CATEGORY: **TURBINE**

BACT Size: Minor Source BACT **GAS TURBINE**

BACT Determination Number: 203	**BACT Determination Date:**

Equipment Information

Permit Number: 25800
Equipment Description: GAS TURBINE
Unit Size/Rating/Capacity: Turbine, 2200 mmBTU/hr
Equipment Location: SMUD FINANCING AUTHORITY (COSUMNES POWER PLANT)
14295 CLAY EAST RD
HERALD, CA

BACT Determination Information

ROCs	**Standard:**	1.0 ppmvd @t 15% O2, 3-Hr Avg, Oxidation Catalyst
	Technology Description:	Oxidation Catalyst
	Basis:	Achieved in Practice
NOx	**Standard:**	2.0 ppmvd @ 15% O2, 1-Hr Avg
	Technology Description:	SCR or Equivalent
	Basis:	Achieved in Practice
SOx	**Standard:**	Natural Gas or Equiv. that meets 0.7 gr S/100scf
	Technology Description:	
	Basis:	Achieved in Practice
PM10	**Standard:**	Natural Gas or Equiv. that meets 0.7 gr S/100scf
	Technology Description:	
	Basis:	Achieved in Practice
PM2.5	**Standard:**	Natural Gas or Equiv. that meets 0.7 gr S/100scf
	Technology Description:	
	Basis:	Achieved in Practice
CO	**Standard:**	2.0 ppmvd @t 15% O2, 1-HR avg, Oxidation Catalyst
	Technology Description:	Oxidation Catalyst
	Basis:	Achieved in Practice
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments:

District Contact: Brian Krebs Phone No.: (916) 874 -4856 email: bkrebs@airquality.org

777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	203
DATE:	August 2, 2018
ENGINEER:	Brian Krebs

Category/General Equip Description:	Combustion Gas Turbine
Equipment Specific Description:	F-Class Combined Gas Turbine Nominal rating of 198.1 MW
Equipment Size/Rating:	Major Source BACT
Previous BACT Det. No.:	N/A

This Best Available Control Technology (BACT) determination category was determined under the project for A/C 25800 and 25801 (SMUD Cosumnes Power Plant (CPP). CPP is a combined cycle power plant that consists of two combined cycle combustion turbines, two unfired heat recovery steam generators, and one steam turbine. The combustion turbines utilize selective catalytic reduction for NOx control and an oxidation catalyst for CO and to a lesser extent VOC control.

BACT/T-BACT ANALYSIS

A: ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following technologies have either been currently employed as BACT/T-BACT for combustion gas turbines or are regulated by applicable District rules by the following agencies and air pollution control districts.

US EPA

BACT

Source: EPA RACT/BACT/LAER Clearinghouse

Gas turbine >25 MW	
Pollutant	**Standard**
VOC	0.3 ppmvd corrected to 15% O2 3hr average (Chouteau Power Plant, OK-0129)
NOx	2.0 ppmvd corrected to 15% O2 1hr average (OTAY Mesa Energy Center, CA-1177)

SOx	0.75 gr S/100 scf Fuel (St. Joseph Energy Center, LLC, IN-0158)
PM10	0.0025 lb/MMBTU (Filer City Station, MI-0427)
PM2.5	NA
CO	0.9 ppmvd corrected to 15% O2 1hr average (CPV Towantic, CT-0157 & CT-0158, and Killingly Energy Center, CT-1061) 1.5 ppmvd corrected to 15% O2 1 Hr average (Avenal Energy Project, CA-1192, Palmdale Hybrid Power Project, CA-1212, and Warren County Power Plant – Dominion, VA-0315) 2.0 ppmvd corrected to 15% O2 1 Hr Average (Sand Hill Energy Center, TX-0709

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

40 CFR Part 60 subpart KKKK – Standards of Performance for Stationary Combustion Turbines

New, modified, or reconstructed turbine firing natural gas, > 850 MMBTU/hr	
Pollutant	**Standard**
NOx	15 ppmvd corrected to 15% O2
SOx	1. 0.90 lb SO2/MW-hr or 2. 0.060 lb SO2/MMBtu heat input of the fuel

CALIFORNIA AIR RESOURCES BOARD

BACT
Source: ARB BACT Clearinghouse

Gas turbine >=50 MW	
Pollutant	**Standard**
VOC	0.7 ppmvd corrected to 15% O2 3hr average (La Paloma Generating Co. LLC)
NOx (A)	1.5 ppmvd corrected to 15% O2 1hr average (IDC Bellingham LLC) 2.0 ppmvd corrected to 15% O2 1hr average (Cosumnes Power Plant)
Sox	1 ppmvd corrected to 15% O2 Calendar Day average (Sutter Power Plant)
PM10	0.0056 lb/MMBTU (Cosumnes Power Plant)
PM2.5	0.0056 lb/MMBTU (Cosumnes Power Plant)
CO	2.0 ppmvd corrected to 15% O2 1hr average (Magnolia Power)

(A) Conversation from the permitting authority of the IDC Bellingham LLC indicated that the facility was never built.

T-BACT
There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS
None.

CAPCOA

BACT
Source: CAPCOA BACT Clearinghouse

Gas turbine >=23MMBTU/hr	
Pollutant	**Standard**
VOC	0.6 ppmvd corrected to 15% O2 (A330-862-98 Bear Mountain Limited)
NOx	2.0 ppmvd corrected to 15% O2 3hr average (A330-877-99 Federal Cold Storage)
SOx	PUC natural gas assuming 0.7 gr/100 scf (A330-882-99 Sutter Power Plant)
PM10	PUC natural gas assuming 0.7 gr/100 scf (A330-882-99 Sutter Power Plant)
PM2.5	PUC natural gas assuming 0.7 gr/100 scf (A330-882-99 Sutter Power Plant)
CO	4.0 ppmvd corrected to 15% O2 Calendar Day average (A330-882-99 Sutter Power Plant)

T-BACT
There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS
None.

SMAQMD

BACT
Source: SMAQMD BACT Clearinghouse

Gas turbine, 170 MW, 1865 MMBTU/hr – CPP, PO16006	
Pollutant	**Standard**
VOC	1.4 ppmvd corrected to 15% O2 3 hr average
NOx	2.0 ppmvd corrected to 15% O2 1hr average
SOx	1 gr s/100scf
PM10	9.0 lb/hr
PM2.5	NA
CO	4.0 ppmvd corrected to 15% O2 3 hr average

T-BACT
There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS

Rule 413 – Stationary Gas Turbines (03-24-05)

Pollutant	Standard
NOx (gaseous fuel)	9 ppmvd corrected to 15% O2 excluding startups/shutdowns and short-term excursions
NOx (liquid fuel)	25 ppmvd corrected to 15% O2 excluding startups/shutdowns and short-term excursions

Startup/Shutdown
(Cold Start) - 4 hrs if steam turbine is shutdown for 72 hrs or more
(Warm Start) - 3 hrs if steam turbine is shutdown for between 8 hrs and 72 hrs or more
(Hot Start) - 1 hrs if associated steam turbine is shutdown for less than or equal to 8 hrs

SCAQMD

BACT

Source: Section I - SCAQMD LAER/BACT Determinations
Section II – Other LAER/BACT Determinations
Section III – Other Technologies
PART D: BACT Guidelines For Non-Major Polluting Facilities

Gas Turbine – For each specific pollutant, listed is the most stringent standard along with ID.	
Pollutant	**Standard**
VOC	1.4 ppmvd corrected to 15% O2 1 hr average (Mountain View, 366147)
NOx	2.0 ppmvd corrected to 15% O2 1hr average (Vernon City, 394164)
SOx	0.004 gr/scf (Three Mountain, 99-PO-01)
PM10	0.0012 gr/scf (Three Mountain, 99-PO-01)
PM2.5	NA
CO	2.0 ppmvd corrected to 15% O2 1 hr average (Magnolia, 386305)

T-BACT

There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines (08-08-97)

Pollutant	Standard
NOx (gaseous fuel)	9 ppmvd corrected to 15% O2 excluding thermal stabilization period

Thermal Stabilization Period
2 hrs or as specified in the permit issued prior to 8/4/89.

SAN DIEGO COUNTY APCD

BACT
Source: NSR Requirements for BACT
There are no BACT standards published in the clearinghouse for this category

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS
Rule 69.3 – Stationary Gas Turbine Engines – Reasonably Available Control Technology (12-16-98)

Pollutant	Standard
NOx (gaseous fuel)	42 ppmvd corrected to 15% O2 excluding startups
NOx (liquid fuel)	65 ppmvd corrected to 15% O2 excluding startups

Startup
Startup - a maximum of 2 hrs unless an extended startup is authorized

Rule 69.3.1 – Stationary Gas Turbine Engines – Best Available Retrofit Technology (02-24-10)

Pollutant	Standard
NOx (gaseous fuel)	9 ppmvd X E/25 corrected to 15% O2 excluding startups
NOx (liquid fuel)	25 ppmvd X E/25 corrected to 15% O2 excluding startups

E=(MRTE)(LHV)/(HHV)

Where:

E: **"Unit Thermal Efficiency (E)"** means the percent thermal efficiency of the gas turbine engine

MRTE: **"Manufacturer's Rated Thermal Efficiency (MRTE)"** means the manufacturer's continuous rated percent thermal efficiency of the gas turbine engine, including the effect of any air pollution control equipment if such equipment is installed, at peak load, after correction to lower heating value.

LHV: **"Lower Heating Value (LHV)"** means the total heat liberated, excluding the heat of condensation of water, per mass of fuel burned (Btu per pound) when fuel and dry air at standard conditions undergo complete combustion and all resultant products are brought to standard conditions.

HHV: **"Higher Heating Value (HHV)"** means the total heat liberated, including the heat of condensation of water, per mass of fuel burned (Btu per pound) when fuel and dry air at standard conditions undergo complete combustion and all resultant products are brought to standard conditions.

Startup
Normal Startup - a maximum of 2 hrs unless an extended startup is authorized
Extended Startup - a maximum of 6 hrs for a combined cycle unit when the APCO determines that key parameters indicates that 2 hrs is not sufficient to meet the emission limits.

BAAQMD

BACT
Source: NSR Requirements for BACT

Combined Cycle >=40 megawatts	
Pollutant	**Standard**
VOC	2.0 ppmvd corrected to 15% O2
NOx	2.0 ppmvd corrected to 15% O2
SOx	Natural Gas Fuel 1 gr/100 scf
PM10	Natural Gas Fuel 1 gr/100 scf
PM2.5	No standard
CO	4.0 ppmvd corrected to 15% O2

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Regulation 9, Rule 9 Nitrogen Oxides from Stationary Gas Turbines (12-06-06)

>500 MMBTU/HR	
Pollutant	**Standard**
NOx (gaseous fuel)	5 ppmvd corrected to 15% O2 excluding startups/shutdowns
NOx (Refinery, waste or LPG gas)	9 ppmvd corrected to 15% O2 excluding startups/shutdowns
NOx (liquid fuel)	25 ppmvd corrected to 15% O2 excluding startups/shutdowns

Startup/Shutdown
Normal Startup - a maximum of 4 hrs
Cold Steam Turbine Starts at combined cycle facilities - a maximum of 6 hrs
Shutdown - a maximum of 2 hrs

San Joaquin Valley APCD

BACT
Source: BACT Clearinghouse

BACT #3.4.2

Gas Turbine - >= 50 MW, Uniform Load, with Heat Recovery	
Pollutant	**Standard**
VOC	1.5 ppmvd corrected to 15% O2 (Technologically Feasible) 2.0 ppmvd corrected to 15% O2 (Achieved in Practice)
NOx	2.0 ppmvd corrected to 15% O2, 1 hr average, excluding startup and shutdown (Technologically Feasible) 2.5 ppmvd corrected to 15% O2, 1 hr average, excluding startup and shutdown (Achieved in Practice)
SOx	PUC-regulated natural gas of 0.75 g S/100 scf
PM10	Air inlet filter cooler, lube oil vent coalescer and natural gas fuel or equal
PM2.5	No standard
CO	4.0 ppmvd corrected to 15% O2 (Technologically Feasible) 6.0 ppmvd corrected to 15% O2 (Achieved in Practice)

T-BACT
There are no T-BACT standards published in the clearinghouse for this category

RULE REQUIREMENTS

Rule 4703 – Stationary Gas Turbines (9-20-07)

>10 MW, Combined Cycle	
Pollutant	**Standard**
NOx (gaseous fuel)	3 ppmvd corrected to 15% O2 excluding startups (Enhanced Option)
NOx (liquid fuel)	25 ppmvd corrected to 15% O2 excluding startups
CO	25 ppmvd corrected to 15% O2 excluding startups (GE Frame 7)

Startup
Normal Startup - a maximum of 2 hrs unless an extended startup is authorized
Extended Startup - as approved by the APCO, ARB, and EPA

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
Pollutant	**Standard**
VOC	1. EPA - 0.3 ppmvd corrected to 15% O2, 3 Hr average (Chouteau Power Plant – OK-0129) 2. CAPCOA – 0.6 ppmvd corrected to 15% O2, 3 Hr average (Bear Mountain Limited – A330-862-98) 3. EPA – 0.7 ppmvd corrected to 15% O2, 1 Hr average and Average of 3-1 Hr stack tests – (CT-0161, NJ-0082, NY-0104) 4. CARB – 0.7 ppmvd corrected to 15% O2, (LaPaloma Generating Co, LLC) 5. EPA – 1.0 ppmvd corrected to 15% O2, 3-Hr Block average (MA-0039 and MD-0041) 6. SMAQMD – 1.4 ppmvd corrected to 15% O2, 3 Hr average (CPP, PO 16006) 7. SCAQMD – 1.4 ppmvd corrected to 15% O2, 1 Hr average (Mountain View, 366147) 8. SJVAPCD – 2.0 ppmvd corrected to 15% O2, 1 Hr average 9. BAAQMD – 2.0 ppmvd corrected to 15% O2 10. SDCAPCD – no determination
NOx	1. CARB – 1.5 ppmvd corrected to 15% O2, 1 Hr average (IDC Bellingham LLC) 2. EPA – 2.0 ppmvs corrected to 15% O2, 1 Hr average (Avenal Energy Project, CA – 1192 and many others) 3. CARB – 2.0 ppmvd corrected to 15% O2, 1 Hr average (CPP and others) 4. SMAQMD - 2.0 ppmvd corrected to 15% O2, 1 Hr average (CPP, PO 16006) 5. SCAQMD - 2.0 ppmvd corrected to 15% O2, 1 Hr average (Vernon City, 394164) 6. CAPCOA - 2.0 ppmvd corrected to 15% O2, 3 Hr average (Federal Cold Storage, A330-877-99) 7. BAAQMD - 2.0 ppmvd corrected to 15% O2 8. SJVAPCD - 2.5 ppmvd corrected to 15% O2, 1 Hr average 9. SDCAPCD - 9 ppmvd corrected to 15% O2, (Rule 69.3.1)
SOx	1. SCAQMD - 0.4 gr S/100 scf Fuel 2. CARB – 0.7 gr S/100 scf Fuel 3. CAPCOA – 0.7 gr S/100 scf Fuel 4. EPA - 0.75 gr S/100 scf Fuel 5. SJVAPCD – 0.75 gr S/100 scf Fuel 6. SMAQMD – 1 gr S/100 scf Fuel 7. BAAQMD – 1 gr S/100 scf Fuel 8. SDCAPCD – no determination
PM10	1. EPA – 0.0025 lb/MMBTU 2. SMAQMD - 0.0048 lb/MMBTU 3. SCAQMD – 0.0056 lb/MMBTU 4. CARB – 0.0056 lb/MMBTU 5. SJVAPCD – Air inlet filter cooler, lube oil vent coalescer and natural gas fuel

	or equal. 6. CAPCOA – The combusting of PUC Natural Gas with a 0.7 gr S/100 scf 7. BAAQMD - Natural Gas Fuel with 1 gr S/100 scf 8. SDCAPCD – no determination
PM2.5 (A)	1. EPA – 0.0025 lb/MMBTU 2. SMAQMD - 0.0048 lb/MMBTU 3. SCAQMD – 0.0056 lb/MMBTU 4. CARB – 0.0056 lb/MMBTU 5. SJVAPCD – Air inlet filter cooler, lube oil vent coalescer and natural gas fuel or equal. 6. CAPCOA – The combusting of PUC Natural Gas with a 0.7 gr S/100 scf 7. BAAQMD - Natural Gas Fuel with 1 gr S/100 scf 8. SDCAPCD – no determination
CO	1. EPA – 0.9 ppmvd corrected to 15% O2, 1 Hr block (CPV Towantic, LLC, CT-0157 & CT-0158, and Killingly Energy Center, CT-0161) 2. EPA - 1.5 ppmvd corrected to 15% O2, 1 Hr average (Avenal Energy Project, CA-1192) 3. EPA – 2.0 ppmvd corrected to 15% O2, 1 Hr average (Sand Hill Energy Center, TX-0709) 4. CARB – 2.0 ppmvd corrected to 15% O2, 1 Hr average (Magnolia Power) 5. SCAQMD - 2.0 ppmvd corrected to 15% O2, 1 Hr average (Magnolia Power) 6. CAPCOA – 4.0 ppmvd corrected to 15% O2, Calendar Day average (Sutter Power Plant, A330-882-99) 7. SMAQMD – 4.0 ppmvd corrected to 15% O2, 3 Hr average (CPP, PO16006) 8. BAAQMD - 4.0 ppmvd corrected to 15% O2 9. SJVAQMD – 6.0 ppmvd corrected to 15% O2 10. SDCAPCD – no determination
T-BACT (VOC)	N/A – [SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, EPA, CAPCOA]

(A) Assume same as PM10

Discussion:

General

The various determinations above span many years. They represent various sizes, classes and manufacturer of the individual turbines. Each power plant in which these turbines are employed can be configured differently to meet the individual needs of the utility and in many cases these factors as well as the previous ones mentioned make it difficult to compare. Many times the emission rates that ultimately are reported as BACT are not a result of a specific technology or control, but rather represents the applicants willingness to accept a smaller compliance margin in order to lessen the permitting burden (availability and cost of emission offsets, CEQA, Major source or PSD thresholds, etc..). For a few pollutants, NOx, VOC and CO, good combustion design and practices can be combined with actual control technology such as Selective Catalytic Reduction or an Oxidation Catalyst to result in lower emissions of these respective pollutants. For particulate, emissions rates are influenced primarily by the fuel quality, combustion design

and emission monitoring precision. For SOx, the emission rates are almost exclusively related to the sulfur content of the fuel which for all of the turbines listed above were from combusting various qualities of natural gas.

VOC

The most stringent VOC concentration reported for all of the projects analyzed was 0.3 ppmvd corrected to 15% O2, 3 hour average from the Chouteau Power Plant in Oklahoma. The turbine is a Siemens V84.3A rated at approximately 1882 MMBTU/hr. Though it appears to be similar in size, it is a different manufacturer and assuredly a different configuration. The CO emissions are listed at 8 ppm which is substantially higher than many of the others evaluated. This project is the only project of the top performing projects that does not utilize an oxidation catalyst which might explain the rather poor CO emission concentration. For these reasons, this BACT determination will not be considered achieved in practice for this application.

The next most stringent VOC emission concentration is 0.6 ppmvd corrected to 15% O2, 3 hour average at the Bear Mountain Limited power plant. This determination is for a GE LM5000 which is an aero-derivative turbine which is much smaller and not at all comparable to a frame turbine. As such, this BACT determination will not be considered achieved in practice for this application.

Several projects reported BACT determinations of 0.7 ppmvd corrected to 15% O2 for various averaging periods. None of these projects reported using the same manufacturer and class of turbine and as such, these BACT determinations will not be considered achieved in practice for this application.

Finally, the next most stringent standard was 1.0 ppmvd corrected to 15% O2 for various averaging periods. There were many projects that arrived at this BACT determination and a few of them reported this determination for General Electric 7FA turbines which are the same as the subject of this BACT determination. All of them utilized an oxidation catalyst. For this reason, a VOC BACT determination that requires an oxidation catalyst that results in a VOC concentration of 1.0 ppmvd corrected to 15% O2, 3-hour average will be considered achieved in practice.

NOx

The most stringent NOx concentration reported for all of the projects analyzed was 1.5 ppmvd corrected to 15% O2, 1 hour average from the IDC Bellingham LLC power plant project in Massachusetts. Conversations with the permitting authority indicated that the project was never built. As such, this BACT determination will not be considered achieved in practice for this application.

The next most stringent NOx emission concentration is 2.0 ppmvd corrected to 15% O2, 1 hour average. This was for many projects throughout the nation including the project for which is the subject of this BACT determination (CPP). All of the projects at this level utilize Selective Catalytic Reduction to achieve this level of NOx control. Though the projects analyzed all use SCR, SCONOx or perhaps other control technologies could potentially achieve similar results. For this reason, no specific control technology will be specified, but rather a NOx BACT determination that results in a NOx concentration of 2.0 ppmvd corrected to 15% O2, 1 hour average will be considered achieved in practice for this application.

SOx

As mentioned previously, SOx emissions are directly related to the sulfur content of the fuel and all of the projects analyzed combust natural gas with sulfur contents that are contained in their local fuel supply. From all of the projects analyzed, the most stringent sulfur content specified was 0.4 gr S/100 scf of fuel. However, this was for a project in Redding CA, Three Mountain, 99-PO-01a which was not built[1]. As such, this BACT determination will not be considered achieved in practice. The next most stringent sulfur content specified was 0.7 gr S/100 scf of fuel. The natural gas fuel supply for the CPP project meets this requirement. Therefore, a SOx BACT determination of natural gas fuel that meet 0.7 gr S/100 scf will be considered achieved in practice.

Particulate (PM10/PM2.5)

Again as mentioned previously, none of the projects utilize any type of add on control for particulate. Though all of the projects employ good combustion practices, some projects report lower particulate emission rates than others with similar equipment and fuel. This is just a function of the projects willingness to accept a lower compliance margin rather than any attempt at lower emissions. Therefore a specific emission rate will not be considered as achieved in practice.

All of the remaining determinations specify the combustion of a clean fuel (i.e. "natural gas"). In addition to the use of combusting natural gas or equivalent, the SJVAPCD identified two combustion practices that can be utilized to minimize particulate emissions. For these reasons, a Particulate (PM10/PM2.5) BACT determination of an air inlet filter cooler, lube oil vent coalescer, and the combusting of natural gas or equivalent will be considered achieved in practice.

CO

Two projects reported BACT determinations of 0.9 ppmvd corrected to 15% O2 without duct firing and 1.7 ppmvd corrected to 15% O2 with duct firing (CPV Towantic, LLC and Killingly Energy Center). Both projects are not operational yet and the turbines appear to be much larger. For these reasons, these BACT determinations will not be considered achieved in practice for this application.

The next most stringent CO emission concentration is 1.5 ppmvd corrected to 15% O2, 1 hour average for the Avenal Energy Project, Palmdale Hybrid Power Project, and the Warren County Power Plant – Dominion. All of the projects utilize an oxidation catalyst to achieve this level of CO control. The Avenal Energy Center and Palmdale Hybrid Power Project are not currently constructed[1]. The Warren County Power Plant is a much larger turbine and has a higher emission limit when the unit is duct firing. For these reasons, this emission concentration is not considered achieved in practice for this application.

Lastly, a CO concentration of 2.0 ppmvd corrected to 15% O2, 1 hour average was found for several turbine projects. The Sand Hill Energy Center is a similar sized turbine, utilizes an oxidation catalyst, and does not have a less stringent limit while duct firing. For these reasons, a CO BACT determination that requires an oxidation catalyst that results in a CO concentration of 2.0 ppmvd corrected to 15% O2 will be considered achieved in practice.

[1] The California Energy Commission maintains a project status webpage for the California power plants under their jurisdiction https://www.energy.ca.gov/sitingcases/all_projects.html.

START-UP's
Since the start-up provisions of the South Coast Rule 1134 only apply to turbines in existence prior to August of 1989 when the physical size of the units did not require extended start-up times, this start-up provision was not considered. A review of the rest of the start-up provisions of the District's rules determined that the start-up provisions of the current CPP turbine continue to be the most stringent.

BEST CONTROL TECHNOLOGIES - ACHIEVED IN PRACTICE	
Pollutant	**Standard**
VOC	1.0 ppmvd corrected to 15% O2, 3-Hr average, utilizing an Oxidation Catalyst
NOx	2.0 ppmvd corrected to 15% O2, 1-Hr average
Sox	Natural Gas or equivalent that meets 0.7 gr Sulfur/100 scf
PM10	Natural gas or equivalent fuel that meets 0.7 gr Sulfur/100 scf with an air inlet filter cooler and lube oil vent coalescer.
PM2.5 (A)	Natural gas or equivalent fuel that meets 0.7 gr Sulfur/100 scf with an air inlet filter cooler and lube oil vent coalescer.
CO	2.0 ppmvd corrected to 15% O2, 1-Hr average utilizing an Oxidation Catalyst

(A) Assume same as PM10

B: TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.)

Technologically Feasible Alternatives:
Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" as per Rule 202, §205.1.a.

Pollutant	Technologically Feasible Alternative
VOC	No other technologically feasible option identified (A)
NOx	No other technologically feasible option identified
SOx	No other technologically feasible option identified
PM10	No other technologically feasible option identified
PM2.5	No other technologically feasible option identified

CO	No other technologically feasible option identified (A)

(A) The SJVAPCD identified technologically feasible emission standards for both VOC and CO. However in both cases, the standards selected for Achieved in Practice were found to be more stringent.

Cost Effective Determination:
Since no other technologies were determined to be technologically feasible, a cost analysis is not applicable.

CONCLUSION

Therefore, no identified technologically feasible controls are considered.

C: SELECTION OF BACT

BACT (#203) COMBUSTION GAS TURBINE	
Pollutant	**Standard**
VOC	1.0 ppmvd corrected to 15% O2, 3-Hr average, utilizing an Oxidation Catalyst
NOx	2.0 ppmvd corrected to 15% O2, 1-Hr average
SOx	Natural Gas or equivalent that meets 0.7 gr Sulfur/100 scf
PM10	Natural gas or equivalent fuel that meets 0.7 gr Sulfur/100 scf with an air inlet filter cooler and lube oil vent coalescer.
PM2.5	Natural gas or equivalent fuel that meets 0.7 gr Sulfur/100 scf with an air inlet filter cooler and lube oil vent coalescer.
CO	2.0 ppmvd corrected to 15% O2, 1-Hr average utilizing an Oxidation Catalyst

D: SELECTION OF T-BACT

No T-BACT determinations were identified. However since the majority of the risk is expected to be from VOC's, the VOC BACT determination will be considered to be T-BACT

REVIEWED BY: _____ **DATE:** _____

APPROVED BY: _____ **DATE:** _____