Final Determination of Compliance

(New Source Review Document)

Blythe Energy Project II
Blythe, California

Eldon Heaston
Air Pollution Control Officer

Mojave Desert Air Quality Management District

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List of Abbreviations

ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
BEP	Blythe Energy Project
BEPII	Blythe Energy Project Phase II
CARB	California Air Resources Board
Caithness	Caithness Blythe II, LLC
CEC	California Energy Commission
CO	Carbon Monoxide
CTG	Combustion Turbine Generator
HAP	Hazardous Air Pollutant
HDPP	High Desert Power Project
HRA	Health Risk Assessment
HRSG	Heat Recovery Steam Generator
LAER	Lowest Achievable Emission Rate
MDAQMD	Mojave Desert Air Quality Management District *or* District
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
O_2	Molecular Oxygen
$PM_{2.5}$	Fine Particulate, Respirable Fraction $\leq$ 2.5 microns in diameter
PM_{10}	Fine Particulate, Respirable Fraction $\leq$ 10 microns in diameter
PSD	Prevention of Significant Deterioration
SCIA	Southern California International Airport
SCR	Selective Catalytic Reduction
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
STG	Steam Turbine Generator
TOG	Total Organic Gases
USDI	United States Department of the Interior, National Park Service
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

1. Introduction

The Mojave Desert Air Quality Management District (District) received permit applications to modify the existing Blythe Energy Project Phase II (BEPII) from Caithness Blythe II, LLC (Caithness) on December 1, 2009, with additional applications received on January 27, 2010. The permit applications consist of the following;

- Replacement (modification) of the Siemens Westinghouse V84.3a turbines with Siemens SGT6-5000F turbines.
- Modification of Heat Recovery Steam Generator (HRSG) Duct Burners
- Incorporation of a new auxiliary boiler to allow fast start technology
- Modification to expand the approved cooling tower configuration by 1,020 square feet
- Replacement (modification) of the diesel fueled fire pump engine
- Removal of inlet air evaporative condenser
- Incorporation of oxidation catalyst into HRSG

The District released its initial new source review document, or Preliminary Determination of Compliance (PDOC), for the proposed project on March 15, 2009. Comments on the PDOC were subsequently received by the District from USEPA, Region IX on May 26, 2010[1]. USEPA's comments generally addressed the areas of the PDOC pertaining to the proposed permit conditions for the combustion turbine generator, including control requirements and associated compliance conditions. The District recognizes USEPA Region IX's comments making changes as outlined below as well as responding to comments in which changes were not made.

General improvements

- Identified which similar projects and agency determinations were reviewed by the District in it's BACT analysis of BEPII (Section 5).
- Added language clarifying that USEPA, not the MDAQMD has authority over PSD permitting (Sections 4-7).
- Provided enforceable permit condition to monitor hours of operation for boiler units (Section 12, Auxiliary Boiler Condition 6).

Turbine Power Train ATC permit condition improvements

- Corrected PSD citation. (p.17)
- Defined "aborted partial cold start" (Condition 5).
- Clarified compliance methods to be used for equipment not equipped with CEMS (pp 18-19).
- Corrected ERC totals in Condition 18 consistent with calculated offsets.
- Added reference to applicable permit condition (Condition 21).

SCR system ATC permit condition improvements

- Added temperature monitoring requirement to be included in recordkeeping log (p.23)

[1] G.Rios, USEPA Region IX to E. Heaston, MDAQMD, May 20, 2010.

USEPA noted that the District has also proposed NOx and CO emission limits for each CTG during hot/warm startup, cold startup and shutdown events (transient conditions). For VOC emissions, however, the PDOC does not include proposed emission limits that apply during these transient conditions. USEPA recommended that the District add appropriate BACT limits for VOC emissions from the CTGs during these transient conditions. It is the Districts position that the addition of limits for VOC during periods of transient conditions is not supportable at this time, for the following reasons:

1. Neither the applicant nor the District can find any data which would support the estimation or establishment of such limits for VOC for transient operation conditions.

2. A review of the BACT-LAER clearinghouse data did not reveal any recent or immediate past BACT determinations (January 2005 to present) which would support separate limits for VOCs for transient conditions such as startups and shutdowns.

3. Startups and shutdowns may represent periods when combustion can be slightly incomplete, and/or during the times when the CO catalyst is not within its required operational range (flow, temperature, etc.). This is evidenced by the CO emissions during such periods, due to the time required to bring the CO catalyst system up to operating temperature, or due to the CO catalyst falling out of its design temperature range during a shutdown. As such, VOC emissions may also be temporarily affected by incomplete combustion periods, or periods when the CO catalyst has not reached, or cannot maintain its design operation conditions. Based on the presence of such variability, setting a limit to address such transient conditions is problematic at best.

USEPA also noted that the District proposed a dual limit for VOC emissions in Condition 4 of the Turbine Power Train ATC and questioned if the District had considered a similar approach for CO or NOx emissions. The dual limit proposed is simply in recognition of the anticipated control efficiency of the CO catalyst steady-state operation when handling only the turbine generated VOC emissions. Firing of the duct burners, which increases the fuel use, and the recognition that the duct burners may not be as efficient, in terms of fuel combustion, as the turbines, results in the CO catalyst's ability to control VOC emissions being slightly diminished, e.g., the higher VOC limit during duct firing mode.

It must be remembered that the CO and SCR catalyst systems are designed and operated to maintain the BACT limits under a wide range of operating conditions, not to achieve lower emissions levels at diminished operating levels. This can be clearly seen in the system (turbine/HRSG) performance sheets supplied for the project. This data indicates that the CO and NOx control systems are designed to maintain compliance with the BACT limits across a wide range of operating conditions. They are not designed to achieve lower limits based upon changes or decreases in operating parameters. In other words, the system has some level of turn-down capability, but the emissions control systems, their individual operating parameters, and the interplay of the data acquisition and feedback systems are such that the system maintains compliance with the BACT limit, the systems do not strive to achieve lower BACT limits based upon the operation or non-operation of the duct burners.

As required by District Rule 1302(D)(1), this FDOC finalizes the District's review of the proposed project modifications and new equipment additions, evaluating worst-case or maximum air quality impacts, and establishing control technology requirements and related air quality permit conditions. This document represents the final pre-construction compliance review of the proposed project, to determine whether construction and operation of the proposed project will comply with all applicable District rules and regulations.

2. Background

The District originally completed a Final Determination of Compliance for the BEPII facility in May of 2004. Authority to Construct permits were subsequently issued by the District and shortly thereafter certification by the California Energy Commission (December 2005). To date, BEPII has maintained both its Certification and District Authority to Construct permits, however construction has yet to begin. Recently the project proponents submitted applications to the CEC for amendments to the AFC and likewise applications were submitted to the District equally notifying the advent of the project, planned changes and its future completion.

3. Project Location

The BEPII is licensed as a nominally rated 520-megawatt (MW) combined cycle facility with a maximum output of 538 MWs. The project is located within the City of Blythe, approximately five miles west of the center of the City. The BEPII site boundary is located on approximately a 76 acre site immediately adjacent to the operational Blythe Energy Project (BEPI).

4. Description of Project

Caithness proposes to modify the currently permitted combustion turbines by replacing the Siemens Westinghouse V84.3a turbines with Siemens SGT6-5000F turbines which will utilize the Siemens Flex Plant ™ 30 fast start technology. This modification to the turbine power train system will increase the total output of the facility by less than 50 MWs. As modified, the proposed projects nominal output will increase to 569 MWs, with a maximum output of 587 MWs. As part of the updated project design, one 60 MMBtu/hr auxiliary boiler will be utilized. Additionally, an oxidation catalyst will be incorporated into each HRSG, the two Heat Recovery Steam Generators will include duct burners and the cooling tower size will be increased by 1,020 square feet.

BEPII is no longer considered a major modification to the existing BEP, as the applicant no longer has ownership in the existing BEP.

As the proposed project location is in a Federal Attainment area for the pollutants Ozone and PM_{10} and their precursors (NO_x, VOC, PM_{10}), USEPA has the responsibility of carrying out the PSD permitting for this proposed project.

Overall Project Emissions

The BEP II 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 a cooling tower. Turbine emissions estimates are based on manufacturer data and mass balance. The project is proposing the use of Siemens SGT6-5000F gas turbines - operational and transient emissions are based on Siemens data.[1a] For natural gas-fired equipment, emissions calculations are based on the Higher Heating Value (HHV) of the natural gas fuel.

Maximum Annual Emissions

Table 1 presents maximum annual facility operational emissions (Table 1A presents maximum annual facility hazardous air pollutant (HAP) emissions). Maximum annual VOC, NO_x, CO and exhaust PM_{10} emissions are calculated by assuming ten (10) cold starts, 300 hot/warm starts, 310 shutdowns, 5820 hours of operation with no duct burner, and 2200 hours of operation with duct burner each at the 20° F and 100 percent load hourly rate. PM_{10} front and back half emissions are estimated. SO_x emissions are calculated with a fuel sulfur content of 0.25 grains/100 dry standard cubic feet with 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. An unknown fraction of total SO_x emissions (calculated from fuel sulfur) 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. Detailed emission calculations are presented in Appendix A along with emission calculations for auxiliary equipment (auxiliary boiler and diesel fire pump).

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

	NO_x	**CO**	**VOC**	**SO_x**	**$PM_{10/2.5}$**
BEPII	169.4	110.7	51.9	13.3	60.9
Total	169.4	110.7	51.9	13.3	60.9

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

	Total	**Threshold**
1,3-Butadiene	0.000237	10

[1a] "Amendment to Application for Certification Blythe Energy Project Phase II", Caithness Blythe II, LLC, October 2009.

Table 1A – BEPII Maximum Annual HAP Emissions (All emissions presented in tons per year)	**Total**	**Threshold**
Acetaldehyde	0.0856	10
Acrolein	0.0353	10
Benzene	0.018	10
Ethylbenzene	0.334	10
Formaldehyde	2.02	10
Hexane	0.483	10
Naphthalene	0.00247	10
PAH	0.007	10
Propylene	1.44	10
Propylene Oxide	0.0552	10
Tolulene	0.0132	10
Xylene	0.0487	10
TOTAL HAPS	**4.54**	**25**
Ammonia	140	n/a
Note: Threshold equivalent to 10 tpy per HAP and 25 tpy combined		

Maximum Daily Emissions

Table 2 presents maximum daily facility emissions estimated under worst case conditions Maximum daily NO_x, VOC, CO and SO_x (fuel sulfur content of 0.5 gr/100 dscf) emissions are calculated by assuming one cold start, one warm/hot start, two shutdowns and 1 hour of operation with no duct burners and 17 hours of operation with duct burners (20° F/100% load for NO_x, CO and VOC). PM (PM_{10} front and back half emissions are estimated) emissions are calculated based upon 19.5 hours with duct burner and 4.5 hours with no duct burner.

Table 2 – BEPII Maximum Daily Emissions	**NO_x**	**CO**	**VOC**	**SO_x**	**PM_{10}**
Pounds per day	1168	892	499	154	380

Note; Startup/shutdown emissions from Siemens Flex 30 are based on plant 100% load with 30% margin added to startup emission estimates and 10% to shutdown (except for PM and SOx).

Equivalent Hourly Emission Rates

Table 3 presents maximum hourly emission rates for each turbine in operational mode. SOx emissions based upon annual fuel sulfur content of 0.5 gr/100 dscf. The cooling tower will emit a maximum of 1.36 pounds of PM_{10} per hour. Cooling tower emissions are not included in this table nor are auxiliary equipment (auxiliary boiler and fire pump engine).

Table 3 – BEPII Operational Mode Hourly Emission Rates (per turbine) All values in pounds per hour					
Mode	**NO_x**	**CO**	**VOC**	**SO_x**	**PM_{10}**
20° F at 100% load	16.2	9.9	2.9	3.0	6.0
20° F at 100% load with duct burner	17.9	10.9	6.3	3.3	7.5

5. Control Technology Evaluation

Best Available Control Technology (BACT) is required for all new permit units at any modified facility that emits, or has the potential to emit, 25 tons per year or more of any non-attainment pollutant or its precursors (MDAQMD Rule 1303(A)(3)). The proposed project site is state non-attainment for ozone and PM_{10}, and their precursors (NO_x, VOC, and SO_x). Note that the proposed project site is attainment/unclassified for all federal ambient air quality standards. Based on the proposed project's maximum emissions as calculated in §4 above, each permit unit at the proposed BEPII must be equipped with BACT/Lowest Achievable Emission Rate (LAER) for NO_x, VOC, $PM_{10/2.5}$ and SO_x, and BACT for CO. The project will trigger BACT for CO through PSD review; the District specifies CO BACT here to show its findings in advance of the PSD issuance by EPA. The applicant has submitted a BACT analysis that evaluates the BACT/ LAER for these pollutants, trace organics, and trace metals.[2, 3]

The proposed internal combustion engine fire suppression water pump 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 engine BACT, which is conformance with USEPA Tier 3 off-road engine standards. This engine 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 District will address ammonia emissions as an element of the toxics new source review analysis (§8).

NO_x BACT/LAER

NO_x is a precursor of ozone, PM_{10} and $PM_{2.5}$. NO_x will be formed by the oxidation of atmospheric nitrogen during combustion within the gas turbine generating systems.

[2] "Amendment to Application for Certification Blythe Energy Project Phase II", Caithness Blythe II, LLC, October 2009.
[3] Addenum to application submitted by Atmospheric Dynamics via email to C. Anderson, February 9. 2010.

A review of recent combined-cycle CTG NO_x BACT determinations (Vernon City, Magnolia Power Project, Victorville 2 Hybrid Power Project) demonstrates that 2 ppm is the most stringent NO_x limit to date, with varying averaging times. BEPII is requesting 2 ppmvd.

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 BEPII. A review of those same recent combined-cycle CTG (with duct burners) NO_x BACT determinations demonstrates that a maximum of 5 ppmvd ammonia slip is an element of the most stringent NO_x limit to date. BEPII is requesting 10 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. BEPII proposes to use "Flex Start" technology to minimize startup durations.

In order to determine BACT during startup and shutdown conditions, a review was conducted of other combined-cycle, natural gas-fired turbine applications. The VV2 Project PSD application addressed BACT for startups and shutdowns, and concluded that "Rapid Start Process" technology represented BACT for GE "F-class" combustion turbines. Siemens "Flex Start" technology is similar to RSP. A review of other similar permits' operating approaches, operating controls, work practices and equipment performance and design did not identify any superior emission rates. Although it is difficult to compare the emission rates expected to be achieved with the FST approach due to the significant variability of the emission levels permitted for combined-cycle power plants startup and shutdowns during the last decade, the emission levels proposed for BEPII are significantly lower and durations are shorter than other projects reviewed.

There are no other technically feasible control techniques to further reduce NO_x emissions during startup and shutdown. Mass emission rate limits, in pounds per event, proposed during startup and shutdown, and the specification of Siemens FST, therefore, represent BACT for emissions of NO_x during the short-term startup and shutdown events. See appendix A for details regarding Siemens Flex 30 startup/shutdown traits.

A review of recent small scale limited use natural gas combustion boiler/heater BACT determinations (BAAQMD) demonstrates that 9 ppmvd at 3% oxygen is the most stringent NO_x limit to date. BEPII is requesting 9 ppmvd at 3% oxygen for the auxiliary boiler.

The District therefore determines that a maximum NO_x concentration of 2 ppmvd averaged over one hour, with an ammonia slip of 5 ppmvd averaged over three hours, and using "fast" start operational methods, is acceptable as NO_x BACT for the BEPII combined cycle gas turbine power trains, achieved with low-NO_x burners and selective catalytic reduction in the presence of ammonia.

The District also determines that a maximum NO_x concentration of 9 ppmvd at 3% oxygen is acceptable as NO_x BACT for the BEPII limited use auxiliary boiler achieved with low-NO_x burners. Since transient periods (startup and shutdown) for these units are expected to be brief and no emissions control technology is proposed, no different BACT emissions limits are specified for transient operations of this equipment.

CO BACT

Carbon monoxide is formed as a result of incomplete combustion of fuel within the gas turbine generating systems.

A review of recent combined-cycle CTG CO BACT determinations (Vernon City, Magnolia Power Project, Victorville 2 Hybrid Power Project) demonstrates that 2 ppm is the most stringent CO limit for similar facilities, with varying averaging times (3 ppm when duct burner operation is accounted for). BEPII is requesting 2 ppmvd averaged over one or three hours with and without duct burners.

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. BEPII proposes to use "Fast Start Technology" to minimize startup durations. Similar to the NO_x BACT discussion, a review of other similar projects did not identify emission limits or durations more stringent than those proposed by the Applicant. Since there is no other technically feasible control techniques to further reduce emissions of CO during startup and shutdown periods, the mass emission rate limits, in pounds per event, proposed to limit CO emissions during startup and shutdown, therefore, represent BACT for this Project. See appendix A for details regarding Siemens Flex 30 startup/shutdown traits.

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. BEPII is requesting 50 ppmvd at 3% oxygen for the auxiliary boiler.

The District therefore determines that a maximum CO concentration of 2 ppmvd (with and without duct burning) averaged over one hour, and using "flex" start operation methods, is acceptable as CO BACT for the BEPII combined cycle gas turbine power trains, achieved with an oxidation catalyst.

The District also determines that a maximum CO concentration of 50 ppmvd at 3% oxygen is acceptable as CO BACT for the BEPII limited use auxiliary boiler, achieved with a low-NO_x burner. Similar to NO_x emissions, no separate CO BACT limit is defined for this equipment during transient periods.

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

PM_{10} and $PM_{2.5}$ is a state non-attainment pollutant at the proposed facility location. Particulate will be emitted by the gas turbine generating 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.

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 scf is PM_{10} BACT. BEPII proposes the sole use of natural gas with a sulfur content not greater than 0.5 grains/100 dscf short term (≤24 hours) and 0.25 grains/100 dscf on an annual (long term) average basis as fuel.

The District therefore determines that the sole use of natural gas fuel with a fuel sulfur content not greater than 0.5 grains/100 dscf short term (≤24 hours) and 0.25 grains per 100 dscf on an annual average basis is acceptable as PM_{10} and $PM_{2.5}$ BACT for the BEPII combined cycle gas turbine power trains and auxiliary boiler.

Cooling Towers

Cooling tower modifications do not result in a net emissions increase, therefore a BACT review is not required. Existing BACT requirements in-place for BEPII are the use of drift eliminators limiting drift to 0.0005 percent.

SO_x BACT

SO_x is a precursor to PM_{10}, a non-attainment pollutant at the proposed facility location. SO_x is exclusively formed through the oxidation of sulfur present in the fuel.

The emission rate is a function of the efficiency of the source and the sulfur content of the fuel, since virtually all fuel sulfur is converted to SO_x. CARB guidance suggests that a requirement to burn natural gas with a fuel sulfur content not greater than 1 grain/100 dscf is SO_x BACT. The District determined that sole use of natural gas with a fuel sulfur content not greater than 0.5 grains per 100 dscf as fuel was SO_x BACT for the original permitting of BEPII. BEPII Caithness

proposes the sole use of natural gas with a sulfur content not greater than 0.5 grains/100 dscf short term (24 hours or less) and 0.25 grains/100 dscf on an annual average basis as fuel as PM_{10} BACT. Pipeline quality natural gas regulated by the California Public Utilities Commission typically must meet one grain per 100 dscf. The District will limit fuel sulfur content by permit condition.

The District determines that the exclusive use of natural gas fuel with no more than 0.5 grains of sulfur per 100 standard cubic feet short term and 0.25 grains per 100 standard cubic feet annual average basis is acceptable as SO_x BACT for the BEPII combined cycle gas turbines and auxiliary boiler.

VOC and Trace Organic BACT

VOC is a precursor for ozone and PM_{10} and $PM_{2.5}$ which are 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.

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. CARB guidance suggests that a 2 ppmvd averaged over three hours VOC emissions limit is VOC BACT. The District 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). Caithness proposes a VOC emission limit of 1 ppmvd with no duct burner and 2 ppmvd with duct burner, averaged over one hour as VOC BACT, achieved with combustion controls.

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. BEPII proposes to use a "Fast Start Technology" to minimize startup durations. VOC emissions during startup and shutdown are controlled to a lesser extent than during normal operation because the oxidation catalyst is below its normal operating temperature range. There are no other technically feasible control techniques to further reduce emissions of VOC during startup and shutdown. The mass emission rate limits, in pounds per event, proposed to limit VOC emissions during startup and shutdown therefore represent BACT. See appendix A for details regarding Siemens Flex 30 startup/shutdown traits.

A review of recent small scale limited use natural gas combustion boiler/heater BACT determinations demonstrates that combustion controls (in accordance with NO_x controls) are the most stringent VOC control requirement. BEPII is requesting natural gas as sole fuel and good combustion practices (not to exceed 5 ppmvd) for the auxiliary boiler.

The District therefore determines that a maximum VOC concentration of 1 ppmvd with no duct burner and 2 ppmvd with duct burner, averaged over one hour as VOC BACT is acceptable as VOC and trace organic BACT for the BEPII combined cycle gas turbines, achieved with combustion controls.

6. PSD Class I Area Visibility Protection

Caithness originally evaluated the visibility reduction potential of project emissions on Prevention of Significant Deterioration (PSD) Class I areas.[4] The District approved of the visibility analysis methods and findings. The USEPA has authority over the PSD permitting of this facility, and will have the ultimate responsibility to review and approve these analyses in order to issue the PSD permit. However, in its review of the BEPII permit application, District reviewed the increment consumption, acid deposition, and visibility analysis methods and findings. District found the methods to be acceptable and agrees with the findings. The following review findings are presented for informational purposes only

Findings

The original BEPII was estimated to generate a maximum 24-hour increase in the light extinction coefficient of 2.05 percent, which is less than the significant change level of 5 percent. The modernization of the permitted plant will not cause an exceedance of the significant change level of 5 percent.

Inputs and Methods

Visibility impacts were evaluated at the Joshua Tree National Monument (70 km from the proposed site), the only applicable site within 100 km. Three dimensional gridded prognostic meteorological data for 1990, 1992 and 1996 were used for the analysis. Worst-case one-hour emissions were used for the analysis. Visibility impacts were evaluated using the USEPA CALPUFF model.

7. Air Quality Impact Analysis

Caithness performed the ambient air quality standard and Prevention of Significant Deterioration impact analyses for CO, $PM_{10/2.5}$, SO_2 and NO_2 emissions.[6] The District 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. This analysis was performed using background air quality values based upon air quality monitoring data representative of the Project region. When added to the maximum recent background concentration, the BEPII did not

[4] "Assessment of Air Quality Impacts from the Proposed Blythe II Energy Project at the Joshua Tree National Park," Earth Tech, March 2003- BEPII original application.
[6] "Amendment to Application for Certification Blythe Energy Project Phase II", Caithness Blythe II, LLC, October 2009.

exceed the most stringent (or lowest) standard for any pollutant except for NO_2 and PM_{10}, which are already in excess of the standard without the project. The BEPII modification from all proposed criteria pollutant emissions were modeled at the nearest Class I area (Joshua Tree National Park). As listed in Table 5, all impacts are well below the Significant Impact Levels (SIL) for all criteria pollutants and averaging periods. Additionally, the maximum modeled impacts during normal operations for all pollutants (with the exception of $PM_{2.5}$ 24 hour average) are less than the Class II and DistrictSILs. To demonstrate that the emissions from the proposed BEPII will not cause or contribute to a violation of the PM2.5 NAAQS, a multi-source cumulative modeling analysis was conducted in accordance with EPA requirements demonstrating compliance with the applicable $PM_{2.5}$ NAAQS and CAAQS.

Table 4 – BEPII Worst Case Ambient Air Quality Impacts

Pollutant	**Project Impact**	**Background**	**Total Impact**	**Federal Standard**	**State Standard**
	All values in $\mu g/m^3$				
Normal Operating Conditions					
CO (1 hour)	36.4	2530	2566	40000	23000
CO (8 hour)	10.8	1789	1800	10000	10000
PM_{10} (24 hour)	2.85	88	90.9	150	50
PM_{10} (annual)	0.666	31.0	31.7	50	20
$PM_{2.5}$ (24 hour)	2.85	28	30.9	35	n/a
$PM_{2.5}$ (annual)	0.666	10.4	11.1	15.0	12
SO_2 (1 hour)	6.28	47.2	53.5	n/a	655
SO_2 (3 hour)	3.26	31.2	34.5	1300	n/a
SO_2 (24 hour)	0.920	13.1	14.0	365	105
SO_2 (annual)	0.036	2.7	2.74	80	n/a
NO_2 (1 hour)	113	149	262	0.001	339
NO_2 (annual)	0.338	38.0	38.34	100	57
Start-up/Shutdown Periods					
NO_2 (1 hour)	110	149	259	0.001	339
CO (1 hour)	213	2530	2743	40000	23000
CO (8 hour)	19.2	1789	1808	10000	10000

Table 5 – Criteria Pollutant Class I SILs and Increments			
	Project Impact	**Class I Significant Impact Level**	**Class I PSD Increment**
Pollutant	*All values in $\mu g/m^3$*		
$PM_{10/2.5}$ (24 hour)	0.11635	0.3	10
$PM_{10/2.5}$ (annual)	0.00226	0.2	5
SO_2 (3 hour)	0.26413	1.0	25
SO_2 (24 hour)	0.05583	0.2	5
SO_2 (annual)	0.00046	0.1	2
NO_2 (annual)	0.00649	0.1	2.5

Inputs and Methods

Worst case emissions were used as inputs, meaning including start-up and shutdown emissions for all short term (24 hours or less) and long term (greater than 24 hours) averages. Data from Blythe Airport for 2002 through 2006 was used as the meteorological inputs. Maximum ambient concentration data for 2006 through 2008 from the District air monitoring sites including Victorville, Blythe and Lucerne Valley were used for background concentrations. Mixing heights were determined from Tucson, Arizona data. For determining annual impacts, the conservative assumption of 100 percent conversion of NO_x to NO_2 was used.

The USEPA AERMOD(version 07026) dispersion model was used to estimate ambient concentrations resulting from BEPII emissions. The dispersion modeling was performed according to requirements stated in the USEPA's "*Guideline on Air Quality Models*"(including supplements), the National Park Service's *"Permit Application Guidance for New Air Pollution Sources"* (Bunyak 1993), the Federal Land Managers' *"Air Quality Related Values Workgraoup (FLAG) Draft Phase I Report"* (June 2008), and the *"Interagency Workgroup on Air Quality Modeling (IWAQM) Phase II Recommendations"* (1998), as well as other modeling guidance documents.

8. Health Risk Assessment and Toxics New Source Review

Caithness performed a Health Risk Assessment (HRA) for carcinogenic, non-carcinogenic chronic, and non-carcinogenic acute toxic air contaminants. Original modeling conducted did not take credit for the toxic reductions normally associated with the use of an oxidation catalyst. The findings presented below are from the original modeling analysis submitted to the District. The District approves of the HRA methods and findings.

Findings

The HRA calculated a peak 70-year cancer risk of 1.81 per million. This risk is slightly above the one in one million level, i.e., the District "moderate risk" value, but well below the "significant risk" and "significant health risk" thresholds established by District. The maximum

non-cancer chronic and acute Hazard Indices are both less than the significance level of 1.0 (0.0295 and 0.3477, respectively). T-BACT for combined cycle combustion turbines is the use of clean fuels (natural gas) and the operation of an oxidation catalyst. BEPII will operate with these technologies in place and is below the significant risk threshold. 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. Please note that the emission factors presented have been adjusted from the original application to account for control efficiency of the oxidation catalyst. Accordingly, the HRA calculated values would effectively have a dramatic decrease if the HRA was repeated with these lower values. The District does not require repeating the analysis at this time.

Inputs and Methods

BEPII will emit toxic air contaminants as products of natural gas combustion, equipment wear, ammonia slip from the SCR systems, and cooling tower emissions. Combustion emissions were estimated using emission factors from USEPA and the California Air Toxics Emission Factors (CATEF) database. Ammonia slip was assumed to be 5 ppm in the stack exhaust. District cooling tower emissions were estimated using USEPA emission factors for evaporative emissions and engineering calculation for drift droplets.

The AERMOD dispersion model was used to estimate ambient concentrations of toxic air pollutants. The California Hot Spots Reporting Program (HARP) AB2588 risk assessment model was used to estimate health risks due to exposure to emissions. Surface data from the Blythe Airport (2002 through 2006) and upper air data from Tuscon, Arizona were used as meteorological inputs.

9. Offset Requirements

District Regulation XIII – *New Source Review* requires offsets for non-attainment pollutants and their precursors emitted by large, new sources and those with major modifications Caithness has an approved offset package for the original permitting of BEPII. This current proposal incorporates the approved package, amending it as necessary to address the modified emissions profile of the proposed project. BEPII is located in an area that has been designated non-attainment by CARB for ozone and PM_{10}. District Rule 1303(B)(1) specifies offset threshold amounts for the non-attainment pollutant PM_{10}. District 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 modified 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 BEPII annual emissions exceed the offset thresholds for three of the four non-attainment pollutants and/or precursors. The table uses BEPII 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, oxidation catalyst and auxiliary boiler), existing units (cooling tower, fire pump and SCR) cargo carriers (none are proposed), fugitive emissions (none are proposed), and non-permitted equipment (none are proposed). For this analysis the Districtassumes VOC is equivalent to ROC and 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 BEPII Emissions with Offset Thresholds
All emissions in tons per year

	NO_x	**VOC**	**SO_x**	**PM_{10}**
Maximum BEPII Emissions	**169.4**	**51.9**	**13.0**	**60.9**
Offset Threshold	25	25	25	15

Required Offsets

District 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 BEPII is located in two non-attainment areas, a state 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 BEPII.

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

	NO_x	**VOC**	**PM_{10}**
Maximum Emissions	169.4	51.9	60.9
Offset Ratio	1.0	1.0	1.0
Required Offsets	**169.4**	**51.9**	**60.9**

Identified Emission Reduction Credits

As stated above, Caithness proposes to amend its existing offset plan through the use of existing ERC certificates held or owned by BEPII, derived from the District emissions bank. For any emissions not mitigated through this approach BEPII proposes to purchase offsets from the Districtbank, or will generate new offsets pursuant to the District rules, or through participation in qualifying district emission reduction programs, i.e. such as the Carl Moyer program. Caithness has submitted sufficient information in advance of an actual ERC application for the local road paving projects to support the ERC numbers presented here. The District 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 proposed BEPII ERC sources are summarized in Table 7.

Table 7 – ERC Sources Identified by Caithness
All emissions in tons per year

Source	Location	**NO_x**	**VOC**	**PM_{10}**
CRIT Road Paving	MDAQMD (pending)			126
Existing ERC Held or Owned By Caithness	MDAQMD - 0058	25		
Existing ERC Held or Owned By Caithness	MDAQMD - 0051	175		
SoCal Gas Company	MDAQMD - 0052	250		

Table 7 – ERC Sources Identified by Caithness All emissions in tons per year				
Source	Location	**NO_x**	**VOC**	**PM_{10}**
	Total ERCs Identified:	**450**		**126**

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

Caithness has proposed to use inter-pollutant ERC trading to make up for the limited amount of ozone precursor ERCs available within the District. The use of inter-pollutant offsets is specifically allowed for by Rule 1305(B).

The District has previously approved the use of inter-pollutant ERC trading (specifically VOC for NO_x) for both the HDPP and the BEP which included BEPII in the original permitting of both. In each case CARB and USEPA Region IX did not object. CAITHNESS is proposing to use NO_x ERCs to offset VOC emissions at a 1.0:1 ratio. The proposed NO_x for VOC trade is between ozone precursors and is greater than the reciprocal of 1.6:1 (0.625:1), the previously approved VOC for NO_x ratio. The District finds that the proposed use of inter-pollutant ERCs for BEPII is consistent with prior inter-pollutant actions.

The District determines that this inter-pollutant trade is technically justified and will not cause or contribute to a violation of an ambient air quality standard. The District concludes that a NO_x to VOC ratio of 1.0:1 is acceptable for BEPII. Table 8 summarizes the total offset requirements for the BEPII.

Table 8 – Total BEPII Offset Requirements All emissions in tons per year			
	NOx	**VOC**	**PM_{10}**
New or Existing Offset Obligation for BEPII	169.4	51.9	60.9
Existing Offsets Identified or Owned by BEPII	450		126
Remaining Offset Burden	0	51.9	0
Inter-Pollutant Ratio (NO_x for VOC)		1.0	
Inter-Pollutant Offset Use		51.9	
Net Offset Requirement	0	0	0

10. Applicable Regulations and Compliance Analysis

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

Regulation II – Permits

Rule 221 – *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 403.2 – *Fugitive Dust Control for the Mojave Desert Planning Area* specifies requirements for construction projects. The construction of the proposed project will be required to comply with the requirements of Rule 403.2.

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 406 – *Specific Contaminants* limits sulfur dioxide emissions. The sole use of pipeline-quality natural gas as a fuel will keep proposed project emission levels in compliance with Rule 406.

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 – *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 475 – *Electric Power Generating Equipment* limits NO_x and particulate matter emissions with mass rate and concentration standards. Permit conditions for the proposed project will establish limits which are in compliance with Rule 475.

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.

Regulation XII – 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.

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 an NO_2 and CO PSD permit, complying with Rule 1300.

Rule 1302 – *Procedure* requires certification of compliance with the Federal Clean Air Act, applicable implementation plans, and all applicable District 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 1306 – *Electric Energy Generating Facilities* places additional administrative requirements on projects involving approval by the California Energy Commission (CEC). The proposed project modifications will not receive an ATC without CEC's approval of Caithness petition to amend the Energy Commission Decision for BEPII, ensuring compliance with Rule 1306.

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 District 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 in the future, the Districtwill 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. BEPII will not emit more than ten tons of any individual toxic air contaminant, and will not collectively emit more than 25 tons of all toxic air contaminants, so MACT is not required.

11. Conclusion

The District has reviewed the proposed project's Application for New Source Review and subsequent supplementary information. The District issued it's preliminary New Source Review document (PDOC) on March 15, 2010. Comments were received by USEPA, Region IX and are addressed by this FDOC. The District has determined that the proposed project, after application of the permit conditions (including BACT requirements) given below, will comply with all applicable District Rules and Regulations. This FDOC will be publicly noticed on or about August 10, including copies to USEPA, CARB and CEC. This FDOC will remain available for public inspection for 30 days or approximately September 9, 2010 (the exact date is a function of when the notice is published).

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 SCR system, oxidation catalyst, duct burner and cooling tower. 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 District permit numbers. The signed and printed version of this document will have printed permits (with descriptions and conditions) in place of condition language listings.

Turbine Power Train Authority to Construct Conditions
[2 individual 2019.6 MMBtu/hr F Class Gas Turbine Generators,
Permit Numbers: B008877 and B008878]

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 0.5 grains per 100 dscf on a twenty-four hour basis and not exceeding 0.25 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 52.21) 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 – 17.9 lb/hr (based on 2.0 ppmvd corrected to 15% oxygen and averaged over one hour)
      ii. CO – 10.9 lb/hr (based on 2.0 ppmvd corrected to 15% oxygen and averaged over one hour)
   b. Hourly rates, verified by annual compliance tests or other compliance methods in the case of SO_x:
      i. VOC as CH_4 – 6.3 lb/hr (based on 2.0 ppmvd (1.0 ppmvd with no duct firing) corrected to 15% oxygen and averaged over one hour)
      ii. SO_x as SO_2 – 3.3 lb/hr (based on 0.5 grains/100 dscf fuel sulfur)
      iii. PM_{10} – 7.5 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, i.e., the applicable emission limits listed in condition 4. Cold startup is defined as a startup when the CTG has not been in operation during the preceding continuous 48 hours, although a startup after an aborted partial cold start(a cold start that does not reach 85% output) is still considered a cold start. Hot/warm 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 – 180 minutes
      ii. Hot/warm startup – 60 minutes
      iii. Shutdown – 60 minutes
   c. During a cold startup emissions shall not exceed the following, verified by CEMS:
      i. NO_x – 120.9 lb
      ii. CO – 140.4 lb
   d. During hot/warm startup emissions shall not exceed the following, verified by CEMS:
      i. NO_x – 81.9 lb
      ii. CO – 58.5 lb
   e. During a shutdown emissions shall not exceed the following, verified by CEMS:
      i. NO_x – 29.7 lb
      ii. CO – 25.3 lb

6. Emissions from this facility, including the duct burner, auxiliary equipment, engine, and cooling tower, shall not exceed the following emission limits, based on a calendar day summary:
   a. NO_x – 1168 lb/day, verified by CEMS, compliance tests, hours of operation and/or fuel use as applicable.
   b. CO – 892 lb/day, verified by CEMS, compliance tests, hours of operation and/or fuel use as applicable.
   c. VOC as CH_4 – 499 lb/day, verified by compliance tests, and hours of operation in mode.
   d. SO_x as SO_2 – 154 lb/day, verified by fuel sulfur content and fuel use data.
   e. PM_{10} –380 lb/day, verified by compliance tests and hours of operation.

7. Emissions from this facility, including the duct burner, auxiliary equipment, engine, and cooling tower, shall not exceed the following emission limits, based on a rolling 12 month summary:
   a. NO_x – 169.4 tons/year, verified by CEMS, compliance tests, hours of operation and/or fuel use as applicable.
   b. CO – 110.7 tons/year, verified by verified by CEMS, compliance tests, hours of operation and/or fuel use as applicable.
   c. VOC as CH_4 – 51.9 tons/year, verified by compliance tests and hours of operation in mode.
   d. SO_x as SO_2 – 13.3 tons/year, verified by fuel sulfur content and fuel use data.
   e. PM_{10} – 60.9 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. (Rule 401-*Visible Emissions*)

9. This equipment shall exhaust through a stack at a minimum height of 130 feet.

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's C00nnnn installed.

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, AVAQMD Rule 218, 40 CFR 60 and/or 40 CFR 75 as applicable. Note;

Where 40 CFR 60 and 40 CFR 75 are applicable but inconsistent, 40 CFR 75 shall take precedent.

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 MDAQMD 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 at full load:
    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 (measured per USEPA Reference method 6 or equivalent).
    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 (measured per USEPA Reference Methods 1 and 2).
    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 hot/warm 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 hot/warm 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 monthly, and cumulative 12 month emissions of NO_x, CO, PM_{10}, VOC and SO_x (including calculation protocol).
    g. Fuel sulfur content (monthly laboratory analyses or monthly natural gas sulfur content reports from the natural gas supplier(s
    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 169.4 tons of NO_x, 51.9 tons of VOC, and 60.9 tons of PM_{10} offsets.

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 concentration limit of Condition 4 above and ammonia concentration limit of Condition 4 of the SCR system 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 734 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 – 25.5 tons, and 193.5 pounds/hour/CTG
    b. CO – 203.5 tons, and 2713.0 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. Formaldehyde;
    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 hot/warm startup VOC emissions; and
    e. Characterization of shutdown VOC emissions.

27. This unit shall emit no more than 0.25 pounds/hour of formaldehyde (measured per California Air Resources Board Method 430) at full load.

28. Total emissions of Hazardous Air Pollutants or HAP (as defined in Rule 1320) from this facility shall not exceed 10 tons per year for any single HAP and 25 tons per year for any combination of HAPs, calculated on a rolling twelve month basis.

HRSG Duct Burner Authority to Construct Conditions
[2 individual 221.6 MMBtu/hr Natural Gas Duct Burners,
Permit Numbers: B008879 and B008880]

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 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 2200 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.

Selective Catalytic NO_x Reduction System Authority to Construct Conditions
[2 individual SCR systems, Permit Numbers: C008881 and C008882]

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 # TBD.

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. The owner/operator shall record and maintain for this equipment the following on site for a minimum of five (5) years and shall be provided to District personnel upon request.
   a. Ammonia injection, in pounds per hour
   b. Temperature, in degrees Fahrenheit.

Oxidation Catalyst System Authority to Construct Conditions

[2 individual oxidation catalyst systems, Application Numbers: 0010949 and 0010950]

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.

Cooling Tower Authority to Construct Conditions

[One Cooling Tower, Permit Number: B008884]

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 108,000 gallons per minute. The maximum hourly PM_{10} emission rate shall not exceed 1.37 pounds per hour, as calculated per the written District-approved protocol.

4. The operator shall perform weekly tests of the blow-down water total dissolved solids (TDS). The average TDS shall not exceed 5050 ppm on a calendar monthly basis. 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. We may want to propose monthly testing.

5. The operator 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.

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 60 MMBtu/hr Gas Fired Auxiliary Boiler, Application Number: 0010864]

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 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 (initial compliance test with respect to VOC, SO_x, and PM_{10}):
   a. NO_x as NO_2 – 0.550 lb/hr (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)
   b. CO – 1.853 lb/hr (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)
   c. VOC as CH_4 – 0.110 lb/hr
   d. SO_x as SO_2 – 0.141 lb/hr (based on 0.5 grains/100 dscf fuel sulfur)
   e. PM_{10} – 0.270 lb/hr (front and back half)

5. This equipment shall not be operated for more than 1500 hours per rolling twelve month period.

6. A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

7. 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, monthly, and rolling 12 month 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.

8. The o/o shall perform the following annual compliance tests on this equipment in accordance with the MDAQMD 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. CO in ppmvd at 3% oxygen and lb/hr (measured per USEPA Reference Method 10).

Emergency Fire Pump Authority to Construct Conditions

[One emergency IC engine driving a fire pump, Permit Number: E008885]

1. 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. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.

2. This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements..

3. A non-resettable four-digit (9,999) hour timer shall be installed and maintained on this unit to indicate elapsed engine operating time.

4. This unit shall be limited to emergency use defined as the pumping of water for fire suppression or protection or the pumping of water to maintain pressure in the water distribution system due to a high demand on the water supply system due to high use of water for fire suppression. In addition, this unit shall be operated no more than 50 hours per year for testing and maintenance including requirements pursuant to the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition.

5. The o/o shall maintain a operations log for this unit current and on-site, either at the engine location or at a on-site location, for a minimum of five (5) years, and be made available to the District staff within 5 working days from the District's request, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:
   a. Date of each use and duration of each use (in hours);
   b. Reason for use (testing & maintenance, emergency, required emission testing);
   c. Calendar year operation in terms of fuel consumption (in gallons) and total hours; and,
   d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log).

6. This equipment shall exhaust through a stack at a minimum height of 30 feet.

7. This equipment shall not be tested during periods of startup of the combustion turbine generators.

8. This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.

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Appendix A - Emission Calculation Detail

NOx, CO and VOC Calculations

Based on Siemens data sheet at 20 F, w/ no duct firing, no inlet cooling.

Enter data in yellow cells:

Actual Exhaust Gas =	**4,286,206**	**lb/hr**

	Exhaust Gas Mole percent	**Dry percentages**	**In 100 moles:**
N2 + AR	**75.88**	0.821478835	82.14788
O2	**12.61**	0.136516185	13.65162
CO2	**3.88**	0.04200498	4.200498
H2O	**7.63**		
Total	**100**		**100**

Net, dry **92.37**

Solve: (O2moles + 0.209X)/(N2moles + O2moles + CO2moles + Xmoles) = 0.15

Where, X = no. of moles of excess air needed for exhaust mixture to have 15% O2)

Hence, O2 + 0.209X = 0.15N2 + 0.15O2 + 0.15CO2 + 0.15X

13.65161849	+ .209	X=	12.32218253	2.047743	0.630075	+ .15 X
	0.059	X=	1.348381509			
		X=	22.85392388	moles of excess air needed for 15% O2		

Therefore,	**O2**	**N2+Ar**	**CO2**	**Total**
	18.42808858	100.2253373	4.200498	122.8539
Percentages:	0.15	0.815809004	0.034191	1

Compute MW of dry exhaust:

4.8	22.84265212	1.504404	**29.14706**	lb/mole

Turbine Exhaust for 15% O2, dry = **5,265,772.26** **lb/hr** **or** **180662.2** **mole/hr**

Pollutant	**Conc. (ppmvd)**	**Calculated Emission Rate**	
NOx	**2.0**	16.62	lb/hr
CO	**2.0**	10.12	lb/hr
VOC	**1.0**	2.89	lb/hr

Siemens emission estimates

Pollutant	Conc. (ppmvd)	**Emission Rate**	
NOx	2	16.20	lb/hr
CO	2	9.90	lb/hr
VOC	1	2.90	lb/hr

NOx, CO and VOC Calculations

Based on Siemens data sheet at 20 F, w/ duct firing, no inlet cooling.

Enter data in yellow cells:

Actual Exhaust Gas =	**4,296,073**	**lb/hr**

	Exhaust Gas Mole percent	**Dry percentages**	**In 100 moles:**
N2 + AR	**75.59**	0.82476814	82.47681
O2	**11.8**	0.128750682	12.87507
CO2	**4.26**	0.046481178	4.648118
H2O	**8.36**		
Total	**100.01**		**100**

Net, dry **91.65**

Solve: (O2moles + 0.209X)/(N2moles + O2moles + CO2moles + Xmoles) = 0.15

Where, X = no. of moles of excess air needed for exhaust mixture to have 15% O2)

Hence, O2 + 0.209X = 0.15N2 + 0.15O2 + 0.15CO2 + 0.15X

12.8750682	+ .209	X=	12.37152209	1.93126	0.697218	+ .15 X
	0.059	X=	2.124931806			
		X=	36.01579332	moles of excess air needed for 15% O2		

Therefore,	**O2**	**N2+Ar**	**CO2**	**Total**
	20.402369	110.9653065	4.648118	136.0158
Percentages:	0.15	0.815826631	0.034173	1

Compute MW of dry exhaust:

4.8	22.84314568	1.503628	**29.14677**	lb/mole

Turbine Exhaust for 15% O2, dry **5,842,753.50** **lb/hr** **or** **200459.7** **mole/hr**

Pollutant	**Conc. (ppmvd)**	**Emission Rate**	
NOx	**2**	18.44	lb/hr
CO	**3**	16.84	lb/hr
VOC	**2**	6.41	lb/hr

Siemens emission estimates

Pollutant	Conc. (ppmvd)	**Emission Rate**	
NOx	2	17.90	lb/hr
CO	2	10.90	lb/hr
VOC	2	6.30	lb/hr

Natural Gas Auxiliary Boiler

App No.	Equipment	MMcf/hr	Max Day Hours	Annual Hours	Max hourly, pounds/hour NOx	CO	VOC	SO2	PM10	Max Daily (pounds) NOx	CO	VOC	SO2	PM10	Max Annual (pounds) **NOx**	**CO**	**VOC**	**SO2**	**PM10**
10864	TBD Boiler, 60 MMBtu/hr	0.0572	*24*	*1500*	0.55	1.85	0.11	0.14	0.27	13.2	44.5	2.7	3.4	6.5	825	2780	168	211	405
									total pounds:	13.2	44.5	2.7	3.4	6.5	825	2780	168	211	405
									total tons:	0.0	0.0	0.0	0.0	0.0	***0.41***	***1.39***	***0.08***	***0.11***	***0.20***

EmFac lb/MMcf [1]	
NOx	9.62
CO	32.4
VOC	1.96
SO2	2.46
PM10	4.72

Notes:

[1] natural gas criteria pollutant emfac
[2] Based on max hourly boiler fuel use 60 MMBtu/hr
and fuel HHV of 1049 Btu/scf

Refs:

(1) Efs from applicant and boiler mfg.

DIESEL FIRE PUMP

App No.	Equipment	bhp	Max Day Hours	Annual Hours	EmFac pounds/hour NOx	CO	VOC	SO2	PM10	Max Daily (pounds) NOx	CO	VOC	SO2	PM10	Max Annual (pounds) NOx	CO	VOC	SO2	PM10
10863	John Deere/Clarke	303	*24*	*50*	1.74	0.56	0.07	0.00	0.07	41.84	13.47	1.60	0.10	1.60	87.17	28.06	3.34	0.20	3.34
								total pounds:		41.84	13.47	1.60	0.10	1.60	87.17	28.06	3.34	0.20	3.34
								total tons:		0.0	0.0	0.0	0.0	0.0	***0.044***	***0.014***	***0.002***	***0.000***	***0.002***

EmFac gm/bhp-hr	
NOx	2.61
CO	0.84
VOC	0.10
SO2	0.01
PM10	0.10

Engine Family Name 9JDXL06.8101
CARB E.O. # U-R-004-0361
emissions data except SOx from manufacturer
Estimated SOX emission factor calculated from estimated max fuel consumption rate, calculated below:
20 gal/hr X 7.21 lbs/gal X 453.59 g/lb X 0.0015/10(#### g/bhp-hr
Diesel fuel use 20 gph
Stack height 30 feet
Not to be tested during rapid starts of CTG

		Main Cooling Tower	Totals
Flow Rate	*gallons/minute*	108000	
Mass Flow Rate	*pounds/minute*	900720	
Max Drift Rate	*Percentage*	0.0005	
Drift Rate	*pounds/minute*	4.50	
Max Solids	*TDS (ppm)*	5050	
PM Rate	*pounds PM/minute*	0.02	
PM Rate	*pounds PM/hour*	1.36	
PM10 Rate	*pounds PM10/hour*	1.36	1.4

Notes:
Drift rate assumes 0.0005 percent thanks to drift eliminators
Calculation assumes max Total Dissolved Solids of 5050 ppm in each device

SOx Calculations

Natural Gas Fuel Sulfur Based Emissions of SO2

Device:	**HRSG**	**(each unit)**
Gas HHV:	1049	
Grains S per 100 scf:	0.5	Short term limit (hourly and daily emissions)
	0.25	Long term limit (annual emissions)
Grains S per mmscf:	5000	Short term limit (hourly and daily emissions)
Grains S per mmscf:	2500	Long term limit (annual emissions)
Hourly fuel use, mmscf:	0.2112	
Daily fuel use, mmscf:	5.068	
Annual fuel use, mmscf:	464.64	0.180506

SO2 Emissions:

Hourly	0.15	lbs	Annual Hourly	0.15	0.25gr
Hourly	0.30	lbs	Annual Hourly	0.30	0.5gr

Device:	**Turbine**	**(each unit)**
Gas HHV:	1049	
Grains S per 100 scf:	0.5	Short term limit (hourly and daily emissions)
	0.25	Long term limit (annual emissions)
Grains S per mmscf:	5000	Short term limit (hourly and daily emissions)
Grains S per mmscf:	2500	Long term limit (annual emissions)
Hourly fuel use, mmscf:	2.0682	
Daily fuel use, mmscf:	49.634	
Annual fuel use, mmscf:	17600.382	

**SO2 Emissions:

Hourly	1.48	lbs	Annual Hourly	1.48	0.25 gr
Hourly	2.95	lbs	Annual Hourly	2.95	0.5 gr

* Standard S to SO2 conversion rate : Sulfur x 2 = SO2

**Based upon Siemens data sheet for SCC6-5000F(4) 28 ppm DLN on NG @59 degrees F- Flex Plan 30 (Benson) 2x1 config. SO2 emission estimate used for max hourly SO2 production at 3.6 lbs.

Short term (≤24 hrs)	2.95	lbs w/o DB
	3.25	lbs w/DB

Pounds per transient event:

		Duration (minutes)	NOx	CO	VOC	SO2	PM
CT1	Cold Startup	180	120.9	140.4	50.7	9.0	18.0
	Warm/Hot Startup	60	81.9	58.5	46.8	3.0	6.0
	Shutdown	60	29.7	25.3	20.9	3.3	7.5
CT2	Cold Startup	180	120.9	140.4	50.7	9.0	18.0
	Warm/Hot Startup	60	81.9	58.5	46.8	3.0	6.0
	Shutdown	60	29.7	25.3	20.9	3.3	7.5
Pounds per hour:							
CT1	Cold Startup		40.3	46.8	16.9	3.0	6.0
	Warm/Hot Startup		81.9	58.5	46.8	3.0	6.0
	Shutdown		29.7	25.3	20.9	3.3	7.5
CT2	Cold Startup		40.3	46.8	16.9	3.0	6.0
	Warm/Hot Startup		81.9	58.5	46.8	3.0	6.0
	Shutdown		29.7	25.3	20.9	3.3	7.5

Notes

Cold Start and Hot/Warm Start w/o duct burner. Shutdown with duct burner.

Startup/shutdown emissions from Siemens Flex 30 are based on plant 100% load with 30% margin added to startup emisssion estimates and 10% to shutdown (except PM and SOx)

Annual hours = 5820 no DB + 2200 w/DB + 30 hours cold start + 300 hours warm start + 310 hours shutdown = 8660

Daily hours = 1 no DB + 17.0 wi/DB + 3 hours cold start + 1.0 hours warm start + 2 hours shutdown (two events/day)

Annual SO2 hourly with and without DB is 1.63 and 1.48 lbs respectively (0.25 gr/100scf)

SOx hourly based on 0.5gr/100scf

Maximum Annual Emissions with Startups/Shutdowns

	No.	min per	total hours	pounds per hour NOx	CO	VOC	SOx	PM10
Cold Startup (CT1)	10	180	30.0	40.30	46.80	16.90	1.48	6.00
Warm/Hot Startup (CT1)	300	60	300.0	81.90	58.50	46.80	1.48	6.00
Shutdown (CT1)	310	60	310.0	29.70	25.30	20.90	1.63	7.50
Operation no DB(CT1)			5820.0	16.20	9.90	2.90	1.48	6.00
Operation w/ DB(CT1)			2200.0	17.90	10.90	6.30	1.63	7.50
Total CT1 Hours:			8660.0					
Cold Start (CT2)	10	180	30.0	40.30	46.80	16.90	1.48	7.50
Warm/Hot Start (CT2)	300	60	300.0	81.90	58.50	46.80	1.48	6.00
Shutdown (CT2)	310	60	310.0	29.70	25.30	20.90	1.63	0.00
Operation no DB (CT2)			5820.0	16.20	9.90	2.90	1.48	6.00
Operation w/ DB(CT2)			2200.0	17.90	10.90	6.30	1.63	7.50
Total CT2 Hours:			8660.0					
Cooling Towers			8760.0	0	0	0	0	1.365
Auxilliary Boiler			2500.0	0.55	1.85	0.11	0.14	0.27
Fire Pump			50.0	1.74	0.56	0.07	0.00	0.07
Facility Annual Total (pounds)				338763	221451	103812	26698.8	121802
Facility Annual Total (tons)				**169.4**	**110.7**	**51.9**	**13.3**	**60.9**

Notes:

No outages

Operation NOx uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with and without duct firing (2.0 ppmvd)

Operation CO uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with and without duct firing (2.0 ppmvd)

Operation VOC uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with (2.0 ppmvd) and without duct firing (1.0 ppmvd)

Operation PM10 uses estimate for front and back half

SO2 operational (annual) based on 0.25 gr/100 scf

SO2 short term (≤24 hours) based on 0.5 grains/100 scf

640 hours of starts/shutdowns per year

warm start = 300/year

cold start = 10/year

shutdown = 310/year

Startup/shutdown emissions from Siemens Flex 30 are based on plant 100% load with 30% margin added to startup emission estimates and 10% to shutdown (except PM and SOx)

Annual hours = 5820 no DB + 2200 w/DB + 30 hours cold start + 300 hours warm start + 310 hours shutdown = 8660

Auxiliary boiler operation at 2500 hours per year, 1 hour per day for full operational turbine day.

Theoretically auxilliary boiler not operated when plant is in operation

Fire pump at 50 hours per year

TDS in cooling tower water set to 5050 ppm

Cooling tower flow rate at 108,000 gpm and 11 cells

Maximum Daily Emissions with Startups/Shutdowns

	No.	min per	total hours	pounds per hour NOx	CO	VOC	SOx	PM10
Cold Start (CT1)	1	180	3.0	40.3	46.8	16.9	3.0	6.0
Hot Start (CT1)	1	60	1.0	81.9	58.5	46.8	3.0	6.0
Shutdown (CT1)	2	60	2.0	29.7	25.3	20.9	3.3	7.5
Operation no DB(CT1)			1.0	16.2	9.9	2.9	3.0	6.0
Operation w/ DB(CT1)			17.0	17.9	10.9	6.3	3.3	7.5
Total CT1 Hours:			24.0					
Cold Start (CT2)	1	180	3.0	40.3	46.8	16.9	3.0	6.0
Hot Start (CT2)	1	60	1.0	81.9	58.5	46.8	3.0	6.0
Shutdown (CT2)	2	60	2.0	29.7	25.3	20.9	3.3	7.5
Operation no DB (CT2)			1.0	16.2	9.9	2.9	3.0	6.0
Operation w/ DB(CT2)			17.0	17.9	10.9	6.3	3.3	7.5
Total CT2 Hours:			24.0					
Cooling Tower			24	0.0	0.0	0.0	0.0	1.36
Auxilliary Boiler			1	0.6	1.9	0.1	0.1	0.3
Fire Pump			1	1.7	0.6	0.1	0.0	0.1
Facility Daily Total (pounds)				**1168**	**892**	**499**	**154**	**378**

Notes:

No outages

Operation NOx uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with and without duct firing (2.0 ppmvd)

Operation CO uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with and without duct firing (2.0 ppmvd)

Operation VOC uses 20 deg F SGT6-5000F(4) @ maximum achievable exhaust flow with (2.0 ppmvd) and without duct firing (1.0 ppmvd)

Operation PM10 uses estimate for front and back half

SO2 operational (annual) based on 0.25 gr/100 scf

SO2 short term (?24 hours) based on 0.5 grains/100 scf

640 hours of starts/shutdowns per year

warm start = 300/year

cold start = 10/year

shutdown = 310/year

Startup/shutdown emissions from Siemens Flex 30 are based on plant 100% load with 30% margin added to startup emission estimates and 10% to shutdown (except PM and SOx)

Daily hours =1 no DB + 17.0 wi/DB + 3 hours cold start + 1.0 hours warm start + 2 hours shutdown

Auxiliary boiler operation at 2500 hours per year, 1 hour per day for full operational turbine day.

Auxilliary boiler not operated when plant is in operation

Fire pump at 50 hours per year

TDS in cooling tower water set to 5050 ppm

Cooling tower flow rate at 108,000 gpm and 11 cells

Blythe Energy Project	NOx	CO	VOC	SOx	PM10
Annual with Transients (tons)	169.4	110.7	51.9	13.3	60.9
Annual by hours (tons)	134.4	83.9	30.9	12.4	57.7
Max Annual (tons)	**169.4**	**110.7**	**51.9**	**13.3**	**60.9**
Daily with Transients (pounds)	1167.7	891.8	498.8	154.0	378.1
Daily by hours (pounds)	886.3	529.5	272.0	77.0	379.6
Max Daily (pounds)	**1168**	**892**	**499**	**154**	**380**