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DOCKET
09-AFC-10

DATE APR 16 2010

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April 16, 2010

Mr. John Kessler
Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Subject: Rice Solar Energy Project (09-AFC-10)
Response to CEC Staff Workshop Queries 1-3

Dear Mr. Kessler:

Attached please find one (1) hardcopy of Rice Solar Energy, LLC's responses to CEC Staff Workshop Queries 1-3 for the Application for Certification for the Rice Solar Energy Project (09-AFC-10). In addition, enclosed are two (2) CDs of Response to Workshop Query 1 - AERMOD Dispersion Modeling Files.

If you have any questions about this matter, please contact me at (916) 286-0278 or Sarah Madams at (916) 286-0249.

Sincerely,

CH2M HILL

Douglas M. Davy, Ph.D.
AFC Project Manager

cc: POS List
Project File

Supplemental Filing

Response to CEC Staff Workshop Queries 1-3

In support of the

Application for Certification

for the

Rice Solar Energy Project

(09-AFC-10)

Submitted to the:

California Energy Commission

Submitted by:

SOLARRESERVE

With Technical Assistance by:



CH2MHILL

Sacramento, California

April 2010

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WSQ1-1 Cummins 2500 DQLC Diesel Generator Emissions Data Sheet

Introduction

Attached are Rice Solar Energy, LLC's (RSE's) responses to California Energy Commission (CEC) Staff Workshop Queries 1-3, submitted in support of RSE's Application for Certification (AFC) for the Rice Solar Energy Project (RSEP) (09-AFC-10). The Workshop Queries are informal requests for additional information that Staff raised during the Data Request Response and Issue Resolution Workshop that was held on March 19, 2010 and for which the RSE has agreed to provide a response or additional information to assist Staff in preparing their environmental and engineering assessment of the RSEP. Workshop Queries 1-3 have to do with air quality.

Air Quality

One-Hour NO₂ Standard

WSQ 1 *Please provide the results of any additional meteorological modeling done to demonstrate compliance with Environmental Protection Agency's recently promulgated 1-hour NO₂ standard.*

Response: The RSEP's construction, liquid salt commissioning, and operational impacts were remodeled using the EPA AERMOD dispersion model (version 09292) to demonstrate compliance with the new federal 1-hour NO₂ ambient air quality standard that became effective on April 12, 2010. The 1-hour NO₂ modeling also incorporated the AERMOD ozone limiting method (OLM). Sources with identical stack and plume conditions were grouped together using the OLMGROUP model selection. The pre-processed Blythe Airport AERMET meteorological data files and the hourly ozone data files for years 2002 through 2004 were provided by CEC staff for this modeling assessment. An annual average background ozone concentration of 29.6 ppb was used in place of any missing hourly data, as suggested by CEC staff. Receptor locations were consistent with the previous RSEP modeling assessments and receptor elevations and hill heights were determined using AERMAP (version 09040) and National Elevation Dataset (NED) terrain files.

Source locations, parameters, and emission rates for construction and operational modeling were consistent with those presented in RSE's responses to Data Requests #s 27 and 28, with the exception of the two 3,600 hp emergency backup generators included in the operational modeling assessment. The two 3,600 hp Caterpillar diesel generators have been replaced with two 3,600 hp Cummins generator sets that provide a higher rated electrical output needed for RSEP emergency electrical power (see Attachment WSQ1-1 for specifications for the Cummins engine generator). Therefore, the emission rates and exhaust parameters have been updated to reflect the new engine. Source locations, parameters, and emission rates for the salt commissioning modeling were consistent with those presented in the AFC.

Results presented in Table WSQ1-1 represent the high eighth-high (H8H) modeled concentration for all receptors, along with the maximum background NO₂ concentration. Based on this approach, the predicted 1-hour NO₂ concentration would be in compliance with the new 1-hour federal NO₂ ambient air quality standard.

TABLE WSQ1-1

Predicted One-hour NO₂ Impacts Compared to the National Ambient Air Quality Standard

Scenario	Maximum Modeled H8H Concentration (µg/m ³)	Background Concentration ^a (µg/m ³)	Total Predicted Concentration (µg/m ³)	Federal Standard (µg/m ³)
Construction	147	24	171	188
Salt Commissioning ^b	162	24	186	188
Operations ^c	147	24	171	188

^aBackground concentrations were the highest concentrations monitored during 2006 through 2008.^bSalt commissioning impacts include the maximum construction impacts during months 18 through 21.^cThe maximum modeled 1-hour concentrations were estimated assuming that the following activities would be conducted within the same hour: (1) one of the emergency generators would be tested for 30 minutes, (2) each of the two fire pumps would be tested for 30 minutes, and (3) the onsite heliostat wash trucks would be operating throughout the hour.

Potential Metals Emissions

WSQ 2 *Provide additional information to support the conclusion that the salt conditioning will not result in release/emissions of metals.*

Response: As discussed in the response to Data Request #10, the only metals with any detection allowance in the nitrate salts are magnesium (Mg) and iron (Fe). Both metals will be oxidized during the melting and conditioning process, however, to form magnesium oxide (MgO) and iron oxides (FeO, Fe₃O₄). MgO has a melting point of 5,166 °F, FeO has a melting point of 2,511 °F, and Fe₃O₄ has a melting point of 1,597 °F. These temperatures are all well above the operating temperature range of the salt system.

Potential Salt Leaks and Losses

WSQ 3 *Provide additional information on the systems proposed to contain salt losses from leaks, salt operation, and the storage tank.*

Response: While some salt leaks were reported in the Sandia National Labs (SNL) report on the Solar Two project, located in Daguerre, California, that served as a proving ground for the concentrating solar technology used in the RSEP, nearly all of these occurrences were due to first-of-their-kind experience with the liquid salt solar tower system. Rocketdyne engineers have subsequently applied rigorous and improved system and components designs to the RSEP to ensure that the risk of salt leaks is significantly minimized. These improvements include incorporating fourth generation designs of the liquid salt piping system thermal expansion system, and the liquid salt valves and pumps. The number of salt valves in the salt circuit has also been reduced, compared with the Solar Two pilot project. In addition, the entire liquid salt piping network is designed to drain automatically to a low point in the closed-loop system in order to minimize the risk of the salt freezing in any branch, which could otherwise lead to system stress.

Even though there are rigorous design elements to eliminate leaks, the RSEP includes design features for containment of any potential leak in the power block island. As discussed in the response to Data Request #21, the northern half of the power block island will be graded and sized to contain 110 percent of the volume of the on-site liquid salt. If a

small salt leak were to occur, the salt would cool quickly and solidify on the ground surface. The solidified salt could then be easily recovered and removed from the site for recycling.

According to the SNL report, the Solar Two molten salt storage tanks did not experience any leaks. As an additional assurance against the potential for salt leaks and losses, Rocketdyne has collaborate closely with the supplier of the Solar Two molten salt storage tanks on design, material selection and testing, as well as on salt specifications, in order to incorporate all of the lessons learned at Solar Two into the RSEP design. Additional measures include the use of thermocouples in the cooling system for the liquid salt storage tank foundations that would detect any incipient leaks.

Attachment WSQ1-1
Cummins 2500 DQLC Diesel Generator Emissions Data Sheet

Exhaust Emission Data Sheet

2500DQLC

60 Hz Diesel Generator Set

Engine Information:

Model: Cummins Inc. QSK78-G6	Bore: 6.69 in. (170 mm)
Type: 4 Cycle, 60°V, 18 Cylinder Diesel	Stroke: 7.48 in. (190 mm)
Aspiration: Turbocharged and Low Temperature aftercooled	Displacement: 4735 cu.in. (77.6 liters)
Compression Ratio: 15.3:1	
Emission Control Device: Turbocharged and Low Temperature Aftercooled	

	1/4	1/2	3/4	Full	Full	Full
PERFORMANCE DATA	Standby	Standby	Standby	Standby	Prime	Continuous
BHP @ 1800 RPM (60 Hz)	900	1800	2700	3599	3371	2835
Fuel Consumption (gal/Hr)	50.3	88.8	127.4	165.9	156.1	133.2
Exhaust Gas Flow (CFM)	7567	11101	14636	18170	17273	15167
Exhaust Gas Temperature (°F)	667	722	777	832	818	786
EXHAUST EMISSION DATA						
HC (Total Unburned Hydrocarbons)	0.37	0.23	0.15	0.12	0.12	0.14
NOx (Oxides of Nitrogen as NO2)	6.00	5.30	6.00	7.80	7.00	6.30
CO (carbon Monoxide)	0.39	0.43	0.30	0.41	0.36	0.32
PM (Particular Matter)	0.08	0.07	0.04	0.05	0.05	0.04
SO2 (Sulfur Dioxide)	0.13	0.11	0.11	0.11	0.11	0.11
Smoke (Bosch)	0.60	0.70	0.40	0.50	0.40	0.50

All Values are Grams/HP-Hour, Smoke is Bosch #

TEST CONDITIONS

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load ($\pm 2\%$). Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	ASTM D975 No. 2-D diesel fuel with 0.03-0.05% sulfur content (by weight), and 40-48 cetane number.
Fuel Temperature:	99 ± 9 °F (at fuel pump inlet)
Intake Air Temperature:	77 ± 9 °F
Barometric Pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb dry air
Reference Standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
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**APPLICATION FOR CERTIFICATION
FOR THE RICE SOLAR ENERGY POWER
PLANT PROJECT**

Docket No. 09-AFC-10

**PROOF OF SERVICE
(Revised 3/4/2010)**

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DECLARATION OF SERVICE

I, Mary Finn, declare that on April 16, 2010, I served and filed copies of the attached, Response to CEC Workshop Queries 1-3 dated April 16, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: <http://www.energy.ca.gov/sitingcases/ricesolar>.

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(Check all that Apply)

FOR SERVICE TO ALL OTHER PARTIES:

☒ sent electronically to all email addresses on the Proof of Service list;

 by personal delivery

 by delivering on this date for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for the mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

☒ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

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CALIFORNIA ENERGY COMMISSION

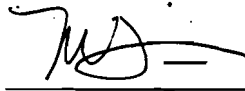
Attn: Docket No. 09-AFC-10

1516 Ninth Street, MS-4

Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.



Mary Finn