BLYTHE ENERGY PROJECT PHASE II

AMENDMENT

(02-AFC-1C)

DATA RESPONSES SET II

Submitted to

California Energy Commission

Submitted by

Caithness Blythe II, LLC

September 2010

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California Energy Commission
Dockets Unit
1516 Ninth Street
Sacramento, CA 95814-5512

Subject**: CAITHNESS BLYTHE II, LLC'S DATA RESPONSES SET 2**
BLYTHE ENERGY PROJECT PHASE II AMENDMENT
DOCKET NO. (02-AFC-1C)

Enclosed for filing with the California Energy Commission are 2 (two) hardcopies (one original and one copy), and 2 (two) compact discs of **CAITHNESS BLYTHE II, LLC'S DATA RESPONSES SET 2**, for the Blythe Energy Project Phase II Amendment (02-AFC-1C). The corresponding Appendix for Caithness Blythe II, LLC's Data Responses Set 2 has also been included.

Sincerely,

Marie Mills

Technical Area: Air Quality

DATA REQUEST

15. Please show detailed calculations for total and annual GHG emissions for the construction phase of the proposed project including all activities at the construction site and any construction activities for linear facilities (gas pipeline and transmission lines), worker travel, and truck or rail material deliveries.

RESPONSE

Caithness Blythe II, LLC (Caithness) will only be responsible for the construction of transmission structures on the Blythe Energy Project Phase II (BEP II or Project) site. Moreover, the BEP II will not construct an independent natural gas line, but rather interconnect into the "existing natural gas pipelines on the BEP site."[1]

The BEP II Amendment Appendices contain detailed calculations for total and annual GHG emissions for the construction phase of the proposed project. Table 5.2-B2 titled *Modeling Inputs/Results for Blythe-II Construction Impacts (Combustion Sources as 32-Point Sources)* provides a short term analysis of CO impacts of 24 hours and less. In addition, Appendix 5.2-E titled *Construction Emissions and Impact Analysis*, provides an updated analysis of the construction phases including available mitigation measures. Appendix 5.2-E provides the total and annual GHG emissions in terms of; average daily onsite emissions during construction in pounds per day, average annual onsite emissions during construction in tons per year, as well as annual onsite emissions during construction in tons per year of the sixteen (16) month construction period. The combustion emission analysis within Appendix 5.2-E included but was not limited to;

- Exhaust from the diesel construction equipment
- Exhaust from water trucks used to control construction dust emissions
- Exhaust from diesel-powered welding machines, electric generators, air compressors, and water pumps,
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site,
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site, and,
- Exhaust from automobiles used by workers to commute to the construction site.

In addition, conservative modeled estimates were provided for the maximum construction impacts of CO in 1-hour and 8-hour increments.

[1] Blythe Energy Project Phase II Amendment, Section 6.1.2

DATA REQUEST

16. Please provide revised NO2 modeling analysis for normal operation to demonstrate the compliance with the new, short-term EPA NO2 standard, including the 3-year averaging requirement.

RESPONSE

1-Hour NO_2 NAAQS

In the February 9, 2010 Federal Register (75 FR 6474), United States Environmental Protection Agency (USEPA) promulgated a new primary NO_2 NAAQS of 100 ppb (about 188 µg/m^3), based on the 3-year average of the annual 98th percentile daily 1-hour maximum NO_2 concentrations. For modeling purposes, the 98th percentile daily maximum is the 8th highest daily maximum, and according the above PM-2.5 guidance memo, a 5-year average is used (rather than 3-years) when five years of meteorological data are modeled. Since AERMOD is NOT currently configured to calculate/present the average of the eighth highest daily 1-hour maximum concentrations (just the average of the annual eighth highest 24-hour impacts for PM-2.5), a post-processor was developed as suggested in the USEPA document *"Notice Regarding Modeling for New Hourly NO2 NAAQS"* updated 02/25/2010. For the modeling analysis, the Ozone Limiting Method (OLM) included within the AERMOD code was used to convert modeled NO_X concentrations to NO_2. Hourly ozone data from the nearby Blythe monitoring station was used by AERMOD in the OLM analysis, which was concurrent with the meteorological data modeled. As part of the OLM analysis, concurrent hourly background NO_2 concentrations were added to modeled NO_2-OLM impacts before determining the maximum 5-year average of the 8th highest (98th percentile) daily 1-hour maximum concentrations. This use of concurrent ozone and background NO2 concentrations in the OLM analysis is consistent with past guidance contained in the *"Guideline on Air Quality Models"* when OLM was discussed in any detail (i.e., 3rd Level Screening in Draft GAQM Revisions proposed November 1984 through GAQM Supplement B issued February 1995). Since NO_2 data are not measured at the Blythe monitoring station, the nearest representative NO_2 station used in the background monitoring determination in the application was used (i.e., Victorville). Results of the AERMOD OLM analysis with the post-processor to determine the maximum 5-year average of the 98th percentile (8th highest) daily maximum 1-hour NO_2 combined (modeled plus background) concentrations are shown below:

- Facility Normal Operations 179 µg/m^3
- Facility Startup/Shutdown Periods 138 µg/m^3
- Facility Commissioning Activities 143 µg/m^3

All of these impacts are less than the new 1-hour NO_2 NAAQS.

The modeling files associated with this Data Request, which also corresponds with Data Response 1, are contained within the Data Response Set II Appendix and identified as Attachment 1. Attachment 1 is provided in an electronic format due to the size of the modeling files.

DATA REQUEST

17.

a. Please explain the bases used to derive the capacity and heat rate values in Figure 1-3.

b. Please justify the values for average site conditions, including temperature and relative humidity.

c. Please explain results as they compare to identical turbines proposed for El Segundo (heat rate = 7,311 BTU/kWh and Carlsbad (heat rate = 7,165 BTU/kWh).

RESPONSE

a. The data provided in Figure 1-3 was developed using a computer based thermodynamic model of the plant and its equipment. The GT Master software application was utilized for modeling. This application is used extensively for modeling power plants in the industry and widely accepted. The specific thermodynamic design criteria can be determined from the heat balance information provided.

b. The values for average site conditions, including temperature and relative humidity were derived at taking into account various factors. Caithness utilized four factors in making this determination;

- Standard Isometric Conditions
- Ensure the conditions were representative of our original Application for Certification,
- Average Site Conditions, and
- The project being able to deliver 570 MWs and operate over a variety of complete temperature ranges.

The climatic pattern for the BEP II region is a typical desert climate within the Mediterranean climate classification. The warmest month for the region is typically July, with the coldest month being, December. The month with the highest precipitation is usually February. The eastern Mojave Desert region experiences a large number of days each year with sunshine, generally 345+ days per year. The region also traditionally experiences excellent visibility, i.e., greater than 10 miles or more 95 percent of the time. Representative climatic data for the Project area was derived from the Blythe CAA Airport Station (#040927, Period of Record 7-1-1948 to 12-31-2008) located to the west of the Project site. A summary of data from this site indicates the following:

- average maximum daily temperature 87.7°F,
- average minimum daily temperature 59.7°F,
- highest mean maximum annual temperature 111.1°F,
- lowest mean minimum annual temperature 32.3°F, and mean annual precipitation 4.02 inches.

c. Unit heat rates of combined cycle plants are influenced by many factors including the plant's power cycle configuration, operating mode, gas turbine type, gas turbine load, cycle cooling, ambient temperature, fuel type, duct burners firing rate, and use of evaporative coolers.

We were unable to identify the origin of the 7,311 BTU/kWh heat rate for the El Segundo, Units 1 & 2 Power Redevelopment Project. However a comparison of El Segundo design with Blythe II reveals the following differences:

Comparison: El Segundo versus Blythe II			
Item No.	Parameter	El Segundo	Blythe II
1	Plant Configuration	2 Units with 1 GT and 1 ST	1 Unit with 2 GTs and 1 ST
2	Gas Turbine	Siemens SGT6-5000F	Siemens SGT6-5000F
3	Steam Turbine	Reheat Turbine with Extractions to Limit Exhaust Flow	Reheat Steam Turbine with Secondary Admissions
4	Gas Turbine Power Augmentation	Steam Injection	None
5	Cycle Cooling	Air Cooled Condenser	Condenser & Cooling Tower

Any difference in operating condition as indicated previously will also impact plant heat rate.

We identified the origin of the 7,165 BTU/kWh heat rate for the Carlsbad Energy Center Project as Case 3 in Figure 2.2-5, Base Load Heat Balance. A comparison of the Carlsbad Case 3 with Blythe II Case 1 reveals the following differences:

Comparison: Carlsbad, Case 3, versus Blythe II, Figure 1-3, Case 1			
Item No.	Parameter	Carlsbad	Blythe II
1	Heat Rate (Btu/kWh) (LHV)	7,165	6,094
2	Cycle Configuration	1 X 1 without Reheat	2 X 1 with Reheat
3	Gas Turbine Power Augmentation	Steam Injection	None
4	Steam Turbine	Non Reheat with Steam Extraction	Reheat with Secondary Steam Admissions
5	Gas Turbine Power Augmentation	Steam Injection	None

Comparison: Carlsbad, Case 3, versus Blythe II, Figure 1-3, Case 1			
Item No.	Parameter	Carlsbad	Blythe II
6	Cycle Cooling	Air Cooled Condenser Operating Above Atmospheric Pressure	Condenser Operating at Vacuum & Cooling Tower
7	Ambient Temperature	73.61° F	59° F

Furthermore, both El Segundo and Carlsbad Plants are designed as rapid response plants. Specific features have been included in the design of El Segundo and Carlsbad that enable the plants to respond rapidly to demand but which detract from plant heat rate. These features include the use of a once through single pressure heat recovery steam generator, a small non-reheat steam turbine, an air cooled condenser operating above atmospheric pressure, and steam injection for gas turbine power augmentation. Blythe II, although using the same gas turbine, and a fast starting profile, is designed for a higher efficiency and by contrast includes a drum type three pressure level heat recovery steam generator, a large reheat steam turbine, a water cooled condenser which operates at vacuum, and does not include gas turbine steam injection.

DATA REQUEST

18. Please provide the calculations for expected annual net energy output (in MWh/yr) and annual GHG performance (MTCO2e/MWh) for typical year operations, including the assumptions and operational scenarios used for the calculations.

RESPONSE

The nominal net generation of the project is expected to be 570 MW. Based on the turbines operating for 8,760 hours per year with the duct burner operation at 2,200 hours per year, the net CO2e in metric tons per hour is 224.19. Dividing this by 570 MW yields 0.393 MTCO2e/MWh which is in compliance with the AB-32 limit of 0.5 MTCO2e/MWh. Please see the attached table for the complete calculation methodology. The calculation methodology is attached to the Data Request Set II Appendix as Attachment 3.

DATA REQUEST

19. Please provide a copy of any MDAQCMD correspondence regarding recent and planned sources located within six miles of the Blythe II facility.

RESPONSE

The following email trail represents the substantive correspondence between Caithness, and its consultants, with the Mojave Desert Air Quality Management District's (District) personnel regarding any recent and planned sources located within six miles of the BEP II facility. The final email listed here, dated September 1, 2010 at 1:38pm, was forwarded to Greg Darvin, a consultant to Caithness. The public records request made on behalf of Caithness, referred to in

Greg Darvin's email to Chris Anderson, is included in the Data Request Set II Appendix as Attachment 2.

Dated: September 1, 2010 11:18AM
From: Greg Darvin
To: Chris Anderson
Subject: BEP II cumulative inventory

Hi Chris. Attached is my formal request for a cumulative source inventory within 8 miles of BEP II. Specifically, I am looking for sources that have been permitted within the last 18 months. See attached.

Dated: September 1, 2010 1:21PM
From: Chris Anderson
To: Greg Darvin
Subject: BEP II cumulative inventory

Greg we have some projects proposed and we have reviewed them already, however have yet to issue final permits to, do you need these? I think you do but just checking.

Dated: September 1, 2010 1:21PM
From: Greg Darvin
To: Chris Anderson
Subject: BEP II cumulative inventory

Yes, I will take those as well.
Thanks!

Dated: September 1, 2010 1:38PM
From: Alan De Salvio
To: Chris Anderson
Subject: BEP II cumulative inventory

No new sources within eight miles, unless you mean the solar project. Just email him the FDOC for the blythe solar project.

DATA REQUEST

20. Please provide the cumulative modeling analysis for operating period impacts, including the Blythe II facility and other identified recent and planned projects within 6 miles of the Blythe II facility.

RESPONSE

As identified in Data Response 19, the District recently provided Caithness and its consultants with information regarding any and all recently identified and planned projects within a six (6) mile radius of the Blythe Energy Project Phase II facility. The response to this Data Request 20 will be supplied under a separate cover once Caithness has completed processing the data.

// Original Signed //

David L. Wiseman
Counsel to Caithness Blythe II, LLC

BLYTHE ENERGY PROJECT PHASE II AMENDMENT

DATA RESPONSE SET II

APPENDIX

ATTACHMENT 1

NO_2 MODELING FILES

THESE FILES HAVE BEEN PROVIDED ON COMPACT DISC DOCKETED WITH BLYTHE ENERGY PROJECT PHASE II AMENDMENT DATA RESPONSES SET II

ATTACHMENT 2

MDAQMD PUBLIC RECORDS REQUEST

Public Records Request

August 31, 2010

From: Greg Darvin
Atmospheric Dynamics, Inc.
P.O. Box 5907
Carmel-By-The-Sea, CA. 93921
831-620-0481
darvin@atmosphericdynamics.com

The following information is requested:

1. A listing of all stationary and/or area sources, permitted within the previous 18 months, which are not yet operational, within an 8 mile radius of the proposed BEP II Generating Project (Blythe, CA), and the following data for each listed source:

    a. A list of emitting devices and/or processes at each identified facility.
    b. Emissions data, for each criteria pollutant emitted, in terms of lbs/hr, lbs/day, and tons/year, from each identified device or process,
    c. Stack and release point data, including stack heights, stack diameters, stack temperatures, stack flow rates, etc.
    d. Source location coordinates.

ATTACHMENT 3

GHG CALCULATION METHODOLOGY

Combustion Turbines-Gaseous Fuels Emissions Analysis Period: Annual

Facility Name: BEP II Gas Type: Natural Gas

Turbine Device ID: Siemens SGT6-5000 Op Hours: 8760

Turbine Heat Rating: 4039.2 mmbtu/hr (2 units)

Gas Btu Content: 1049 btu/scf Ref 1, Table C.5 Carbon Content: 14.47 kg/mmbtu

Frac Oxidized: 0.995

Annual Gas Usage: 33731 mmscf CO2/C Ratio: 3.6667

35383392 mmbtu/yr

Emissions Factors:

CO2	118.9	lb/mmbtu	Ref 1
CH4	0.002	lb/mmbtu	Ref 1
N2O	0.00022	lb/mmbtu	Ref 1

	lbs/yr	kg/yr	Emissions metric tons/yr	IPCC GWP/SAR		CO2e metric tons/yr
CO2	4.207E+09	1.908E+09	1908333.9	1	Ref 2	1908334
CH4	7.077E+04	3.210E+04	32.0998132	25	Ref 2	802
N2O	7.784E+03	3.531E+03	3.53097945	298	Ref 2	1052

Total **1910189** **CO2e metric tons**

HRSGs Gaseous Fuels Emissions Analysis Period: Annual

Gas Type: Natural Gas

Turbine Device ID: HRSG Duct Burners Op Hours: 2200

Heat Rating: 443.2 mmbtu/hr

Gas Btu Content: 1049 btu/scf Ref 1, Table C.5 Carbon Content: 14.47 kg/mmbtu

Frac Oxidized: 0.995

Annual Gas Usage: 929 mmscf CO2/C Ratio: 3.6667

975040 mmbtu/yr

Emissions Factors:

CO2	118.9	lb/mmbtu	Ref 1
CH4	0.009	lb/mmbtu	Ref 1
N2O	0.003	lb/mmbtu	Ref 1

	lbs/yr	kg/yr	Emissions metric tons/yr	IPCC GWP/SAR		CO2e metric tons/yr
CO2	1.159E+08	5.259E+07	52586.8713	1	Ref 2	52587
CH4	8.775E+03	3.981E+03	3.9805033	25	Ref 2	100
N2O	2.925E+03	1.327E+03	1.32683443	298	Ref 2	395

Total **53082** **CO2e metric tons**

Total GHG from Turbines and HRSGs on an annual basis **1963270** **CO2e metric tons**

570 **Nominal Net Generation Output in MW**

0.393 **MTCO2e/MWh**