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Preliminary Determination of Compliance

(Preliminary New Source Review Document)

Palmdale Hybrid Power Project
Palmdale, California

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Executive Director

Antelope Valley Air Quality Management District

February 12, 2009

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List of Abbreviations

APCO	Air Pollution Control Officer
ATC	Authority To Construct
ATCM	Airborne Toxic Control Measure
AVAQMD	Antelope Valley Air Quality Management District
BACT	Best Available Control Technology
CARB	California Air Resources Board
CATEF	California Air Toxics Emission Factors
CEC	California Energy Commission
CEMS	Continuous Emissions Monitoring System
CERMS	Continuous Emission Rate Monitoring System
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CTG	Combustion Turbine Generator
dscf	Dry Standard Cubic Feet
ERC	Emission Reduction Credit
°F	Degrees Fahrenheit (Temperature)
FDOC	Final Determination of Compliance
HAP	Hazardous Air Pollutant
HARP	Hot Spots Analysis and Reporting Program
HDPP	High Desert Power Project
hp	Horsepower
hr	Hour
HRA	Health Risk Assessment
HRSG	Heat Recovery Steam Generator
HTF	Heat Transfer Fluid
LAER	Lowest Achievable Emission Rate
lb	Pound
MACT	Maximum Achievable Control Technology
$\mu g/m^3$	Micrograms per cubic meter
MDAQMD	Mojave Desert Air Quality Management District
MMBtu	Millions of British Thermal Units
n/a	Not applicable
NAAQS	National Ambient Air Quality Standard
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NSPS	New Source Performance Standard
O_2	Molecular Oxygen
OEHHA	Office of Environmental Health Hazard Assessment
o/o	Owner/Operator
PAH	Polycyclic Aromatic Hydrocarbons
PDOC	Preliminary Determination of Compliance

PHPP	Palmdale Hybrid Power Project
$PM_{2.5}$	Fine Particulate, Respirable Fraction ≤ 2.5 microns in diameter
PM_{10}	Fine Particulate, Respirable Fraction ≤ 10 microns in diameter
ppmvd	Parts per million by volume, dry
PSD	Prevention of Significant Deterioration
SCAQMD	South Coast Air Quality Management District
SJVAPCD	San Joaquin Valley Unified Air Pollution Control District
SCLA	Southern California Logistics Airport
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
STG	Steam Turbine Generator
TOG	Total Organic Gases
tpy	Tons per Year
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

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1. Introduction

The Antelope Valley Air Quality Management District (AVAQMD) received an Application for New Source Review for the Palmdale Hybrid Power Project (PHPP) and received a Request for Agency Participation and Application for Certification for the Palmdale Hybrid Power Project (PHPP) on August 18, 2008.[1] This document represents the initial new source review document, or Preliminary Determination of Compliance (PDOC), for the proposed project.

As required by AVAQMD Rule 1306(E)(1)(a), this document will review the proposed project, evaluating worst-case or maximum air quality impacts, and establish control technology requirements and related air quality permit conditions. This document represents the preliminary pre-construction compliance review of the proposed project, to determine whether construction and operation of the proposed project will comply with all applicable AVAQMD rules and regulations.

2. Project Location

The PHPP address is 950 E Ave M, Palmdale, California. The Project site is located on an approximately 377-acre parcel west of the northwest corner of U.S. Air Force Plant 42, and east of the intersection of Sierra Highway and E Ave M, within the City of Palmdale. The project site has been designated non-attainment for the Federal 8-hour ozone ambient air quality standard (NAAQS) and non-attainment of the California ozone and PM_{10} standards (CAAQS). The area is attainment or unclassified for all other standards and averaging times. The project site is currently essentially undeveloped desert.

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3. Description of Project

The City of Palmdale proposes to construct, own, and operate the Palmdale Hybrid Power Project (PHPP or Project). The PHPP consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City of Palmdale (City). The combined-cycle equipment utilizes two natural gas-fired combustion turbine generators (CTG), two heat recovery steam generators (HRSG), and one steam turbine generator (STG). The solar thermal equipment utilizes arrays of parabolic collectors to heat a high-temperature working fluid. The hot working fluid is used to boil water to generate steam. The combined-cycle equipment is integrated thermally with the solar equipment at the HRSG and both utilize the single STG that is part of the Project.

The Project will have a nominal electrical output of 570 MW and commercial operation is planned for the summer of 2012. The solar thermal input will provide approximately 10 percent of the peak power generated by the Project during the daily periods of highest energy demand. The Project will be fueled with natural gas delivered via a new natural gas pipeline. The

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[1] E. Heaston (AVAQMD) to J. Kessler (CEC), August 28, 2008.

Southern California Gas Company (SCG) will design and construct the approximately 8.7-mile pipeline in existing street rights-of-way (ROW) within the City of Palmdale

The project will have twin General Electric 7FA combustion turbine generators (CTGs) with dry low NO_x combustors driving dedicated duct burner-equipped heat recovery steam generators (HRSGs). Each gas turbine will have a maximum heat input rating of 1,736.4 million Btu per hour (MMBtu/hr), and each duct burner will have a maximum heat input rating of 424.3 MMBtu/hr. The (two) CTGs and (two) HRSG duct burners will be exclusively fueled by pipeline-quality natural gas, without back-up liquid fuel firing capability. The CTG power blocks will each include a turbine air compressor section, gas combustion system combustors, power turbine, and a 60-hertz generator. Inlet air will be filtered and conditioned, with inlet cooling provided by an evaporative type cooling system. Ambient air will be filtered and compressed in a multiple-stage axial flow compressor. Compressed air and natural gas will be mixed and combusted in the turbine combustion chamber. Lean pre-mix low NO_x combustors will be used to minimize NO_x formation during combustion. Exhaust gas from the combustion chamber will then expand through a multi-stage power turbine which drives both the air compressor and the electric power generator. Heat from the exhaust gas will then be recovered in a HRSG.

Each HRSG is a horizontal, natural circulation type unit with three pressure levels of steam generation. A duct burner in each HRSG will provide supplementary firing during high ambient temperatures (limited to 2000 hours per year) to maintain constant steam production to the condensing STG. A selective catalytic reduction (SCR) system and high temperature oxidation catalyst will be located within each HRSG. Steam will be produced in each HRSG and flow to the STG. The STG will drive an electric generator to produce electricity. STG exhaust steam will be condensed in a surface condenser with water from a mechanical draft wet cooling tower.

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PHPP will employ a "Rapid Start Process" to shorten startup durations through the use of a modified steam drum complex. In support of this process, the project includes a limited use (500 hour per year) natural gas-fired auxiliary boiler equipped with low NO_x burners (9 ppmvd) with a maximum heat input rating of 110 MMBtu/hr. The auxiliary boiler will provide a sealing steam header to minimize HRSG and STG startup thermal limitations.

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The hybrid nature of the project is based on 251 acres of parabolic sun-tracking mirrors focused on and heating a heat transfer fluid (HTF). The heated fluid circulates through a dedicated steam boiler that provides supplemental steam to each HRSG high pressure steam drum. The solar side will include a limited use (1000 hour per year) natural gas-fired HTF heater equipped with low NO_x burners (9 ppmvd) with a maximum heat input rating of 40 MMBtu/hr. The HTF heater will ensure the HTF circulation system remains above a minimum system temperature of approximately 54 degrees Fahrenheit (°F) during off-line periods.

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A small amount of emergency electrical power will be provided on site by a (2000 kW) 2683 horsepower (hp) diesel-fired internal combustion engine and shaft generator. Emergency fire suppression water pressure will be provided on site by a 182 hp (135 kW) diesel-fired internal combustion engine and shaft water pump.

Overall Project Emissions

PHPP will produce exhaust emissions during three basic performance modes: startup, operations mode, and shutdown. In addition to combustion related emissions, the project will have evaporative and entrained particulate emissions due to the operation of an evaporative cooling tower. There will also be emissions from the use of vehicles for maintenance in the solar field. PM_{10} emission estimates include filterable and condensable particulate (front and back half of the particulate sampling train). Turbine emissions estimates are based on manufacturer data and mass balance. The project is proposing the use of General Electric 7FA gas turbines - operational and transient emissions are based on General Electric data.[2]

Maximum Annual Emissions

Table 1 presents maximum annual facility operational emissions (Table 1A presents maximum annual facility hazardous air pollutant (HAP) emissions). Maximum annual emissions with transients are calculated by assuming fifty cold starts, 260 other (not cold) starts, 310 shutdowns and 4207 hours of operation at the 64° F at 100 percent load hourly rate, with 2000 hours of duct burner operation and maximum auxiliary equipment operation (50 hours for emergency engines). Maximum annual NO_x transient emissions are calculated by assuming 8760 hours of operation at the 64° F at 100 percent load hourly rate, with 2000 hours of duct burner operation and maximum auxiliary equipment operation. Maximum annual SO_x emissions are calculated by assuming 8760 hours at the maximum fuel use rate and maximum duct burner operation with a fuel sulfur content of 0.2 grains/100 dry standard cubic feet and complete conversion of fuel sulfur to exhaust SO_x. The maximum annual cooling tower PM_{10} emissions are calculated by assuming 8760 hours of operation and are included in the facility totals. Maximum total SO_x emissions are presented as 9 tpy, but an unknown fraction of these (fuel sulfur) emissions are accounted for in the PM_{10} emissions (as the PM_{10} estimate includes filterable and condensable particulate). For this project, $PM_{2.5}$ emissions are assumed to be equal to PM_{10} emissions (except for the fugitive dust emissions from vehicles in the solar field).

Table 1 – PHPP Maximum Annual Operational Emissions
(All emissions presented in tons per year)

(All emissions presented in tons per year)	NO_x	CO	VOC	SO_x	PM_{10}	$PM_{2.5}$
Entire Facility (with transients)	90	255	38	5	88	81
Entire Facility (no transients)	115	80	40	9	132	125
PHPP Facility Maximum	**115**	**255**	**40**	**9**	**132**	**125**

[2] "Application for Certification Palmdale Hybrid Power Project," ENSR, July 2008

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Table 1A – PHPP Maximum Annual HAP Emissions
(All emissions presented in pounds per year)

	Total	Threshold
1,3-Butadiene	15	20,000
Acetaldehyde	1389	20,000
Acrolein	222	20,000
Benzene	417	20,000
Ethylbenzene	1111	20,000
Formaldehyde	2465	20,000
Naphthalene	45	20,000
PAH	0	20,000
Propylene Oxide	1007	20,000
Tolulene	4514	20,000
Xylene	2223	20,000
TOTAL HAPS	13,424	**50,000**
Ammonia	197,000	n/a

Note: Threshold equivalent to 10 tpy per HAP and 25 tpy combined

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Maximum Daily Emissions

Table 2 presents maximum daily facility emissions calculated under worst case conditions. Maximum daily NO_x, VOC and CO emissions are calculated by assuming one cold start, two other starts, three shutdowns and 18 hours of operation (with duct burners) at the 23 degree Fahrenheit hourly rate. Maximum daily SO_x and PM_{10} emissions are calculated by assuming 24 hours of operation at the maximum fuel use rate (with duct burners) with a fuel sulfur content of 0.2 grains/100 dscf and complete conversion of fuel sulfur to exhaust SO_x.

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Table 2 – PHPP Maximum Daily Operational Emissions

	NOx	CO	VOC	SO_x	PM_{10}
Pounds per day	1359	4853	577	64	931

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Equivalent Hourly Emission Rates

Table 3 presents maximum hourly emission rates for each CTG (including HRSG) in operational mode. The cooling tower will emit a maximum of 1.63 pounds of PM_{10} per hour. Cooling tower emissions are not included in this table.

Table 3 – PHPP Operational Mode Hourly Emission Rates (per CTG)[1]

All values in pounds per hour

Mode	NO_x	CO	VOC	SO_x	PM_{10} /$PM_{2.5}$
23° F at 100% load	13.47	8.20	4.70	1.05	12.0
23° F at 100% load with duct burner, no solar	16.60	15.16	5.79	1.29	18.0
64° F at 100% load	12.77	7.78	4.45	0.99	12.0
64° F at 100% load with duct burner, max solar	13.67	12.48	4.77	1.06	18.0

1. Assumes that both turbines are operating.

5. Control Technology Evaluation

Best Available Control Technology (BACT) is required for all new permit units at any new facility that emits, or has the potential to emit, 25 tons per year or more of any non-attainment pollutant or its precursors (AVAQMD Rule 1303(A)(3)). The proposed project site is state non-attainment for ozone and PM_{10} and Federal non-attainment for ozone, and their precursors (NO_x, VOC, and SO_x). Based on the proposed project's maximum emissions as calculated in §4 above, each permit unit at the proposed project must be equipped with Lowest Achievable Emission Rate (LAER) for NO_x and VOC, and BACT for CO, PM_{10} and $PM_{2.5}$. The project will trigger BACT for CO, PM_{10} and $PM_{2.5}$ through PSD review; the AVAQMD specifies CO, PM_{10} and $PM_{2.5}$ BACT here to shorten the overall permitting process. The applicant has submitted a BACT analysis that evaluates the BACT and LAER for these pollutants, trace organics, and trace metals.[3]

Both proposed internal combustion engines will be limited to emergency use, except for up to 50 hours per year for testing and maintenance, and required to comply with current emergency internal combustion BACT, which is conformance to the applicable off-road engine standards by size and engine model year. The generator engine must comply with Tier 2 limits, and the fire suppression water pump Tier 3 limits. Both engines will comply with the stationary internal combustion engine air toxics control measure through use limits.

All concentration levels presented in the following BACT determinations are corrected to 15% oxygen, unless otherwise specified.

Ammonia is a by-product of the selective catalytic reduction process, as some ammonia does not react and remains in the exhaust stream. As ammonia is not a regulated criteria air pollutant, but is a hazardous and toxic compound, the AVAQMD will address ammonia emissions as an element of the toxics new source review analysis (§8).

NO_x LAER

NO_x is a precursor of ozone, PM_{10} and $PM_{2.5}$, and both ozone and PM_{10} are state non-attainment pollutants at the proposed facility location, as well as ozone is Federal non-attainment in this

[3] ibid

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area. NO_x will be formed by the oxidation of atmospheric nitrogen during combustion within the gas turbine generating systems.

A review of recent combined-cycle CTG NO_x LAER determinations demonstrates that 2.0 ppm is the most stringent NO_x limit to date, with varying averaging times. PHPP is requesting 2.0 ppmvd averaged over one hour.

A limit on the ammonia slip is an integral part of the NO_x limit, due to the dynamics of the reduction chemistry and physical limits to the extent of the effective reduction chemistry zone (limited by temperature and duration). Ammonia slip dynamics are further complicated by the use of a duct burner within the HRSG, an integral part of the PHPP. A review of those same recent combined-cycle CTG (with duct burners) NO_x LAER determinations demonstrates that a maximum of five ppmvd ammonia slip is an element of the most stringent NO_x limit to date. PHPP is requesting five ppmvd ammonia slip.

By definition operation at transient conditions will disrupt operation of the selective catalytic reduction system, through temperature and flow variation. Minimizing the duration of transient conditions will also minimize the disruption of the combustion air pollution control system. PHPP proposes to use "Rapid Start Process" to minimize startup durations.

A review of recent small scale limited use natural gas combustion boiler/heater LAER determinations demonstrates that 9 ppmvd at 3% oxygen is the most stringent NO_x limit to date. PHPP is requesting 9 ppmvd at 3% oxygen for the auxiliary boiler and HTF heater.

The AVAQMD therefore determines that a maximum NO_x concentration of 2.0 ppmvd averaged over one hour, with an ammonia slip of 5 ppmvd averaged over three hours, and using "rapid" start operational methods, is acceptable as NO_x LAER for the PHPP combined cycle gas turbine power trains, achieved with low-NO_x burners and selective catalytic reduction in the presence of ammonia. The AVAQMD also determines that a maximum NO_x concentration of 9 ppmvd at 3% oxygen is acceptable as NO_x LAER for the PHPP limited use auxiliary boiler and HTF heater, achieved with low-NO_x burners.

CO BACT

Carbon monoxide is formed as a result of incomplete combustion of fuel within the gas turbine generating systems. CO is an attainment pollutant at the proposed facility location.

A review of recent combined-cycle CTG CO BACT determinations demonstrates that 2.0 ppm is the most stringent CO limit for similar facilities, with varying averaging times (3.0 ppm when duct burner operation is accounted for). PHPP is requesting 2.0 ppmvd averaged over one hour, 3.0 ppmvd averaged over one hour when the duct burner is in operation.

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By definition operation at transient conditions will disrupt operation of the catalytic oxidation system, through temperature and flow variation. Minimizing the duration of transient conditions will also minimize the disruption of the combustion air pollution control system. PHPP proposes to use a "Rapid Start Process" to minimize startup durations.

A review of recent small scale limited use natural gas combustion boiler/heater BACT determinations demonstrates that 50 ppmvd at 3% oxygen is the most stringent CO limit to date. PHPP is requesting 50 ppmvd at 3% oxygen for the auxiliary boiler and HTF heater.

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The AVAQMD therefore determines that a maximum CO concentration of 2.0 ppmvd (without duct burning) and 3.0 ppmvd (with duct burning) averaged over one hour, and using "rapid" start operation methods, is acceptable as CO BACT for the PHPP combined cycle gas turbine power trains, achieved with an oxidation catalyst. The AVAQMD also determines that a maximum CO concentration of 50 ppmvd at 3% oxygen is acceptable as CO BACT for the PHPP limited use auxiliary boiler and HTF heater, achieved with low-NO_x burners.

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PM_{10} and $PM_{2.5}$ BACT

PM_{10} is a state non-attainment pollutant at the proposed facility location. Particulate will be emitted by the gas-fired systems due to fuel sulfur, inert trace contaminants, mercaptans in the fuel, dust drawn in from the ambient air and particulate of carbon, metals worn from the equipment while in operation, and hydrocarbons resulting from incomplete combustion. Particulate will also be emitted by the cooling towers through evaporation and particulate mist entrainment. Fugitive dust may also be caused by vehicle use in the solar field.

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Natural-Gas Fired Equipment

There have not been any add-on particulate control systems developed for gas turbines from the promulgation of the first New Source Performance Standard for Stationary Turbines (40 CFR 60 Subpart GG, commencing with §60.330) in 1979 to the present. The cost of installing such a device has been and continues to be prohibitive and performance standards for particulate control of stationary gas turbines have not been proposed or promulgated by USEPA. Inlet filters are used to protect the gas turbine, which also have the effect of reducing particulate loading into the combustion process.

The most stringent particulate control method for gas-fired equipment is the use of low ash fuels such as natural gas. Combustion control and the use of low or zero ash fuel (such as natural gas) is the predominant control method listed for turbines, boilers, and heaters with PM limits. CARB guidance suggests a requirement to burn natural gas with a fuel sulfur content not greater than 1 grain/100 dscf is PM_{10} BACT. PHPP proposes the sole use of natural gas with a sulfur content not greater than 0.2 grains/100 dscf on an annual average basis as fuel.

The AVAQMD therefore determines that the sole use of natural gas fuel with a fuel sulfur content not greater than 0.2 grain per 100 scf on an annual average basis is acceptable as PM_{10} and $PM_{2.5}$ BACT for the PHPP combined cycle gas turbine power trains, auxiliary boiler and HTF heater.

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Cooling Towers

The only particulate control method for evaporative cooling towers is the use of drift eliminators. PHPP proposes drift eliminators limiting drift to 0.0005 percent.

The AVAQMD therefore determines that drift eliminators limiting drift to 0.0005 percent are acceptable as PM_{10} and $PM_{2.5}$ BACT for the PHPP cooling towers.

VOC and Trace Organic LAER

VOC is a precursor for ozone and PM_{10} and $PM_{2.5}$, and ozone and PM_{10} are state non-attainment pollutants at the proposed facility location. VOCs and trace organics are emitted from natural gas-fired turbines as a result of incomplete combustion of fuel and trace organics contained in pipeline-quality natural gas.

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The most stringent VOC control level for gas turbines has been achieved by those which employ catalytic oxidation for CO control. An oxidation catalyst designed to control CO would provide a side benefit of controlling VOC emissions. The MDAQMD has determined that a maximum VOC concentration of 1 ppmvd averaged over one hour was VOC LAER for the High Desert Power Project (achieved through the use of an oxidation catalyst optimized for VOC control). PHPP proposes a VOC emission limit of 1.4 ppmvd without duct firing, 2.0 ppmvd with duct firing, achieved through the use of an oxidation catalyst. A slightly higher level than previous combined cycle gas turbine projects is proposed for PHPP due to changes in the configuration to accommodate the design changes associated with the "rapid start process" and its associated air pollutant reductions, for which there is no operational experience.

By definition operation at transient conditions will disrupt operation of the catalytic oxidation system, through temperature and flow variation. Minimizing the duration of transient conditions will also minimize the disruption of the combustion air pollution control system. PHPP proposes to use a "Rapid Start Process" to minimize startup durations.

A review of recent small scale limited use natural gas combustion boiler/heater BACT/LAER determinations demonstrates that combustion controls (in accordance with NO_x controls) are the most stringent VOC control requirement. PHPP is requesting natural gas as sole fuel and good combustion practices (not to exceed 0.005 lb/MMBtu VOC) for the auxiliary boiler and HTF heater.

The AVAQMD therefore determines that a maximum VOC concentration of 1.4 ppmvd averaged over one hour without duct burners, 2.0 ppmvd averaged over one hour with duct burners, and using "rapid" start operation methods, is acceptable as VOC and trace organic LAER for the PHPP combined cycle gas turbine power trains, achieved with an oxidation catalyst. The AVAQMD also determines that a maximum VOC emission rate of 0.005 lb/MMBtu is acceptable as VOC LAER for the PHPP limited use auxiliary boiler and HTF heater, achieved with good combustion practices.

6. PSD Class I Area Protection

PHPP evaluated the NO_2, PM_{10}, and $PM_{2.5}$ increment consumption, visibility reduction potential, nitrogen deposition, and plume blight of project emissions on two (2) Prevention of Significant Deterioration (PSD) Class I areas within 100 kilometers of the proposed facility site. The AVAQMD approves of the increment consumption, acid deposition, and visibility analysis methods and findings.

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Findings

PHPP NO_2 and PM_{10} concentrations at each of the two Class I areas are well below the USEPA Significant Impact Level and Class I increments. Although increments have not yet been defined for $PM_{2.5}$, maximum $PM_{2.5}$ concentrations where found to be less than two percent of the PSD Class I area PM_{10} increments. PHPP maximum 24-hour increase in the particle scattering coefficient at each area is less than the significant change level. Maximum PHPP deposition rates at each area are below the Federal Land Manager threshold. PHPP plume perceptibility and contrast were both well below the screening criteria at the applicable area.

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Inputs and Methods

Visibility impacts were evaluated at the Cucamonga Wilderness Area and the San Gabriel Wilderness Area. CALMET meteorological data for 2002 through 2004 were used for the analysis. Worst-case one hour emissions were used for the analysis. NO_2, PM_{10}, and $PM_{2.5}$ increment, visibility and deposition impacts were evaluated using the USEPA CALPUFF model. Plume blight was evaluated using VISCREEN.

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7. Air Quality Impact Analysis

PHPP performed the ambient air quality standard impact analyses for CO, PM_{10}, $PM_{2.5}$, SO_2 and NO_2 emissions. The AVAQMD approves of the analysis methods used in these impact analyses and the findings of these impact analyses.

Findings

The impact analysis calculated a maximum incremental increase for each pollutant for each applicable averaging period, as shown in Table 4 below. When added to the maximum recent background concentration, the PHPP did not exceed the most stringent (or lowest) standard for any pollutant except PM_{10}, which is already in excess of the state standard without the project. The PHPP was estimated to consume a maximum annual NO_2 increment of 0.002 $\mu g/m^3$ in a PSD Class I area, which is less than the NO_2 increment threshold of 2.5 $\mu g/m^3$. The PHPP was estimated to consume a maximum annual NO_2 increment of 0.98 $\mu g/m^3$ in a PSD Class II area, which is less than the overall NO_2 increment threshold of 25 $\mu g/m^3$ and the 1.0 $\mu g/m^3$ Class II significant impact level.

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Table 4 – PHPP Worst Case Ambient Air Quality Impacts

Pollutant	Project Impact	Background	Total Impact	Federal Standard	State Standard
	All values in µg/m³				
CO (1 hour)	366.9	3680	4046.9	40,000	23,000
CO (8 hour)	20.4	1840	1860.4	10,000	10,000
PM_{10} (24 hour)	12.9	86	98.9	150	50
PM_{10} (annual)	1.1	25	26.1	n/a	20
$PM_{2.5}$ (24 hour)	12.9	17	29.9	35	n/a
$PM_{2.5}$ (annual)	1.1	8.9	10.0	15	12
SO_2 (1 hour)	1.7	34.1	35.8	n/a	665
SO_2 (3 hour)	1.3	23.6	24.9	1300	n/a
SO_2 (24 hour)	0.9	15.7	16.6	365	105
SO_2 (annual)	0.2	5.2	5.4	80	n/a
NO_2 (1 hour)	203.0	139.2	291.1[1]	n/a	339
NO_2 (annual)	6.6	28.2	34.8	100	57

1 Modeled NO_2 concentrations as determined with the OLM. NO_2 background shown is the maximum during the 3-years, actual concentration based on an hourly matched background value per OLM analysis.
2 Highest value from Table 5.2-48R
3 Modeled concentration plus ambient background.
4 The annual PM_{10} NAAQS of 50 µg/m3 was revoked by EPA on September 21st, 2006. Federal Register Vol. 71 Number 200 10/17/2006.
5 $PM_{2.5}$ Project maximum modeled concentration assumed equal to PM_{10} concentrations.
6. See modeling discussion for how these values were determined.

Inputs and Methods

Worst case emissions were used as inputs, meaning 100 percent full load in most cases, except for half load in the case of the three hour SO_2 standard and the 24 hour PM_{10} standard. Modeling of pollutants for annual averages was conducted using the 64 degree Fahrenheit emissions rate (the annual average condition). A three-year (2002 through 2004) sequential hourly meteorological data set from the AVAQMD Sierra Avenue station was used, supplemented with cloud cover and cloud ceiling height data from the National Weather Service station at Fox Field in Lancaster. Mixing heights were determined from Desert Rock, Nevada data. For determining NO_2 impacts using a NO_x background, the hourly Ozone Limiting Method for conversion of NO_x to NO_2 was used.

The AERMOD dispersion model (version 04300) was used to estimate ambient concentrations resulting from PHPP emissions. The dispersion modeling was performed according to requirements stated in the USEPA Guideline on Air Quality Models.

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8. Health Risk Assessment and Toxics New Source Review

PHPP performed a Health Risk Assessment (HRA) for carcinogenic, non-carcinogenic chronic, and non-carcinogenic acute toxic air contaminants. The AVAQMD approves of the HRA methods and findings.

Findings

The HRA calculated a peak 70-year cancer risk of 0.36 per million. The calculated peak 70-year residential cancer risk is less than 1.0 per million (for all receptors). The maximum non-cancer chronic and acute hazard indices are both less than the significance level of 1.0 (0.0008 and 0.028, respectively). As these risks make the project a "low priority" project, and as the project emits less than 10 tons per year of every single HAP and 25 tons per year of any combination of HAPs, no further toxics new source review is required for this project (Rule 1320(E)(2)(b)). Please refer to Table 1A above for a summary of project HAP emissions.

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Inputs and Methods

PHPP will emit toxic air contaminants as products of natural gas combustion, diesel fuel combustion, equipment wear, ammonia slip from the SCR systems, and cooling tower emissions. Combustion emissions were estimated using emission factors from OEHHA and USEPA, and a speciation profile for polycyclic aromatic hydrocarbons (PAH) was derived from the California Air Toxics Emission Factors (CATEF) database. Ammonia slip was assumed to be 5 ppm in the stack exhaust. Cooling tower emissions were estimated using USEPA emission factors for evaporative emissions, engineering calculation for drift droplets, and water quality data from the Victor Valley Water Reclamation Authority.

The ISCST3 dispersion model (as incorporated into HARP) was used to estimate ambient concentrations of toxic air pollutants. The Hot Spots and Reporting Program (HARP, Version 1.4, 2008) risk assessment model was used to estimate health risks due to exposure to emissions. The AERMET/AERMOD meteorological dataset was used for the risk analysis.

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9. Offset Requirements

AVAQMD Regulation XIII – *New Source Review* requires offsets for non-attainment pollutants and their precursors emitted by large, new sources. PHPP has prepared and submitted a proposed offset package for the proposed project as required by Rule 1302(C)(3)(b). PHPP is proposed for a location that has been designated non-attainment by USEPA for ozone, AVAQMD Rule 1303(B)(1) specifies offset threshold amounts for the state non-attainment pollutant PM_{10}. AVAQMD Rule 1303(B)(1) also specifies offset threshold amounts for precursors of non-attainment pollutants: NO_x (precursor of ozone and PM_{10}), SO_x (precursor of PM_{10}), and VOC (precursor of ozone and PM_{10}). A new facility which emits or has the potential to emit more than these offset thresholds must obtain offsets equal to the facility's entire potential to emit. As Table 5 shows, maximum PHPP annual emissions exceed the offset thresholds for three of the four non-attainment pollutants and/or precursors. The table uses PHPP maximum or worst-case annual emissions. The table also includes all applicable emissions, including the emissions increases from proposed new permit units (turbines, duct burners, SCR, boiler, heater, engines and cooling equipment), cargo carriers (none are proposed),

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fugitive emissions (from vehicle use in the solar field), and non-permitted equipment (none are proposed). For this analysis the AVAQMD assumes SO_2 is equivalent to SO_x. Note that some fraction of sulfur compounds are included in both the SO_x and the PM_{10} totals, as the PM_{10} total includes front and back half particulate.

Table 5 - Comparison of PHPP Emissions with Offset Thresholds
All emissions in tons per year

	NO_x	VOC	SO_x	PM_{10}
Maximum Annual Potential to Emit	115	40	9	132
Offset Threshold	25	25	25	15

Required Offsets

AVAQMD Rule 1305 increases the amount of offsets required based on the location of the facility obtaining the offsets (on a pollutant category specific basis). As PHPP is located in two overlapping non-attainment areas, a Federal ozone non-attainment area and a state PM_{10} non-attainment area, the largest applicable offset ratio applies. Table 6 calculates the offsets required for PHPP.

Table 6 – Emission Offsets Required for PHPP
All emissions in tons per year

	NO_x	VOC	PM_{10}
PHPP Emissions	115	40	132
Offset Ratio	1.3	1.3	1.0
Required Offsets	**150**	**52**	**132**

Identified Potential Emission Reduction Credits

PHPP has also identified potential ERCs resulting from the paving of existing unpaved roads as a source of PM_{10} ERCs. The MDAQMD has previously allowed the use of road paving PM_{10} reductions for New Source Review actions, and the AVAQMD supports the use of road paving PM_{10} reductions to offset natural gas combustion PM_{10} emissions within a PM_{10} non-attainment area. The AVAQMD will analyze road paving ERC quantification and issuance process in a manner similar to the MDAQMD Rule 1406 - *Generation of Emission Reduction Credits for Paving Unpaved Public Roads*, to determine the exact amount of ERCs that can be issued to PHPP in response to the paving of any given existing unpaved road segments. Adequate existing unpaved roads are present within the AVAQMD to offset the proposed PHPP.

The proposed PHPP ERC sources are summarized in Table 7.

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Table 7 – ERC Sources Identified by PHPP All emissions in tons per year			
Source	Location	**VOC**	**PM_{10}**
SJVAPCD or other source	AVAQMD (pending)	456.3	
Road Paving	AVAQMD (pending)		145
Total ERCs potentially Identified:		**456.3**	**145**

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Inter-District, Inter-Basin and Inter-Pollutant Offsetting

PHPP proposes the use of inter-district and inter-basin offsets from the MDAQMD, SJVAPCD or other source. AVAQMD Rule 1305(B) explicitly allows for the use of inter-district and inter-basin offsets (in consultation with CARB and with the approval of USEPA).

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The MDAQMD has previously allowed the use of inter-district offsets for the High Desert Power Project, the Blythe Energy Project, and the Blythe Energy Project II. In each case CARB and USEPA did not object to the inter-district trade. The proposed inter-district trade originates in an air district (SJVAPCD or SCAQMD) that is both upwind from, and has a higher ozone non-attainment classification than, the AVAQMD. The South Coast Air Basin and San Joaquin Valley Air Basin have been determined to be a source of overwhelming transport of air pollution into the Mojave Desert Air Basin by CARB; overwhelming in the sense that local emissions are overwhelmed by South Coast Air Basin emissions being transported into the local area. The nature of the ozone problem at the project site (and within the entire AVAQMD federal ozone attainment area) is a function of ozone and ozone precursor emissions from the SCAQMD and SJVAPCD. The regional nature of the AVAQMD ozone problem has been explicitly and implicitly recognized by both districts, CARB and USEPA since the mid 1990s, as ozone State Implementation Plans (SIPs) submitted and approved by all four agencies include a "but for" attainment demonstration for the AVAQMD. This attainment demonstration indicates that the AVAQMD would be in attainment "but for" ozone and ozone precursors originating within the SCAQMD and SJVAPCD, and that ozone precursor emission reductions within the SCAQMD and SJVAPCD are necessary for the AVAQMD to demonstrate attainment of the Federal standard. The reduction of ERCs within the SCAQMD or SJVAPCD and their consumption within the AVAQMD represents a reduction in potential upwind ozone precursors, in direct support of regional ozone attainment efforts. On the basis of this intimate regional ozone relationship, and supported by regional ozone attainment demonstration modeling as presented in every recent regional ozone SIP, the AVAQMD finds that the use of inter-district ozone precursor offsets from SCAQMD or SJVAPCD is technically justified for the PHPP, and finds no technical justification for an inter-district or inter-basin based distance ratio (other than the nominal 1:1).

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PHPP has proposed to use inter-pollutant ERC trading to make up for the limited amount of ozone precursor ERCs available within the AVAQMD. AVAQMD Rule 1305(B) specifically allows for the use of inter-pollutant offsets (in consultation with CARB and with the approval of USEPA).

The MDAQMD has previously approved the use of inter-pollutant ERC trading (specifically between VOC and NO_x) for the High Desert Power Project, the Blythe Energy Project, and the Blythe Energy Project II. In each case CARB and USEPA Region IX did not object to the inter-pollutant trade. Therefore the AVAQMD PHPP is proposing to use VOC ERCs to offset NO_x emissions at a 1.6:1 ratio. The proposed inter-pollutant VOC for NO_x ratio for PHPP is consistent with prior inter-pollutant actions. This inter-pollutant ratio was established by agreement between the AVAQMD, USEPA, CARB and the CEC during the permitting and licensing process for the High Desert Power Project. At that time it was determined that no acceptably accurate project-specific evaluation tool or mechanism existed to quantify a VOC for NO_x ratio for new sources within the AVAQMD, primarily due to the coarseness of regional ozone modeling and the relatively small scale of proposed emission decreases and increases. Both the reduction associated with the ERCs and the increase associated with the new project are less than the sensitivity threshold of regional ozone modeling (the region has an ozone precursor emissions inventory measured in excess of a thousand tons per day). In addition, any net reduction in ozone precursors produces a net benefit to the regional ozone attainment effort, given the established historical efficiency of the region in photochemically producing ozone from existing ozone precursor emissions. The AVAQMD concludes that a VOC for NO_x ratio of 1.6:1 is acceptable, conservative and technically justified for PHPP.

The AVAQMD determines that the proposed sources of offsets and use of ERCs as offsets is technically justified and will not cause or contribute to a violation of an ambient air quality standard. Table 8 summarizes the total offset requirements for the PHPP.

Table 8 – Total PHPP Offset Requirements
All emissions in tons per year

	NO_x	**VOC**	**PM_{10}**
Project Offset Obligation	150	52	132
Inter-pollutant Ratio	*1.6*		
Inter-pollutant Offset Burden	240	52	132
Required Offsets		**290**	**132**
Identified Offsets		456	145

For ozone precursors, NOx and VOC, offsets will be obtained through interbasin, interpollutant trading. These offsets will be obtained from the SJVAPCD or other source, open market, or another appropriate mechanism.

For PM_{10} ERCs, the Project Applicant plans to work closely with the AVAQMD to develop a rule to allow for the banking of PM_{10} ERCs from the paving of unpaved roads if required by USEPA. MDAQMD has developed Rule 1406, which was patterned after a similar rule that was developed by Maricopa County, Arizona Air Quality Department (MCAQD) which has been approved by EPA.

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10. Applicable Regulations and Compliance Analysis

Selected AVAQMD Rules and Regulations will apply to the proposed project:

Regulation II – Permits

Rule 218 - *Stack Monitoring* requires certain facilities to install and maintain stack monitoring systems. The proposed project will be required to install and maintain stack monitoring systems by permit condition.

Rule 225 – *Federal Operating Permit Requirements* requires certain facilities to obtain federal operating permits. The proposed project will be required to submit an application for a federal operating permit within twelve months of the commencement of operations.

Regulation IV - Prohibitions

Rule 401 – *Visible Emissions* limits visible emissions opacity to less than 20 percent (or Ringelmann No. 1). During start up, visible emissions may exceed 20 percent opacity. However, emissions of this opacity are not expected to last three minutes or longer. In normal operating mode, visible emissions are not expected to exceed 20 percent opacity.

Rule 402 – *Nuisance* prohibits facility emissions that cause a public nuisance. The proposed turbine power train exhaust is not expected to generate a public nuisance due to the sole use of pipeline-quality natural gas as a fuel. In addition, due to the location of the proposed project, no nuisance complaints are expected.

Rule 403 – *Fugitive Dust* specifies requirements for controlling fugitive dust. The proposed project does not include any significant sources of fugitive dust so the proposed project is not expected to violate Rule 403.

Rule 404 – *Particulate Matter – Concentration* specifies standards of emissions for particulate matter concentrations. The sole use of pipeline-quality natural gas as a fuel will keep proposed project emission levels in compliance with Rule 404.

Rule 405 – *Solid Particulate Matter - Weight* limits particulate matter emissions from fuel combustion on a mass per unit combusted basis. The sole use of pipeline-quality natural gas as a fuel will keep proposed project emission levels in compliance with Rule 405.

Rule 408 – *Circumvention* prohibits hidden or secondary rule violations. The proposed project is not expected to violate Rule 408.

Rule 409 – *Combustion Contaminants* limits total particulate emissions on a density basis. The sole use of pipeline-quality natural gas a fuel will keep proposed project emission levels in compliance with Rule 409.

Rule 430 – *Breakdown Provisions* requires the reporting of breakdowns and excess emissions. The proposed project will be required to comply with Rule 430 by permit condition.

Rule 431.1, 431.2 and 431.3 – *Sulfur Content in Fuels* limits sulfur content in gaseous, liquid and solid fuels. The sole use of pipeline-quality natural gas a fuel will keep the proposed project in compliance with Rule 431.

Rule 476 - *Steam Generating Equipment* limits NO_x and particulate matter from steam boilers, including the auxiliary boiler, and specifies monitoring and recordkeeping for such equipment. The proposed project will have specific permit conditions requiring compliance with these provisions.

Regulation IX – Standards of Performance for New Stationary Sources

Regulation IX includes by reference the New Source Performance Standards (NSPS) for New Stationary Combustion Turbines (40 CFR 60 Subpart KKKK), NSPS for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII), and NSPS for Industrial-Commercial-Institutional Steam Generating Units (40 CFR 60 Subpart Db). Permit conditions for the proposed project will establish limits which are in compliance with the turbine, auxiliary boiler, and compression ignition engine NSPS referenced in Regulation IX.

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Regulation XI - Source Specific Standards

Rule 1113 - *Architectural Coatings* limits VOC content of applied architectural coatings. The proposed project will be required to use compliant coatings by permit condition.

Rule 1134 - Emissions of Oxides of Nitrogen from Stationary Gas Turbines. Limits NO_x emissions from combined-cycle turbines and specifies monitoring and recordkeeping for such equipment. The proposed project will have specific permit conditions requiring compliance with these provisions.

Rule 1135 - Emissions of Oxides of Nitrogen from Electric Power Generating Systems. Limits emission from selected combustion equipment, including equipment such as the HTF heater, and specifies monitoring and recordkeeping for such equipment. The proposed project will have specific permit conditions requiring compliance with these provisions.

Regulation XIII – New Source Review

Rule 1300 – *General* ensures that Prevention of Significant Deterioration (PSD) requirements apply to all projects. The proposed project has submitted an application to the USEPA for a PSD permit that regulates PHPP emissions of NO_2, CO and $PM_{2.5}$, complying with Rule 1300.

Rule 1302 – *Procedure* requires certification of compliance with the Federal Clean Air Act, applicable implementation plans, and all applicable AVAQMD rules and regulations. The ATC application package for the proposed project includes sufficient documentation to comply with Rule 1302(D)(5)(b)(iii). Permit conditions for the proposed project will require compliance with Rule 1302(D)(5)(b)(iv).

Rule 1303 – *Requirements* requires BACT and offsets for selected large new sources. Permit conditions will limit the emissions from the proposed project to a level which has been defined as BACT for the proposed project, bringing the proposed project into compliance with Rule 1302(A). Prior to the commencement of construction the proposed project shall have obtained sufficient offsets to comply with Rule 1303(B)(1).

Rule 1305 – *Emissions Offsets* provides the procedures and formulas to determine the eligibility, calculations and use of Offsets required pursuant to the provisions of District Rile 1303 (B). Fugitive Emissions, as defined in Rule 1301 (HH), will be included when calculating the base quantity of offsets as required by Rule 1305.

Rule 1306 – *Electric Energy Generating Facilities* places additional administrative requirements on projects involving approval by the California Energy Commission (CEC). The proposed project will not receive an ATC without CEC's approval of their Application for Certification, ensuring compliance with Rule 1306.

Regulation XXX – Federal Operating Permits

Regulation XII contains requirements for sources which must have a federal operating permit and an acid rain permit. The proposed project will be required to submit applications for a federal operating permit and an acid rain permit by the appropriate date.

Maximum Achievable Control Technology Standards

Health & Safety Code §39658(b)(1) states that when USEPA adopts a standard for a toxic air contaminant pursuant to §112 of the Federal Clean Air Act (42 USC §7412), such standard becomes the Airborne Toxic Control Measure (ATCM) for the toxic air contaminant. Once an ATCM has been adopted it becomes enforceable by the AVAQMD 120 days after adoption or implementation (Health & Safety Code §39666(d)). USEPA has not to date adopted a Maximum Achievable Control Technology (MACT) standard that is applicable to the proposed project. Should USEPA adopt an applicable MACT standard in the future, the AVAQMD will be required to enforce said MACT as an ATCM on the proposed project. MACT is also required for each major source of toxic air contaminants. PHPP will not emit more than ten tons per year of any individual toxic air contaminant, and will not collectively emit more than 25 tons per year of all toxic air contaminants, so MACT is not required.

11. Conclusion

The AVAQMD has reviewed the proposed project's Application for New Source Review and subsequent supplementary information. The AVAQMD has determined that the proposed project, after application of the permit conditions (including BACT/LAER requirements) given below, will comply with all applicable AVAQMD Rules and Regulations. This PDOC will be released for public comment and publicly noticed on or after February 12, 2009. Written comments will be accepted for thirty days from the date of publication of the public notice. A

Final Determination of Compliance shall be prepared no later than thirty days after the end of the public comment period (approximately April 14, 2009).

Please forward any comments on this document to:

Eldon Heaston
Executive Director
Antelope Valley Air Quality Management District
43301 Division Street, Suite 206
Lancaster, CA 93535-4649

12. Permit Conditions

The following permit conditions will be placed on the Authorities to Construct for the project. Separate permits will be issued for each turbine power train. Separate permits will also be issued for each oxidation catalyst, SCR system, duct burner, cooling tower, auxiliary boiler, HTF heater and emergency internal combustion engine. The electronic version of this document contains a set of conditions that are essentially identical for each of multiple pieces of equipment, differing only in AVAQMD permit reference numbers. The signed and printed FDOC will have printed permits (with descriptions and conditions) in place of condition language listings.

Combustion Turbine Generator Power Block Authority to Construct Conditions

[2 individual 1736.4 MMBtu/hr F Class Gas Combustion Turbine Generators, Application Numbers: 00010013 and 00010014]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be exclusively fueled with pipeline quality natural gas with a sulfur content not exceeding 0.2 grains per 100 dscf on a rolling twelve month average basis, and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. This equipment is subject to the Federal NSPS codified at 40 CFR Part 60, Subparts A (General Provisions) and KKKK (Standards of Performance for New Stationary Gas Turbines). This equipment is also subject to the Prevention of Significant Deterioration (40 CFR 51.166) and Federal Acid Rain (Title IV) programs. Compliance with all applicable provisions of these regulations is required.

4. Emissions from this equipment (including its associated duct burner) shall not exceed the following emission limits at any firing rate, except for CO, NO_x and VOC during periods of startup, shutdown and malfunction:
   a. Hourly rates, computed every 15 minutes, verified by CEMS and annual compliance tests:
      i. NO_x as NO_2 – 16.60 lb/hr (based on 2.0 ppmvd corrected to 15% O_2 and averaged over one hour) **Deleted:** 5
      ii. CO – 15.16 lb/hr (based on 2.0 ppmvd (3.0 ppmvd with duct firing) corrected to 15% O_2 and averaged over one hour) **Deleted:** 4 **Deleted:** 25
   b. Hourly rates, verified by annual compliance tests or other compliance methods in the case of SOx:
      i. VOC as CH_4 – 5.79 lb/hr (based on 1.4 ppmvd (2.0 ppmvd with duct firing) corrected to 15% O_2) **Deleted:** 44
      ii. SO_x as SO_2 – 1.29 lb/hr (based on 0.2 grains/100 dscf fuel sulfur) **Deleted:** 1
      iii. PM_{10} – 18.0 lb/hr

5. Emissions of CO and NO_x from this equipment shall only exceed the limits contained in Condition 4 during startup and shutdown periods as follows:

a. Startup is defined as the period beginning with ignition and lasting until the equipment has reached operating permit limits. Cold startup is defined as a startup when the CTG has not been in operation during the preceding 48 hours. Other startup is defined as a startup that is not a cold startup. Shutdown is defined as the period beginning with the lowering of equipment from base load and lasting until fuel flow is completely off and combustion has ceased.

b. Transient conditions shall not exceed the following durations:
   i. Cold startup – 110 minutes
   ii. Other startup – 80 minutes
   iii. Shutdown – 30 minutes

c. During a cold startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 96 lb
   ii. CO – 410 lb

d. During any other startup emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 40 lb
   ii. CO – 329 lb

e. During a shutdown emissions shall not exceed the following, verified by CEMS:
   i. NO_x – 57 lb
   ii. CO – 337 lb

6. Emissions from this facility, including the duct burner, auxiliary equipment, engines, cooling tower, shall not exceed the following emission limits, based on a calendar day summary:
   a. NO_x – 1359 lb/day, verified by CEMS
   b. CO – 4833 lb/day, verified by CEMS
   c. VOC as CH_4 – 577 lb/day, verified by compliance tests and hours of operation in mode
   d. SO_x as SO_2 – 64 lb/day, verified by fuel sulfur content and fuel use data
   e. PM_{10} – 931 lb/day, verified by compliance tests and hours of operation

7. Emissions from this facility, including the duct burner, auxiliary equipment, engines, cooling tower and fugitive dust for vehicle use in the solar field, shall not exceed the following emission limits, based on a rolling 12 month summary:
   a. NO_x – 115 tons/year, verified by CEMS
   b. CO – 255 tons/year, verified by CEMS
   c. VOC as CH_4 – 40 tons/year, verified by compliance tests and hours of operation in mode
   d. SO_x as SO_2 – 9 tons/year, verified by fuel sulfur content and fuel use data
   e. PM_{10} – 132 tons/year, verified by compliance tests and hours of operation
   f. $PM_{2.5}$ – 125 tons/year, verified by compliance tests and hours of operation

8. Particulate emissions from this equipment shall not exceed an opacity equal to or greater than twenty percent (20%) for a period aggregating more than three (3) minutes in any one (1) hour, excluding uncombined water vapor.

9. This equipment shall exhaust through a stack at a minimum height of 145 feet.

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10. The owner/operator (o/o) shall not operate this equipment after the initial commissioning period without the oxidation catalyst with valid District permit C00nnnn and the selective catalytic reduction system with valid District permit C00nnnn installed and fully functional.

11. The o/o shall provide stack sampling ports and platforms necessary to perform source tests required to verify compliance with District rules, regulations and permit conditions. The location of these ports and platforms shall be subject to District approval.

12. Emissions of NO_x, CO, oxygen and ammonia slip shall be monitored using a Continuous Emissions Monitoring System (CEMS). Turbine fuel consumption shall be monitored using a continuous monitoring system. Stack gas flow rate shall be monitored using either a Continuous Emission Rate Monitoring System (CERMS) meeting the requirements of 40 CFR 75 Appendix A or a stack flow rate calculation method. The o/o shall install, calibrate, maintain, and operate these monitoring systems according to a District-approved monitoring plan and AVAQMD Rule 218, and they shall be installed prior to initial equipment startup after initial steam blows are completed. Two (2) months prior to installation the operator shall submit a monitoring plan for District review and approval.

13. The o/o shall conduct all required compliance/certification tests in accordance with a District-approved test plan. Thirty (30) days prior to the compliance/certification tests the operator shall provide a written test plan for District review and approval. Written notice of the compliance/certification test shall be provided to the District ten (10) days prior to the tests so that an observer may be present. A written report with the results of such compliance/certification tests shall be submitted to the District within forty-five (45) days after testing.

14. The o/o shall perform the following annual compliance tests on this equipment in accordance with the AVAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:
    a. NO_x as NO_2 in ppmvd at 15% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).
    b. VOC as CH_4 in ppmvd at 15% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).
    c. SO_x as SO_2 in ppmvd at 15% oxygen and lb/hr.
    d. CO in ppmvd at 15% oxygen and lb/hr (measured per USEPA Reference Method 10).
    e. PM_{10} in mg/m^3 at 15% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).
    f. Flue gas flow rate in dscf per minute.
    g. Opacity (measured per USEPA reference Method 9).
    h. Ammonia slip in ppmvd at 15% oxygen.

15. The o/o shall, at least as often as once every five years (commencing with the initial compliance test), include the following supplemental source tests in the annual compliance testing:
    a. Characterization of cold startup VOC emissions;
    b. Characterization of other startup VOC emissions; and
    c. Characterization of shutdown VOC emissions.

16. Continuous monitoring systems shall meet the following acceptability testing requirements from 40 CFR 60 Appendix B (or otherwise District approved):
    a. For NO_x, Performance Specification 2.
    b. For O_2, Performance Specification 3.
    c. For CO, Performance Specification 4.
    d. For stack gas flow rate, Performance Specification 6 (if CERMS is installed).
    e. For ammonia, a District approved procedure that is to be submitted by the o/o.
    f. For stack gas flow rate (without CERMS), a District approved procedure that is to be submitted by the o/o.

17. The o/o shall submit to the APCO and USEPA Region IX the following information for the preceding calendar quarter by January 30, April 30, July 30 and October 30 of each year this permit is in effect. Each January 30 submittal shall include a summary of the reported information for the previous year. This information shall be maintained on site and current for a minimum of five (5) years and shall be provided to District personnel on request:
    a. Operating parameters of emission control equipment, including but not limited to ammonia injection rate, NO_x emission rate and ammonia slip.
    b. Total plant operation time (hours), duct burner operation time (hours), number of startups, hours in cold startup, hours in other startup, and hours in shutdown.
    c. Date and time of the beginning and end of each startup and shutdown period.
    d. Average plant operation schedule (hours per day, days per week, weeks per year).
    e. All continuous emissions data reduced and reported in accordance with the District-approved CEMS protocol.
    f. Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of NO_x, CO, PM_{10}, VOC and SO_x (including calculation protocol).
    g. Fuel sulfur content (monthly laboratory analyses, monthly natural gas sulfur content reports from the natural gas supplier(s), or the results of a custom fuel monitoring schedule approved by USEPA for compliance with the fuel monitoring provisions of 40 CFR 60 Subpart KKKK)
    h. A log of all excess emissions, including the information regarding malfunctions/breakdowns required by Rule 430.
    i. Any permanent changes made in the plant process or production which would affect air pollutant emissions, and indicate when changes were made.
    j. Any maintenance to any air pollutant control system (recorded on an as-performed basis).

18. The o/o must surrender to the District sufficient valid Emission Reduction Credits for this equipment before the start of construction of any part of the project for which this equipment is intended to be used. In accordance with Regulation XIII the operator shall

obtain 150 tons of NO_x, 52 tons of VOC, and 132 tons of PM_{10} offsets (VOC ERCs may be substituted for NO_x ERCs at a ratio of 1.6:1).

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19. During an initial commissioning period of no more than 180 days, commencing with the first firing of fuel in this equipment, NO_x, CO, VOC and ammonia concentration limits shall not apply. The o/o shall minimize emission of NO_x, CO, VOC and ammonia to the maximum extent possible during the initial commissioning period.

20. The o/o shall tune each CTG and HRSG to minimize emissions of criteria pollutants at the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor.

21. The o/o shall install, adjust and operate each SCR system to minimize emissions of NO_x from the CTG and HRSG at the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor. The NO_x and ammonia concentration limits shall apply coincident with the steady state operation of the SCR systems.

22. The o/o shall submit a commissioning plan to the District and the CEC at least four weeks prior to the first firing of fuel in this equipment. The commissioning plan shall describe the procedures to be followed during the commissioning of the CTGs, HRSGs and steam turbine. The commissioning plan shall include a description of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but not be limited to, the tuning of the dry low NO_x combustors, the installation and testing of the CEMS, and any activities requiring the firing of the CTGs and HRSGs without abatement by an SCR system.

23. The total number of firing hours of each CTG and HRSG without abatement of NO_x by the SCR shall not exceed 624 hours during the initial commissioning period. Such operation without NO_x abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system in place and operating. Upon completion of these activities, the o/o shall provide written notice to the District and CEC and the unused balance of the unabated firing hours shall expire.

24. During the initial commissioning period, emissions from this facility shall not exceed the following emission limits (verified by CEMS):
    a. NO_x - 32 tons, and 242 pounds/hour/CTG
    b. CO - 118 tons, and 1337 pounds/hour/CTG

25. Within 60 days after achieving the maximum firing rate at which the facility will be operated, but not later than 180 days after initial startup, the operator shall perform an initial compliance test. This test shall demonstrate that this equipment is capable of operation at 100% load in compliance with the emission limits in Condition 4.

26. The initial compliance test shall include tests for the following. The results of the initial compliance test shall be used to prepare a supplemental health risk analysis if required by the District:
    a. PAH;
    b. Certification of CEMS and CERMS (or stack gas flow calculation method) at 100% load, startup modes and shutdown mode;
    c. Characterization of cold startup VOC emissions;
    d. Characterization of other startup VOC emissions; and
    e. Characterization of shutdown VOC emissions.

HRSG Duct Burner Authority to Construct Conditions

[2 individual 424.3 MMBtu/hr Natural Gas Duct Burners,
Application Numbers: 00000000 and 00000000]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be exclusively fueled with natural gas and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. The duct burner shall not be operated unless the combustion turbine generator with valid District permit #, catalytic oxidation system with valid District permit #, and selective catalytic NO_x reduction system with valid District permit # are in operation.

4. This equipment shall not be operated for more than 2000 hours per rolling twelve month period.

5. Monthly hours of operation for this equipment shall be recorded and maintained on site for a minimum of five (5) years and shall be provided to District personnel on request.

Oxidation Catalyst System Authority to Construct Conditions

[2 individual oxidation catalyst systems, Application Numbers: 0010011 and 0010012]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. This equipment shall be operated concurrently with the combustion turbine generator with valid District permit B00nnnn.

Selective Catalytic Reduction System Authority to Construct Conditions

[2 individual SCR systems, Application Numbers: 0010011 and 0010012]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. This equipment shall be operated concurrently with the combustion turbine generator with valid District permit B00nnnn.

4. Ammonia shall be injected whenever the selective catalytic reduction system has reached or exceeded 550° Fahrenheit except for periods of equipment malfunction. Except during periods of startup, shutdown and malfunction, ammonia slip shall not exceed 5 ppmvd (corrected to 15% O_2), averaged over three hours.

5. Ammonia injection by this equipment in pounds per hour shall be recorded and maintained on site for a minimum of five (5) years and shall be provided to AVAQMD personnel on request.

Cooling Tower Authority to Construct Conditions

[One Cooling Tower, Application Number: 0010019]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. The drift rate shall not exceed 0.0005 percent with a maximum circulation rate of 130,000 gallons per minute. The maximum hourly PM_{10} emission rate shall not exceed 1.63 pounds per hour, as calculated per the written District-approved protocol.

4. The o/o shall perform weekly tests of the blow-down water total dissolved solids (TDS). The operator shall maintain a log which contains the date and result of each blow-down water test in TDS ppm, and the resulting mass emission rate. This log shall be maintained on site for a minimum of five (5) years and shall be provided to District personnel on request.

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5. The o/o shall conduct all required cooling tower water tests in accordance with a District-approved test and emissions calculation protocol. Thirty (30) days prior to the first such test the operator shall provide a written test and emissions calculation protocol for District review and approval.

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6. A maintenance procedure shall be established that states how often and what procedures will be used to ensure the integrity of the drift eliminators. This procedure is to be kept on-site and available to District personnel on request.

Auxiliary Boiler Authority to Construct Conditions

[One 110 MMBtu/hr Gas Fired Auxiliary Boiler, Application Number: 0010018]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be exclusively fueled with natural gas and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. This equipment is subject to the Federal NSPS codified at 40 CFR Part 60, Subparts A (General Provisions) and Db (Industrial-Commercial-Institutional Steam Generating Units).

4. Emissions from this equipment shall not exceed the following hourly emission limits at any firing rate, verified by fuel use and annual compliance tests:
   a. NO_x as NO_2 – 1.21 lb/hr (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)
   b. CO – 4.05 lb/hr (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)
   c. VOC as CH_4 – 0.59 lb/hr
   d. SO_x as SO_2 – 0.06 lb/hr (based on 0.2 grains/100 dscf fuel sulfur)
   e. PM_{10} – 0.82 lb/hr (front and back half)

5. This equipment shall not be operated for more than 500 hours per rolling twelve month period.

6. The o/o shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:
   a. Total operation time (hours per month, by month);
   b. Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of NO_x, CO, PM_{10}, VOC and SO_x (including calculation protocol); and,
   c. Any permanent changes made to the equipment that would affect air pollutant emissions, and indicate when changes were made.

7. The o/o shall perform the following annual compliance tests on this equipment in accordance with the AVAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:
   a. NO_x as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).

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b. VOC as CH_4 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).
c. SO_x as SO_2 in ppmvd at 3% oxygen and lb/hr.
d. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).
e. PM_{10} in mg/m^3 at 3% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).
f. Flue gas flow rate in dscf per minute.
g. Opacity (measured per USEPA reference Method 9).

HTF Heater Authority to Construct Conditions

[One 40 MMBtu/hr Gas Fired HTF Heater, Application Number: 0010017]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be exclusively fueled with natural gas and shall be operated and maintained in strict accord with the recommendations of its manufacturer or supplier and/or sound engineering principles.

3. Emissions from this equipment shall not exceed the following hourly emission limits at any firing rate, verified by fuel use and annual compliance tests:
   a. NO_x as NO_2 – 0.44 lb/hr (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)
   b. CO – 1.47 lb/hr (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)
   c. VOC as CH_4 – 0.22 lb/hr
   d. SO_x as SO_2 – 0.02 lb/hr (based on 0.2 grains/100 dscf fuel sulfur)
   e. PM_{10} – 0.30 lb/hr (front and back half)

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4. This equipment shall not be operated for more than 1000 hours per rolling twelve month period.

5. The o/o shall maintain an operations log for this equipment on-site and current for a minimum of five (5) years, and said log shall be provided to District personnel on request. The operations log shall include the following information at a minimum:
   a. Total operation time (hours per month, by month);
   b. Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of NO_x, CO, PM_{10}, VOC and SO_x (including calculation protocol); and,
   c. Any permanent changes made to the equipment that would affect air pollutant emissions, and indicate when changes were made.

6. The o/o shall perform the following annual compliance tests on this equipment in accordance with the AVAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District no later than six weeks prior to the expiration date of this permit. The following compliance tests are required:

a. NO_x as NO_2 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 19 and 20).
b. VOC as CH_4 in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Methods 25A and 18).
c. SO_x as SO_2 in ppmvd at 3% oxygen and lb/hr.
d. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).
e. PM_{10} in mg/m^3 at 3% oxygen and lb/hr (measured per USEPA Reference Methods 5 and 202 or CARB Method 5).
f. Flue gas flow rate in dscf per minute.
g. Opacity (measured per USEPA reference Method 9).

Emergency Generator Authority to Construct Conditions

[One 2683 hp emergency IC engine driving a generator, Application Number: 0010015]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants.

3. This unit shall be limited to use for emergency power, defined as when commercially available power has been interrupted. In addition, this unit may be operated as part of a testing program that does not exceed 50 hours of testing or maintenance per calendar year.

4. This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 15 ppm on a weight basis per CARB Diesel or equivalent requirements.

5. A non-resettable four digit hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

6. The o/o shall maintain a log for this unit, which, at a minimum, contains the information specified below. This log shall be maintained current and on-site for a minimum of five (5) years and shall be provided to District personnel on request:
   a. Date of each use or test;
   b. Duration of each use or test in hours;
   c. Reason for each use;
   d. Cumulative calendar year use, in hours; and,
   e. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log).

Deleted: owner/operator

7. This equipment shall comply with the applicable requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115).

Emergency Fire Suppression Water Pump Authority to Construct Conditions

[One 182 hp emergency IC engine driving a fire suppression water pump, Application Number: 0010016]

1. Operation of this equipment shall be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2. This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants.

3. This unit shall be limited to use for emergency fire fighting. In addition, this unit may be operated as part of a testing program that does not exceed 50 hours of testing or maintenance per calendar year.

4. This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 15 ppm on a weight basis per CARB Diesel or equivalent requirements.

5. A non-resettable four digit hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

6. The owner/operator shall maintain a log for this unit, which, at a minimum, contains the information specified below. This log shall be maintained current and on-site for a minimum of five (5) years and shall be provided to District personnel on request:
   a. Date of each use or test;
   b. Duration of each use or test in hours;
   c. Reason for each use;
   d. Cumulative calendar year use, in hours; and,
   e. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log).

7. This equipment shall comply with the applicable requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115).

Appendix - PHPP Emissions Calculations

[Rather than providing a markup of the Emissions Appendix, Applicant has provided replacement tables.]

Appendix – PHPP Emissions Calculations

PHPP Combustion Equipment Emission Rates by Temperature									
	Temp	Conc Limit *(ppmvd @ 15%)*			Hourly Emissions pounds				
Device	*deg F*	NOx	CO	VOC	NOx	CO	VOC	SOx	PM10
Turbine	23	2.0	2	1.4	13.47	8.20	4.70	1.05	12.0
	59	2.0	2	1.4	12.79	7.78	4.46	0.99	12.0
	64	2.0	2	1.4	12.77	7.78	4.45	0.99	12.0
	98	2.0	2	1.4	12.29	7.48	4.29	0.95	12.0
	108	2.0	2	1.4	12.17	7.41	4.24	0.95	12.0
Duct Burner/No Solar	23	2.0	1	0.6	3.13	6.96	1.09	0.24	6.0
	59	2.0	1	0.6	3.24	6.86	1.13	0.25	6.0
Duct Burner/Max Solar	64	2.0	1	0.6	0.89	4.70	0.31	0.07	6.0
	98	2.0	1	0.6	0.92	4.59	0.32	0.07	6.0
	108	2.0	1	0.6	0.93	4.55	0.32	0.07	6.0
Turbine and Duct Burner/Max Solar	23	2.0	1	0.6	14.35	13.10	5.00	1.11	18.0
	59	2.0	1	0.6	13.68	12.48	4.77	1.06	18.0
	64	2.0	1	0.6	13.67	12.48	4.77	1.06	18.0
	98	2.0	1	0.6	13.21	12.07	4.61	1.03	18.0
	108	2.0	1	0.6	13.10	11.96	4.57	1.02	18.0
Turbine and Duct Burner/No Solar	23	2.0	1	0.6	16.60	15.16	5.79	1.29	18.0
	59	2.0	1	0.6	16.03	14.64	5.59	1.25	18.0
	64	2.0	1	0.6	16.03	14.64	5.59	1.25	18.0
	98	2.0	1	0.6	15.72	14.36	5.48	1.22	18.0
	108	2.0	1	0.6	15.62	14.27	5.45	1.22	18.0
Aux Boiler	Any	9.0	50		1.21	4.05	0.59	0.06	0.82
HTF Heater	Any	9.0	50		0.44	1.47	0.22	0.023	0.30
Genset	Any				26.79	15.42	1.41	0.029	0.89
Fire Pump	Any				1.14	1.05	0.06	0.002	0.06

PHPP Transient (Startup and ShutDown) Emission Rates						
	Duration	NOx	CO	VOC	SO2	PM
Pounds per Turbine per Transient Event:						
Cold	110	96	410	31	2	33
Not Cold	80	40	329	28	1	24
Shutdown	30	57	337	29	0	9
Pounds per Hour:						
Cold		52.36	223.64	16.91	0.89	18.0
Not Cold		30.0	246.75	21.0	0.89	18.0
Shutdown		114.0	674.0	58.0	0.89	18.0

PHPP Hourly SOx Emissions (by Device)							
	units	**Turbine**	**Duct Burner**	**Aux Boiler**	**HTF Heater**	**Genset**	**Pump**
Avg Max heat input	MMBtu/hr	1599.6	424.3	110	40	2682	182
Avg Max fuel use	scf/hr	1562109	414355	107422	39063		
Sulfur	grains/hr	3124	829	215	78		
Sulfur	lb/hr	0.45	0.12	0.03	0.01		
As SO_2	lb/hr	0.89	0.24	0.06	0.02	0.029	0.002

Average max heat input based on annual average 64 degree F at 100% load
Calculation assumes natural gas parameters 1024 BTU/scf and 0.2 gr/100 dscf
Engines are rated in horsepower, engine SOx emissions assume 15 ppm diesel

	units	**Turbine**
Max heat input	MMBtu/hr	1763.87
Max fuel use	scf/hr	1722529
Sulfur	grains/hr	3445
Sulfur	lb/hr	0.49
As SO_2	lb/hr	0.98

Absolute max heat input based on maximum 23 degree F at 100% load condition

PHPP Cooling Tower Emissions		
Flow Rate	*gallons/minute*	130000
Mass Flow Rate	*pounds/minute*	1084889
Max Drift Rate	*Percentage*	0.0005
Drift Rate	*pounds/minute*	5.42
Max Solids	*TDS (ppm)*	5000
PM Rate	*pounds PM/minute*	0.03
PM Rate	*pounds PM/hour*	1.63
PM10 Rate	*pounds PM10/hour*	1.63
PM2.5 Rate	*pounds PM2.5/hour*	1.63

Notes:
Drift rate assumes 0.0005 percent (mist eliminators)
PM10 & PM2.5 assumed to be equal (100 percent) to PM

PHPP Maximum Potential to Emit						
	NOx	CO	VOC	SOx	PM10	PM2.5
Annual with Transients (tons)	90	255	38	5	88	81
Annual by hours (tons)	115	80	40	9	132	125
Max Annual (tons)	**115**	**255**	**40**	**9**	**132**	**125**
Daily with Transients (pounds)	1359	4853	577	59	931	
Daily by hours (pounds)	864	877	299	64	931	
Max Daily (pounds)	**1359**	**4853**	**577**	**64**	**931**	

PHPP Facility Maximum Annual Emissions with Transients (Startups/Shutdowns)									
Operating Mode	No.	minutes per event	total hours	pounds per hour					
				NOx	CO	VOC	SOx	PM10	PM2.5
Cold Start	50	110	91.7	52.36	223.64	16.91	0.89	18.0	18.0
Cold Start Downtime	50	2880	2400.0						
Other Start	260	80	346.7	30.00	246.75	21.00	0.89	18.0	18.0
Other Start Downtime	260	360	1560.0						
Shutdown	310	30	155.0	114.00	674.00	58.00	0.89	18.0	18.0
Operation			4206.7	12.77	7.78	4.45	0.99	12.0	12.0
Total Single Turbine Hours:			8760.0						
Duct Burner			2000.00	0.89	4.70	0.31	0.07	6.00	6.00
Auxiliary Boiler			500.00	1.21	4.05	0.59	0.06	0.82	0.82
HTF Heater			1000.00	0.44	1.47	0.22	0.02	0.30	0.30
Genset			50.00	26.79	15.42	1.41	0.03	0.89	0.89
Fire Pump			50.00	1.14	1.05	0.06	0.00	0.06	0.06
Cooling Tower			8760.00	0.00	0.00	0.01	0.00	1.63	1.63
Vehicle Fugitive Emissions (pounds per year)								14320	1432
Facility Annual Total (pounds)				179236	509581	75068	9741	175650	162762
Facility Annual Total (tons)				**90**	**255**	**38**	**5**	**88**	**81**

Notes: Facility includes two turbines and HRSG/duct burners
Operation NOx, CO and VOC estimated using 64 deg F at 100% load, max solar
Operation SOx estimated as SO_2 using 0.2 gr/100 dscf
Operation PM10 uses estimate for front and back half
Startup and shutdown NOx, CO and VOC emissions using GE data
Annual hours assumes minimum outage length prior to operations
Fugitive Emissions (pounds per year) are included in Annual Emissions for offset calculations

PHPP Facility Maximum Daily Emissions with Startups/Shutdowns								
Operating Mode	No.	minutes per event	total hours	pounds per hour				
				NOx	CO	VOC	SOx	PM10
Cold Start	1	110	1.8	52.36	223.64	16.91	0.89	18.0
Other Start	2	80	2.7	30.00	246.75	21.00	0.89	18.0
Shutdown	3	30	1.5	114.00	674.00	58.00	0.89	18.0
Operation			18.0	13.47	8.20	4.70	1.05	12.0
Total Single Turbine Hours:			24.0					
Duct Burner			18.0	3.13	6.96	1.09	0.24	6.00
Auxiliary Boiler			24	1.21	4.05	0.59	0.06	0.82
HTF Heater			24	0.44	1.47	0.22	0.02	0.30
Genset			1	26.79	15.42	1.41	0.03	0.89
Fire Pump			1	1.14	1.05	0.06	0.00	0.06
Cooling Tower			24	0.0	0.0	0.0	0.0	1.6
Facility Daily Total (pounds)				**1359**	**4853**	**577**	**59**	**931**

Notes: No outages
Duct Burners will not operate during startup and shutdown
Facility includes two turbines and HRSG/duct burners
Operation NOx, CO and VOC estimated using 23 deg F at 100% load, no solar
Operation SOx estimated as SO_2 using 0.2 gr/100 dscf
Operation PM10 uses estimate for front and back half
Startup and shutdown NOx, CO and VOC emissions using GE data

PHPP Maximum Facility Emissions without Transients (Startup/Shutdown)							
Maximum Annual Emissions by Operation Hours:							
	Hrs	NOx	CO	VOC	SOx	PM10	PM2.5
Turbine	8760	12.77	7.78	4.45	0.99	12.00	12.00
Duct Burner	2000	0.89	4.70	0.31	0.070	6.00	12.0
Auxiliary Boiler	500	1.21	4.05	0.59	0.06	0.82	12.0
HTF Heater	1000	0.44	1.47	0.22	0.023	0.30	6.0
Genset	50	26.79	15.42	1.41	0.029	0.89	6.0
Fire Pump	50	1.14	1.05	0.06	0.002	0.06	6.0
Cooling Tower	8760	0.00	0.00	0.01	0.00	1.63	6.0
Fugitive Emissions (pounds/yr)						14320	1432
Facility Annual Total (pounds)		229832	159384	79992	17717	263570	250682
Facility Annual Total (tons)		**115**	**80**	**40**	**9**	**132**	**125**
Same assumptions as with transients for operation hours							

Maximum Daily Emissions by Operation Hours:						
	Hrs	NOx	CO	VOC	SOx	PM10
Turbine	24	13.47	8.20	4.70	1.05	12.00
Duct Burner	24	3.13	6.96	1.09	0.24	6.00
Auxiliary Boiler	24	1.21	4.05	0.59	0.06	0.82
HTF Heater	24	0.44	1.47	0.22	0.023	0.30
Genset	1	26.79	15.42	1.41	0.029	0.89
Fire Pump	1	1.14	1.05	0.06	0.002	0.06
Cooling Tower	24	0.00	0.00	0.01	0.00	1.63
Facility Daily Total (pounds)		**864**	**877**	**299**	**64**	**931**
Same assumptions as with transients for operation hours						

PHPP Maintenance Vehicle Fugitive Emissions

Vehicle	Distance		Daily Emissions		Annual Emissions	
	(Miles/yr)	(Miles/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM10 (tpy)	PM2.5 (tpy)
Mirror Wash Truck	600	4.8	6.55	0.65	0.41	0.04
Maintenance Vehicles	19200	76.8	53.26	5.33	6.66	0.67
Weed Abatement	68	40	54.58	5.46	0.05	0.00
Soil Stabilizer Application	68	40	54.58	5.46	0.05	0.00
Total			168.98	16.90	7.16	0.72

Fugitive Dust Emission Factors

Vehicle Use	Vehicle Type	Vehicle Weight (tons)	Emission Factors	
			PM10 (lb/mi)	PM2.5 (lb/mi)
Mirror Wash Truck	Water Trucks, Freightliner 4000 gallon	13.5	1.36	0.14
Maintenance Vehicles	On-Site 3/4 Ton Pick-Up, Ford	3	0.69	0.07
Weed Abatement	Water Trucks, Freightliner 4000 gallon	13.5	1.36	0.14
Soil Stabilizer Application	Water Trucks, Freightliner 4000 gallon	13.5	1.36	0.14

Notes / Assumptions

EF = k (s/12)a (W/3)b (1-CE/100)

k =	1.5	Particle size multiplier for PM10
	0.15	Particle size multiplier for PM2.5
a =	0.9	for PM10 and PM2.5
b =	0.45	for PM10 and PM2.5
s = surface silt content =	11%	Default conservative silt content from MDAQMD guidance
W = mean vehicle weight		
CE =	50%	Based on quarterly application of dust suppressant

Vehicle weights for the mirror wash, weed abatement and soil stabilizer application trucks is the average of a full truck and an empty truck.

Emissions [pounds] = Emission factor [pounds/mile] x Vehicle miles traveled [miles]

The daily and annual VMT are estimated based on the following assumptions:

Mirror washing weekly six months per year and once per month for six months per year;
Application of soil stabilizers in the solar field quarterly;
Application of weed killer in the solar field quarterly; and
Inspection of the solar piping three times per day.

There are approximately 18 miles of piping in the solar field.

PHPP Solar Field Maintenance Vehicle Exhaust Emissions									
Vehicle	**Distance**		**Speed**	**CO**	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Exh. PM2.5**
	Miles/yr	**Miles/day**	**Miles/hr**	**lb/hr**					
Mirror Wash Truck	600	4.8	5	0.06	0.01	0.19	0.0002	0.008	0.007
Maintenance Vehicles	19200	76.8	20	0.23	0.02	0.03	0.0000	0.001	0.001
Weed Abatement	68	40	5	0.06	0.01	0.19	0.0002	0.008	0.007
Soil Stabilizer Application	68	40	5	0.06	0.01	0.19	0.0002	0.008	0.007
Total				0.42	0.06	0.62	0.0006	0.024	0.022
Vehicle	**Distance**		**Speed**	**CO**	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Exh. PM2.5**
	Miles/yr	**Miles/day**	**Miles/hr**	**lb/day**					
Mirror Wash Truck	600	4.8	5	0.06	0.01	0.19	0.0002	0.007	0.007
Maintenance Vehicles	19200	76.8	20	0.90	0.07	0.13	0.0000	0.005	0.005
Weed Abatement	68	40	5	0.49	0.12	1.56	0.0017	0.062	0.057
Soil Stabilizer Application	68	40	5	0.49	0.12	1.56	0.0017	0.062	0.057
Total				1.93	0.32	3.43	0.0035	0.135	0.125
Vehicle	**Distance**		**Speed**	**CO**	**VOC**	**NOx**	**SOx**	**Exh. PM10**	**Exh. PM2.5**
	Miles/yr	**Miles/day**	**Miles/hr**	**tpy**					
Mirror Wash Truck	600	4.8	5	0.00	0.00	0.01	0.0000	0.000	0.000
Maintenance Vehicles	19200	76.8	20	0.11	0.01	0.02	0.0000	0.001	0.001
Weed Abatement	68	40	5	0.00	0.00	0.00	0.0000	0.000	0.000
Soil Stabilizer Application	68	40	5	0.00	0.00	0.00	0.0000	0.000	0.000
Total				0.12	0.01	0.03	0.0000	0.001	0.001

2009 Motor Vehicle Emission Factors								
Vehicle Use	Vehicle Type	Vehicle Class	CO (lb/mi)	VOC (lb/mi)	NOx (lb/mi)	SOx (lb/mi)	Exh. PM10 (lb/mi)	Exh. PM2.5 (lb/mi)
Mirror Wash Truck	Water Truck, 4000 gallon	HHDT-DSL	0.01214	0.00295	0.03890	0.000042	0.00154	0.00142
Weed Abatement	Water Truck, 4000 gallon	HHDT-DSL	0.01214	0.00295	0.03890	0.000042	0.00154	0.00142
Soil Stabilizer Application	Water Truck, 4000 gallon	HHDT-DSL	0.01214	0.00295	0.03890	0.000042	0.00154	0.00142
Maintenance Vehicles	On-Site 3/4 Ton Pick-Up, Ford	LDT2-CAT	0.01175	0.00087	0.00171	0.000000	0.00006	0.00006

Note: The emission factors for vehicle exhaust were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.
Pickup trucks and construction worker commuting vehicles are assumed to be Light-Duty Trucks 1.
All other vehicles are assumed to be heavy heavy-duty diesel vehicles.
All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions.
Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]