to offset the emission increases from the permitted sources proposed for the Pico Power Plant.

**Table 6**  
**Emission Reduction Credits Owned by Silicon Valley Power (ton/yr)**

Valid Emission Reduction Credits	POC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>
Certificate number, Owner, Reduction Location Banking Certificate 861, Silicon Valley Power, Martinez		51.5	0	0
Banking Certificate 860, Silicon Valley Power, South San Francisco	5.0			
Banking Certificate 865, Silicon Valley Power, Oakland	6.5			
Total ERC's Owned	11.5	51.5	0	0
Permitted Source Emission Limits	11.9	43.0	0	0
Offsets Required per BAAQMD Calculations	0	43.0	0	0
<b>Outstanding Offset Balance</b>	<b>+11.5</b>	<b>+8.5</b>	<b>0</b>	<b>0</b>

**Timing for Provision of Offsets**

Pursuant to District Regulation 2-2-311, the applicant must provide the required valid emission reduction credits to mitigate the emission increases for the facility prior to the issuance of the Authority to Construct. Pursuant to District Regulation 2, Rule 3, "Power Plants," an Authority to Construct will be issued only after issuance of the Final Determination of Compliance by the Air Pollution Control Officer, and the power plant has been granted certification by the California Energy Commission.

### 3. PSD Air Quality Impact Analysis

As shown in the previous discussion of Table 4, the regulated air pollutant emissions of the Pico Power Plant will be limited to sufficiently low levels such that the project is not subject to Prevention of Significant Deterioration (PSD) analysis. Nonetheless, in reference to BAAQMD Regulation 2-2-414.1, the applicant has voluntarily submitted an air quality impact modeling analysis. That analysis is under review by staff of the California Energy Commission under its power plant licensing process.

### B. Health Risk Assessment

Pursuant to the BAAQMD Risk Management Policy, a health risk screening analysis was conducted by District staff to determine the potential impact on public health resulting from the worst-case emissions of toxic air contaminants (TACs) from the PPP project. The potential TAC emissions (both carcinogenic and non-carcinogenic) from the PPP are summarized in Table 3. The risk screening analysis was performed in accordance with the requirements of the BAAQMD Toxic Risk Management Policy (TRMP) and guidelines adopted by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA), the California Air Resources Board (CARB), and the California Air Pollution Control Officers Association (CAPCOA). The impact on public health due to the emissions of the toxic compounds was assessed utilizing approved air pollutant dispersion models.

**Table 7 Health Risk Assessment Results**

Sources	Multi-pathway Carcinogenic Risk (risk in one million)	Chronic Hazard Index	Acute Hazard Index <sup>a</sup>
Gas Turbines, HRSGs, and Cooling Tower <sup>b</sup>	0.2	0.2	0.4
Maximum Facility Risk:	0.2	0.2	0.4

<sup>a</sup> Included for informational purposes only; BAAQMD Toxic Risk Management Policy does not require an assessment of acute (short-term; i.e. < 24 hour) health impacts.

<sup>b</sup> Numbers represent combined risk from all sources

Pursuant to 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. The chronic hazard index attributed to the emission of non-carcinogenic air contaminants is considered to be not significant since it is less than 1.0. Therefore, the proposed Pico Power Plant facility is deemed to be in compliance with the BAAQMD Toxic Risk Management Policy. Please see Appendix C for further discussion.

### 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 insures that the proposed facility will comply with this Regulation by concluding that the Pico Power Plant will not interfere with the attainment or maintenance of applicable federal or state health-based ambient air quality standards for NO<sub>2</sub>, CO, SO<sub>2</sub>, and PM<sub>10</sub>.

**Regulation 2, Rule 1, Sections 301 and 302:  
Authority to Construct and Permit to Operate**

Pursuant to Regulation 2-1-301 and 2-1-302, the Pico Power Plant has submitted an application to the District to obtain an Authority to Construct and Permit to Operate for the proposed S-1 & S-3 Gas Turbines, S-2 & S-4 Heat Recovery Steam Generators, and S-5 Cooling Tower

**Regulation 2, Rule 1, Sections 426: CEQA-Related Information Requirements**

As the lead agency under CEQA for the proposed Pico Power Plant, the California Energy Commission (CEC) will satisfy the CEQA requirements of Regulation 2-1-426.2.1 by producing their Certification which serves as an EIR-equivalent pursuant to the CEC's CEQA-certified regulatory program in accordance with CEQA Guidelines Section 15253(b) and Public Resource Code Sections 21080.5 and 25523.

**Regulation 2, Rule 2, Section 307: Denial, Failure of all Facilities to be in Compliance**

Pursuant to Regulation 2-2-307, Silicon Valley Power Corporation has provided a list of all major facilities within the state of California owned or operated by Silicon Valley Power or by any entity controlling, controlled by, or under common control with Silicon Valley Power and certified under penalty of perjury that these major facilities are in compliance with all applicable state and federal emission limitations and standards.

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

Pursuant to Regulation 2-3-405, this Preliminary Determination of Compliance (PDOC) serves as the APCO's preliminary determination that the proposed power plant will meet the requirements of all applicable BAAQMD, state, and federal regulations. The PDOC contains proposed permit conditions to ensure compliance with those regulations. Pursuant to Regulation 2-3-404, this PDOC will be required to fulfill the public notice, public comment, and public inspection requirements contained in Regulation 2-2-406 and 407. The Authority to Construct, when issued by the District, will be the construction permit for the Pico Power Plant.

**Regulation 2, Rule 6: Major Facility Review**



Pursuant to Regulation 2, Rule 6, section 404.1, the Owner/Operator of the Pico Power Plant shall submit an application to the BAAQMD for a major facility review permit within 12 months after the facility becomes subject to Regulation 2, Rule 6. Pursuant to Regulation 2-6-212.1 and 2-6-218, the Pico Power Plant will become subject to Regulation 2, Rule 6 upon completion of construction as demonstrated by first firing of the gas turbines.

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

The Pico Power Plant gas turbine units and heat recovery steam generators will be subject to the requirements of Title IV of the federal Clean Air Act. The requirements of the Acid Rain Program are outlined in 40 CFR Part 72. The specifications for the type and operation of continuous emission monitors (CEMs) for pollutants that contribute to the formation of acid rain are set forth in 40 CFR Part 75. District Regulation 2, Rule 7 incorporates by reference the provisions of 40 CFR Part 72. Pursuant to 40 CFR Part 72.30(b)(2)(ii), PPP must submit an Acid Rain Permit Application to the District at least 24 months prior to the date on which each unit commences operation. Pursuant to 40 CFR Part 72.2, “commence operation” includes the start-up of the unit’s combustion chamber.

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

Through the use of modern turbine design technology and proper combustion practices, the combustion of natural gas at the proposed gas turbines and HRSG duct burners 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 (Gas Turbine and HRSG Duct Burners) is 0.0035 gr/dscf @ 6% O<sub>2</sub>. See Appendix A for Gas Turbine/HRSG grain loading calculations.

With a maximum total dissolved solids content of 5880 ppm and corresponding maximum PM<sub>10</sub> emission rate of 0.514 lb/hr, the proposed 3-cell cooling tower is expected to comply with the requirements of Regulation 6.

Particulate matter emissions associated with the construction of the facility are exempt from District permit requirements but are subject to Regulation 6. It is expected that the conditions of certification to be imposed by the California Energy Commission will include requirements for construction activities that will require the use of water and/or chemical dust suppressants to minimize PM<sub>10</sub> emissions, including 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 slip emissions from the proposed

CTG/HRSG power trains will each be limited by permit condition to 10 ppmvd @ 15% O<sub>2</sub>, the facility is expected to comply with the requirements of Regulation 7.

### **Regulation 8:           Organic Compounds**

The gas turbines and HRSGs are exempt from Regulation 8, Rule 2, “Miscellaneous Operations” per 8-2-110 since natural gas will be fired exclusively at those sources. The use of solvents for cleaning and maintenance at the Pico Power Plant is expected to comply with Regulation 8, Rule 4, “General Solvent and Surface Coating Operations” section 302.1 by emitting less than 2 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<sub>2</sub> 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<sub>2</sub> emissions in excess of 300 ppmv (dry). With maximum projected SO<sub>2</sub> emissions of < 1 ppmv, the gas turbines and HRSG duct burners are not expected to cause ground level SO<sub>2</sub> concentrations in excess of the limits specified in Regulation 9-1-301 and should easily comply with section 302.

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

The proposed combustion gas turbines (each rated at 473.9 MM BTU/hr, HHV) and HRSG duct burners (each rated at 136.9 MM BTU/hr, HHV) shall comply with the Regulation 9-3-303 NO<sub>x</sub> limit of 125 ppm by complying with a permit condition nitrogen oxides emission limit of 2.0 ppmvd @ 15% O<sub>2</sub>.

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

The proposed S-2 and S-4 HRSGs are subject to the emission concentration limits of Regulation 9, Rule 7, section 301 which limits NO<sub>x</sub> emissions to 30 ppmv, dry @ 3% O<sub>2</sub> and CO emissions to 400 ppmv, dry @ 3% O<sub>2</sub>. To determine if the HRSG duct burners comply with these NO<sub>x</sub> emission limits, it would be necessary to install a NO<sub>x</sub> CEM upstream of the HRSG duct burners since the HRSGs and turbines exhaust through a common stack. Because the combined exhaust from the turbines and HRSGs are subject to a much more stringent BACT limit of 2.0 ppmvd @ 15% O<sub>2</sub>, it is reasonable to conclude that the HRSG duct burners comply with the emission limits of Regulation 9, Rule 7. As a practical matter, the HRSG duct burners are therefore subject to Regulation 9, Rule 9.

#### 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<sub>x</sub> emissions of 2.0 ppmvd @ 15% O<sub>2</sub>, they will comply with the Regulation 9-9-301.3 NO<sub>x</sub> limitation of 9 ppmvd @ 15% O<sub>2</sub>.

**Regulation 10: Standards of Performance for New Stationary Sources**

Regulation 10 incorporates by reference the provisions of Title 40 CFR Part 60. The applicable subparts of 40 CFR 60 include Subpart A, “General Provisions”, Subpart Da, “Standards of Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978”, and Subpart GG “Standards of Performance for Stationary Gas Turbines”. The proposed gas turbines and heat recovery steam generators will comply with all applicable standards and limits prescribed by these regulations. The applicable emission limitations are summarized below:

**Applicable New Source Performance Standards**

Source	Requirement	Emission Limitation	Compliance Verification
Gas Turbines and HRSGs	Subpart Da		
	40 CFR 60.44a(a)(1)	0.2 lb NO <sub>x</sub> (as NO <sub>2</sub> )/MMBTU, except during start-up, shutdown, or malfunction	Sources limited by permit condition to 0.00735 lb/NO <sub>x</sub> (as NO <sub>2</sub> )/MMBTU
	40 CFR 60.44a(a)(2)	25% reduction of potential NO <sub>x</sub> emission concentration	SCR Systems will comply with this reduction requirement
	40 CFR 60.44a(d)(1)	1.6 lb NO <sub>x</sub> (as NO <sub>2</sub> )/MW-hr	0.029 lb NO <sub>x</sub> (as NO <sub>2</sub> )/MW-hr at nominal plant rating of 122 MW
	Subpart GG		
	40 CFR 60.332(a)(1)	100 ppmv NO <sub>x</sub> , @ 15% O <sub>2</sub> , dry	Sources limited by permit condition to 2.0 ppmv NO <sub>x</sub> @ 15% O <sub>2</sub> , dry

## V 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. Furthermore, pollutant mass emission limits (in units of lb/hr and lb/MM BTU of natural gas fired) will ensure that daily and annual emission rate limitations are not exceeded.

To provide maximum operational flexibility, no limitations will be imposed on the type, or quantity 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<sub>x</sub> limitations will be verified by continuous emission monitors (CEMs) that will be in operation during all turbine operating modes, including start-up and shutdown. If the CO and NO<sub>x</sub> CEMs are not capable of accurately assessing gas turbine start-up and shutdown mass emission rates due to variable O<sub>2</sub> content and the differing response times of the O<sub>2</sub> and NO<sub>x</sub> monitors, then start-up and shutdown mass emission rates will be based upon annual source test results. Compliance with POC, SO<sub>2</sub>, and PM<sub>10</sub> 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, conditions will be imposed that govern equipment operation during the initial commissioning period when the CTG/HRSG power trains will operate without their SCR systems in place. Commissioning activities include, but are not limited to the testing of the gas turbines, adjustment of control systems, and the cleaning of the HRSG and auxiliary boiler steam tubes. Permit conditions 1 through 12 apply to this commissioning period and are intended to minimize emissions during the commissioning period and insure that those emissions will not contribute to the exceedance of any short-term applicable ambient air quality standard.

## Pico Power Plant Permit Conditions

### Sources:

- S-1 Combustion Gas Turbine #1, General Electric LM6000 PC SPRINT; 473.7 MM BTU per hour, equipped with water injection, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-2 Heat Recovery Steam Generator #1, equipped with low emission Duct Burners, 136.9 MM BTU per hour, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-3 Combustion Gas Turbine #2, General Electric LM6000 PC SPRINT); 473.7 MM BTU per hour, equipped with water injection, abated by A-3 SCR and A-4 Oxidation Catalyst**
- S-4 Heat Recovery Steam Generator #2, equipped with low emission Duct Burners, 136.9MM BTU per hour, abated by A-3 SCR and A-4 Oxidation Catalyst**

### Exempt Source:

- S-5 Cooling Tower, 3-Cell, 34,980 gallons per minute capacity, equipped with High Efficiency Drift Eliminators**

### (A) 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
HHV:	Higher Heating Value BTU/scf (natural gas)
Rolling 3-hour period:	Any consecutive three-hour period, not including start-up or shutdown periods
Firing Hours:	Period of time during which fuel is flowing to a unit, measured in minutes
MMBTU:	million British thermal units
Gas Turbine Startup Mode:	The lesser of the first 180 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 20(b) and 20(d).

Gas Turbine Shutdown Mode: The lesser of the 60 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 20(b) and 20(d) until termination of fuel flow to the Gas Turbine.

Specified PAHs: The polycyclic aromatic hydrocarbons (PAHs) listed below shall be considered to be 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

Benzo[a]anthracene  
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<sub>x</sub>, CO, POC, or NH<sub>3</sub>) corrected to a standard stack gas oxygen concentration. For emission points P-1 (combined exhaust of S-1 Gas Turbine and S-2 HRSG duct burners) and P-2 (combined exhaust of S-3 Gas Turbine and S-4 HRSG duct burners), the standard stack gas oxygen concentration is 15% O<sub>2</sub> by volume on a dry basis.

Commissioning Activities: All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the PPP owner's engineer to insure safe and reliable steady state operation of the gas turbines, heat recovery steam generators, steam turbine, 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 successfully completed both performance and compliance testing. The commissioning period shall not exceed 180 days under any circumstances.

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
District	Bay Area Air Quality Management District
PPP:	Pico Power Plant

**(B) Applicability:**

Conditions 1 through 12 shall only apply during the commissioning period as defined above. Unless otherwise indicated, Conditions 13 through 47 shall apply after the commissioning period has ended.

**Conditions for the Commissioning Period**

1. The Owner/Operator of the Pico Power Plant shall minimize emissions of carbon monoxide and nitrogen oxides from S-1, S-3 Gas Turbines and S-2, S-4 Heat Recovery Steam Generators (HRSGs) to the maximum extent possible during the commissioning period.
2. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the Owner/Operator shall tune the S-1 & S-3 Gas Turbine combustors and S-2 & S-4 Heat Recovery Steam Generator duct burners 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, the Owner/Operator shall install, adjust, and operate the A-1 & A-3 SCR Systems and A-2 & A-4 Oxidation Catalysts to minimize the emissions of carbon monoxide and nitrogen oxides from S-1, S-3 Gas Turbines, 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 Owner/Operator shall operate the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) in such a manner as to comply with the NO<sub>x</sub> and CO emission limitations specified in Conditions 20(a) through 20(d).
5. The Owner/Operator of Pico Power Plant shall submit a plan to the District Permit Services Division and the CEC Compliance Program Manager (CPM) at least four weeks prior to first firing of S-1 or S-3 Gas Turbines describing the procedures to be followed during the commissioning of the turbines, HRSGs, 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 gas turbine combustors, water injection system, and the duct burners associated

with the HRSGs; the installation and operation of the required emission control systems; the installation, calibration, and testing of the CO and NO<sub>x</sub> continuous emission monitors; and any activities requiring the firing of the Gas Turbines (S-1 & S-3), HRSGs (S-2 & S-4), without abatement by their respective SCR Systems (A-1 & A-3) and/or Oxidation Catalysts (A-2 & A-4). The Owner/Operator shall not fire any of the Gas Turbines (S-1 & S-3) sooner than 28 days after the District receives the commissioning plan.

6. During the commissioning period, the Owner/Operator of Pico Power Plant shall demonstrate compliance with Conditions 10 and 11 through the use of properly operated and maintained continuous emission monitors and data 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 the Gas Turbines (S-1 & S-3), and HRSGs (S-2 & S-4). The Owner/Operator shall use District-approved methods to calculate heat input rates, nitrogen dioxide mass emission rates, carbon monoxide mass emission rates, and NO<sub>x</sub> and CO emission concentrations, summarized for each clock hour and each calendar day. The Owner/Operator shall retain records on site for at least 5 years from the date of entry and make such records available to District personnel upon request.

7. The Owner/Operator shall install, calibrate, and operate the District-approved continuous monitors specified in Condition 6 prior to first firing of the Gas Turbines (S-1 & S-3), and Heat Recovery Steam Generators (S-2 & S-4). After first firing of the gas turbines, the Owner/Operator shall adjust the detection range of these continuous emission monitors as necessary to accurately measure the resulting range of CO and NO<sub>x</sub> emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval.
8. The Owner/Operator shall not fire the S-1 Gas Turbine and S-2 Heat Recovery Steam Generator without abatement of nitrogen oxide emissions by A-1 SCR System and/or abatement of carbon monoxide emissions by A-2 Oxidation Catalyst for more than 300 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 the SCR system and/or oxidation catalyst 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 300 firing hours without abatement shall expire.
9. The Owner/Operator shall not fire the S-3 Gas Turbine and S-4 Heat Recovery Steam Generator without abatement of nitrogen oxide emissions by A-3 SCR System and/or abatement of carbon monoxide emissions by A-4 Oxidation Catalyst for more than 300 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 the SCR system and/or oxidation catalyst 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 300 firing hours without abatement shall expire.

10. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM<sub>10</sub>, and sulfur dioxide that are emitted by the Gas Turbines (S-1 & S-3) and Heat Recovery Steam Generators (S-2 & S-4) during the commissioning period shall accrue towards the consecutive twelve-month emission limitations specified in Condition 23.

11. The Owner/Operator shall not operate the Gas Turbines (S-1 & S-3) and Heat Recovery Steam Generators (S-2 & S-4) in a manner such that the combined pollutant emissions from these sources will exceed the following limits during the commissioning period. These emission limits shall include emissions resulting from the startup and shutdown of the Gas Turbines (S-1 & S-3).

NO <sub>x</sub> (as NO <sub>2</sub> )	358.5 pounds per calendar day	18 pounds per hour
CO	377.4 pounds per calendar day	45 pounds per hour
POC (as CH <sub>4</sub> )	79.9 pounds per calendar day	
PM <sub>10</sub>	190.9 pounds per calendar day	
SO <sub>2</sub>	18.2 pounds per calendar day	

12. Prior to the end of the Commissioning Period, the Owner/Operator of the Pico Power Plant shall conduct a District and CEC approved source test using external continuous emission monitors to determine compliance with the limitations specified in Condition 21. The source test shall determine NO<sub>x</sub>, CO, and POC emissions during startup 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 startup and three shutdown periods. Thirty working 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 60 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)**

13. The Owner/Operator shall fire the Gas Turbines (S-1 & S-3) and HRSG Duct Burners (S-2 & S-4) exclusively with natural gas. (BACT for SO<sub>2</sub> and PM<sub>10</sub>)
14. The Owner/Operator shall not operate the units such that 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) exceeds 610.6 MM BTU (HHV) per hour, averaged over any rolling 3-hour period. (BACT and Cumulative Increase)
15. The Owner/Operator shall not operate the units such that 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) exceeds 13,559.2 MM BTU (HHV) per calendar day. (BACT and Cumulative Increase)
16. The Owner/Operator shall not operate the units such that the combined cumulative heat input rate for the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) exceeds 8,682,544 MM BTU (HHV) per year. (Offsets and Cumulative Increase)
17. The Owner/Operator shall not fire the HRSG duct burners (S-2 & S-4) unless its associated Gas Turbine (S-1 & S-3 respectively) is in operation. (BACT for NO<sub>x</sub>)
18. The Owner/Operator shall ensure that the S-1 Gas Turbine and S-2 HRSG are abated by the properly operated and properly maintained A-1 Selective Catalytic Reduction (SCR) System whenever fuel is combusted at those sources and the A-1 SCR catalyst bed has reached minimum operating temperature. (BACT for NO<sub>x</sub>)
19. The Owner/Operator shall ensure that the S-3 Gas Turbine and S-4 HRSG are abated by the properly operated and properly maintained A-3 Selective Catalytic Reduction (SCR) System whenever fuel is combusted at those sources and the A-3 SCR catalyst bed has reached minimum operating temperature. (BACT for NO<sub>x</sub>)
20. The Owner/Operator shall ensure that the Gas Turbines (S-1 & S-3) and HRSGs (S-2 & S-4) comply with requirements (a) through (i) under all operating scenarios, including duct burner firing mode and power augmentation mode. Requirements (a) through (i) do not apply during a gas turbine start-up or shutdown. (BACT and Toxic Risk Management Policy)
  - (a) Nitrogen oxide mass emissions (calculated as NO<sub>2</sub>) at P-1 (the combined exhaust point for S-1 Gas Turbine and S-2 HRSG after abatement by A-1 SCR System) shall not exceed 4.49 pounds per hour or 0.00735 lb/MMBTU (HHV) of natural gas fired. Nitrogen oxide mass emissions (calculated as NO<sub>2</sub>) at P-2 (the combined exhaust point for S-3 Gas Turbine and S-4 HRSG after abatement by A-3 SCR System) shall not exceed 4.49 pounds per hour or 0.00735 lb/MM BTU (HHV) of natural gas fired.

- (b) The nitrogen oxide emission concentration at emission points P-1 and P-2 each shall not exceed 2.0 ppmv, on a dry basis, corrected to 15% O<sub>2</sub>, averaged over any 1-hour period. (BACT for NO<sub>x</sub>)
- (c) Carbon monoxide mass emissions at P-1 and P-2 each shall not exceed 5.47 pounds per hour or 0.00896 lb/MM BTU of natural gas fired, averaged over any rolling 3-hour period.
- (d) The carbon monoxide emission concentration at P-1 and P-2 each shall not exceed 4.0 ppmv, on a dry basis, corrected to 15% O<sub>2</sub>, averaged over any rolling 3-hour period. (BACT for CO)
- (e) Ammonia (NH<sub>3</sub>) emission concentrations at P-1 and P-2 each shall not exceed 10 ppmv, on a dry basis, corrected to 15% O<sub>2</sub>, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to A-1 and A-3 SCR Systems. The correlation between the gas turbine and HRSG heat input rates, A-1 and 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 Condition 30. (TRMP for NH<sub>3</sub>)
- (f) Precursor organic compound (POC) mass emissions (as CH<sub>4</sub>) at P-1 and P-2 each shall not exceed 1.56 pounds per hour or 0.00255 lb/MM BTU of natural gas fired. (BACT for POC)
- (g) Precursor organic compound (POC) mass emissions (as CH<sub>4</sub>) at P-1 and P-2 each shall not exceed 2.0 ppmv, on a dry basis, corrected to 15% O<sub>2</sub>, averaged over any rolling 3-hour period. (BACT for POC)
- (h) Sulfur dioxide (SO<sub>2</sub>) mass emissions at P-1 and P-2 each shall not exceed 0.41 pounds per hour or 0.000676 lb/MM BTU of natural gas fired. (BACT for SO<sub>2</sub>)
- (i) Particulate matter (PM<sub>10</sub>) mass emissions at P-1 and P-2 each shall not exceed 3.33 pounds per hour when the HRSG duct burners are not in operation. Particulate matter (PM<sub>10</sub>) mass emissions at P-1 and P-2 each shall not exceed 4.3 pounds per hour when HRSG duct burners are in operation. (BACT for PM<sub>10</sub>)
- (j) Compliance with the hourly NO<sub>x</sub> emission limitations specified in Condition 20(a) and 20(b), at both P1 and P2, shall not be required during short-term excursions, limited to a cumulative total of 160 hours per rolling 12 month period. Short-term excursions are defined as 15-minute periods designated by the Owner/Operator that are the direct result of transient load conditions, not to exceed four consecutive 15-minute periods, when the 15-minute average NO<sub>x</sub> concentration exceeds 2.0 ppmv, dry @ 15% O<sub>2</sub>. Examples of transient load conditions include, but are not limited to the following:
  - (1) Initiation/shutdown of combustion turbine inlet air cooling

- (2) Initiation/shutdown of combustion turbine water mist or steam injection for power augmentation
- (3) Rapid combustion turbine load changes
- (4) Initiation/shutdown of HRSG duct burners
- (5) Provision of Ancillary Services and Automatic Generation Control at the direction of the California Independent System Operator (Cal-ISO)

The maximum 1-hour average NO<sub>x</sub> concentration for short-term excursions at P-1 and P-2 each shall not exceed 5 ppmv, dry @ 15% O<sub>2</sub> or 11.2 lb/hr (2.80 lb per 15 minute period). All emissions during short-term excursions shall be included in all calculations of hourly, daily and annual mass emission rates as required by this permit.

21. The Owner/Operator shall ensure that the regulated air pollutant mass emission rates from each of the Gas Turbines (S-1 & S-3) during a start-up or a shutdown does not exceed the limits established below.

	Startup (lb/startup)	Shutdown (lb/shutdown)
Oxides of Nitrogen (as NO <sub>2</sub> )	41	8
Carbon Monoxide (CO)	35	10
Precursor Organic Compounds (as CH <sub>4</sub> )	3	3

**Conditions for All Sources**

22. The Owner/Operator shall not allow total combined emissions from the Gas Turbines and HRSGs (S-1 & S-2 and S-3 & S-4) including emissions generated during Gas Turbine startups and shutdowns and transient excursions to exceed the following limits during any calendar day:

- (a) 358.5 pounds of NO<sub>x</sub> (as NO<sub>2</sub>) per day
- (b) 377.4 pounds of CO per day
- (c) 79.9 pounds of POC (as CH<sub>4</sub>) per day
- (d) 190.9 pounds of PM<sub>10</sub> per day
- (e) 18.2 pounds of SO<sub>2</sub> per day

23. The Owner/Operator shall not allow cumulative combined emissions from the Gas Turbines and HRSGs (S-1 & S-2 and S-3 & S-4) including emissions generated during Gas Turbine startups and shutdowns and transient excursions to exceed the following limits during any consecutive twelve-month period:

- (a) 43.0 tons of NO<sub>x</sub> (as NO<sub>2</sub>) per year
- (b) 48.1 tons of CO per year
- (c) 11.9 tons of POC (as CH<sub>4</sub>) per year

- (d) 30.5 tons of PM<sub>10</sub> per year
  - (e) 2.92 tons of SO<sub>2</sub> per year
- (Offsets and Cumulative Increase)

- 24. The Owner/Operator shall not allow the combined heat input rate to the Gas Turbines and HRSGs (S-1 & S-2 and S-3 & S-4) to exceed 27,118.4 MMBTU per calendar day.
- 25. The Owner/Operator shall not allow the cumulative heat input rate to the Gas Turbines and HRSGs (S-1, S-2, S-3, S-4) combined to exceed 8,682,544.0 MMBTU per year.
- 26. The Owner/Operator shall not allow the maximum projected annual toxic air contaminant emissions (per Conditions 29 and 33) from the Gas Turbines and HRSGs (S-1 & S-2 and S-3 & S-4) combined to exceed the following limits:

acetaldehyde	1,155 pounds per year
formaldehyde	2,706 pounds per year
benzene	112 pounds per year
Specified PAHs	0.71 pound per year

unless the following requirement is satisfied:

The Owner/Operator shall perform a health risk assessment to determine the total facility risk using the emission rates determined by District approved source testing and the most current Bay Area Air Quality Management District approved procedures and unit risk factors in effect at the time of the analysis. This risk analysis shall be submitted to the District and the CEC Compliance Program Manager (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 not result in a significant cancer risk, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (TRMP)

- 27. The Owner/Operator shall demonstrate compliance with Conditions 14 through 17, 20(a) through 20(d), 21, 22(a), 22(b), 23(a), and 23(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 & S-2 combined, S-3 & S-4 combined.
  - (b) Oxygen (O<sub>2</sub>) concentration, nitrogen oxides (NO<sub>x</sub>) concentration, and carbon monoxide (CO) concentration at each of the following exhaust points:  
P-1 and P-2.
  - (c) Ammonia injection rate at A-1 and A-3 SCR Systems
  - (d) Any transient load conditions recorded in 27(a) above and as described in 20(j) shall be fully characterized and recorded on a quarter hour (15-minute period) basis.

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:

- (e) Heat Input Rate for each of the following sources: S-1 & S-2 combined and S-3 & S-4 combined.
- (f) Corrected NO<sub>x</sub> concentration, NO<sub>x</sub> mass emission rate (as NO<sub>2</sub>), corrected CO concentration, and CO mass emission rate at each of the following exhaust points: P-1 and P-2.

For each source, source grouping, or exhaust point, the Owner/Operator shall record the parameters specified in Conditions 27(e) and 27(f) at least once every 15 minutes (excluding normal calibration periods). As specified below, the Owner/Operator shall calculate and record the following data:

- (g) Total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.
- (h) On an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and associated HRSG combined and all four sources (S-1, S-2, S-3, and S-4) combined.
- (i) The average NO<sub>x</sub> mass emission rate (as NO<sub>2</sub>) and corrected NO<sub>x</sub> emission concentration for every clock hour and for every quarter hour (15-minute) period.
- (j) The average CO mass emission rate and corrected CO emission concentration for every clock hour and for every rolling 3-hour period.
- (k) On an hourly basis, the cumulative total NO<sub>x</sub> mass emissions (as NO<sub>2</sub>) and the cumulative total CO mass emissions, for each calendar day for each Gas Turbine and associated HRSG combined, and all four sources (S-1, S-2, S-3, and S-4) combined.
- (l) For each calendar day, the average hourly Heat Input Rates, Corrected NO<sub>x</sub> emission concentration, NO<sub>x</sub> mass emission rate (as NO<sub>2</sub>), corrected CO emission concentration, and CO mass emission rate for each Gas Turbine and associated HRSG combined
- (m) On a daily basis, the cumulative total NO<sub>x</sub> mass emissions (as NO<sub>2</sub>) and cumulative total CO mass emissions, for the previous consecutive twelve month period for all four sources (S-1, S-2, S-3, and S-4) combined.

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

- 28. To demonstrate compliance with Conditions 20(f), 20(g), 20(h), 20(i), 21, 22(c) through 22(e), and 23(c) through 23(e), the Owner/Operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter (PM<sub>10</sub>) mass emissions (including condensable particulate matter), and Sulfur Dioxide (SO<sub>2</sub>) mass emissions from each power train. The Owner/Operator shall use the actual Heat Input Rates calculated pursuant to Condition 27, 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<sub>10</sub>, and SO<sub>2</sub> emissions shall be summarized for: each power train (Gas Turbine and its respective HRSG combined) and all four sources (S-1, S-2, S-3, and S-4) combined.
  - (b) on a daily basis, the cumulative total POC, PM<sub>10</sub>, and SO<sub>2</sub> mass emissions, for each year for all four sources (S-1, S-2, S-3, and S-4) combined.  
(Offsets, Cumulative Increase)
29. To demonstrate compliance with Condition 26, the Owner/Operator shall calculate and record on an annual basis the maximum projected annual emissions of: acetaldehyde, formaldehyde, benzene, and Specified PAHs. Maximum projected annual emissions shall be calculated using the maximum Heat Input Rate of 8,682,544 MMBTU/year and the highest emission factor (pounds of pollutant per MMBTU of heat input) determined by any District approved source test of the S-1 and S-3 Gas Turbines and/or S-2 and S-4 Heat Recovery Steam Generators. If the highest emission factor for a given pollutant occurs during minimum-load turbine operation, a reduced annual heat input rate may be utilized to calculate the maximum projected annual emissions to reflect the reduced heat input rates during gas turbine start-up and minimum-load operation. The reduced annual heat input rate shall be subject to District review and approval. (TRMP).
30. Within 60 days of start-up of the Pico Power Plant, the Owner/Operator shall conduct District-approved source tests on exhaust point P-1 and P-2 to determine the corrected ammonia (NH<sub>3</sub>) emission concentration to determine compliance with Condition 20(e). The source test shall determine the correlation between the heat input rates of each gas turbine (S-1 and S-3) and associated HRSG (S-2 and S-4), A-1, and A-3 SCR System ammonia injection rates, and the corresponding NH<sub>3</sub> emission concentrations at emission point P-1 and P-2. The source tests shall be conducted over the expected operating range of the turbine and HRSG (including, but not limited to, minimum and full load, and SPRINT power augmentation mode) to establish the range of ammonia injection rates necessary to achieve required NO<sub>x</sub> emission reductions while maintaining ammonia slip levels. Source testing shall be repeated on an annual basis thereafter. Ongoing compliance with Condition 20(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlations and continuous records of ammonia injection rate. Source test results shall be submitted to the District and the CEC Compliance Program Manager within 90 days of conducting the tests. (TRMP)
31. Within 90 days of start-up of the Pico Power Plant 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 (including SPRINT power augmentation mode) to determine compliance with Conditions 20(a), (b), (c), (d), (f), (g), (h), and (i) while each Gas Turbine and associated Heat Recovery Steam Generator are operating at minimum load to determine compliance with Conditions 20(c) and (d), and to verify the accuracy of the continuous emission monitors required in Condition 27. The Owner/Operator shall test for (at a minimum): water content,

stack gas flow rate, oxygen concentration, precursor organic compound concentration and mass emissions, nitrogen oxide concentration and mass emissions (as NO<sub>2</sub>), carbon monoxide concentration and mass emissions, sulfur dioxide concentration and mass emissions, methane, ethane, and particulate matter (PM<sub>10</sub>) emissions including condensable particulate matter. Source test results shall be submitted to the District and the CEC Compliance Program Manager within 60 days of conducting the tests. (BACT)

32. The Owner/Operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC Compliance Program Manager (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 in Condition 31 above, the Owner/Operator shall measure and include the contribution of condensable PM (back half) to the total PM<sub>10</sub> 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 60 days of conducting the tests. (BACT)
33. Within 90 days of start-up of the Pico Power Plant, the Owner/Operator shall conduct a District-approved source tests on exhaust point P-1 and P-2 while the Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum allowable operating rates to demonstrate compliance with Condition 26.  
(TRMP)
34. The Owner/Operator of the Pico Power Plant 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)
35. The Owner/Operator of the Pico Power Plant 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, emission rates, monitor excesses, breakdowns, etc.), source test and analytical records, natural gas sulfur content analysis results, 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 Compliance Program Manager staff upon request. (Regulation 2-6-501)
36. The Owner/Operator of the Pico Power Plant shall notify the District and the CEC Compliance Program Manager 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. Notwithstanding 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)

37. The Owner/Operator shall ensure that the stack height of emission points P-1 and P-2 is each at least 95 feet above grade level at the stack base. (TRMP)
38. The Owner/Operator of the Pico Power Plant 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 comply with the District Manual of Procedures, Volume IV, Source Test Policy and Procedures, and shall be subject to BAAQMD review and approval. (Regulation 1-501)
39. Within 180 days of the issuance of the Authority to Construct for the Pico Power Plant, the Owner/Operator shall contact the BAAQMD Technical Services Division regarding requirements for the continuous emission monitors, sampling ports, platforms, and source tests required by Conditions 27, 30, 31, 32, 33, 38, and 45. All source testing and monitoring shall be conducted in accordance with the BAAQMD Manual of Procedures. (Regulation 1-501)
40. Prior to the issuance of the BAAQMD Authority to Construct for the Pico Power Plant, the Owner/Operator shall demonstrate that valid emission reduction credits in the amount of 43.0 tons/year of Nitrogen Oxides (as defined by District Regulation 2-2-302) are under their control through enforceable contracts, option to purchase agreements, or equivalent binding legal documents. (Offsets)
41. Prior to the start of construction of the Pico Power Plant, the Owner/Operator shall provide to the District valid emission reduction credit banking certificates in the amount of 43.0 tons/year of Nitrogen Oxides or equivalent as defined by District Regulations 2-2-302 and 2-2-302.2. (Offsets)
42. Pursuant to BAAQMD Regulation 2, Rule 6, section 404.1, the Owner/Operator of the Pico Power Plant shall submit an application to the BAAQMD for a major facility review permit within 12 months of completing construction as demonstrated by the first firing of any gas turbine or HRSG duct burner. (Regulation 2-6-404.1)
43. Pursuant to 40 CFR Part 72.30(b)(2)(ii) of the Federal Acid Rain Program, the Owner/Operator of the Pico Power Plant shall submit an application for a Title IV operating permit to the BAAQMD at least 24 months before operation of any of the gas turbines (S-1, S-3) or HRSGs (S-2, S-4). (Regulation 2, Rule 7)
44. The Owner/Operator of the Pico Power Plant shall comply with the continuous emission monitoring requirements of 40 CFR Part 75. (Regulation 2, Rule 7)
45. The Owner/Operator shall take monthly samples of the natural gas combusted at the Pico Power Plant. The samples shall be analyzed for sulfur content using District-approved laboratory methods. The sulfur content test results shall be retained on site for a minimum

of five years from the test date and shall be utilized to satisfy the requirements of 40 CFR Part 60, subpart GG.

## **VI Recommendation**

The APCO has made a preliminary decision that the proposed Pico Power Plant power plant, which is composed of the permitted sources listed below, complies with all applicable District rules and regulations, provided the facility complies with the permit conditions contained in this document.

The following sources will be subject to the permit conditions and BACT and offset requirements discussed previously.

- S-1 Combustion Gas Turbine #1, General Electric LM6000 PC SPRINT; 473.7 MM BTU per hour, equipped with water injection, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-2 Heat Recovery Steam Generator #1, equipped with low emission Duct Burners, 136.9 MM BTU per hour, abated by A-1 SCR and A-2 Oxidation Catalyst**
- S-3 Combustion Gas Turbine #2, General Electric LM6000 PC SPRINT; 473.7 MM BTU per hour, equipped with water injection, abated by A-3 SCR and A-4 Oxidation Catalyst**
- S-4 Heat Recovery Steam Generator #2, equipped with low emission Duct Burners, 136.9MM BTU per hour, abated by A-3 SCR and A-4 Oxidation Catalyst**

**The following source is exempt from District permit requirements:**

- S-5 Cooling Tower, 3-Cell, 34,980 gallons per minute capacity, equipped with High Efficiency Drift Eliminators**

Pursuant to District Regulation 2-3-404, this document is subject to the public notice, public comment, and public inspection requirements of Regulation 2-2-406 and 2-2-407. Accordingly, a notice inviting written public comment will be published in a newspaper of general circulation within the vicinity of the proposed project.

Executive Officer/Air Pollution Control Officer  
Bay Area Air Quality Management District  
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San Francisco CA 94109