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March 20, 2012

DOCKET
11-AFC-1
DATE MAR 20 2012
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VIA EMAIL

Mr. Eric Solorio, Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Pio Pico Energy Center Project (11-AFC-01)
PSD Permit Application, Supplemental Information

Dear Mr. Solorio:

On March 16, 2012, Applicant Pio Pico Energy Center LLC provided supplemental information to the United States Environmental Protection Agency, Region 9, for the Pio Pico Energy Center Project ("PPEC"). To that end, Applicant submits such information herein for docketing in the PPEC Application for Certification proceeding.

If you have any questions concerning this filing, please do not hesitate to contact our office.

Respectfully submitted,

Kimberly J. Hellwig
Paralegal

KJH:jmw
Enclosures
cc: Proof of Service List

71354011.1 0042399-00001

From: Steve Hill
Sent: Friday, March 16, 2012 9:27 AM
To: Gerardo Rios (rios.gerardo@epa.gov); Kohn.Roger@epamail.epa.gov
Cc: Dave Jenkins; 'grchandler@apexpowergroup.com'; Craig Kebodeaux; McKinsey, John A.; Gary Rubenstein
Subject: Use of combined cycle for peaking service for PPEC

As requested by EPA, PPEC is providing the attached letter from Kiewit Power, which provides a comparison between PPEC's proposed turbine configuration and a combined cycle facility of comparable capacity. This letter is provided as an addition to the record supporting PPEC's PSD permit application.

Please let me know if you have any questions.

Steve Hill

Kiewit

March 16, 2012

Mr. Gerardo Rios
Chief, Permits Branch
Air Division – AIR 3
EPA Region 9
75 Hawthorne Street
San Francisco, CA 94015

Subject: PSD Permit Application for Pio Pico Energy Center

Dear Mr. Rios:

Kiewit Power was requested by Pio Pico Energy Center to provide information regarding the comparison of using the currently planned General Electric LMS100 machines for peaking and intermediate load versus using a fast start/rapid response combined cycle plant in the same duty cycle. The following information is based on information readily available to the public from various gas turbine manufacturers and from independent design studies performed by Kiewit. Final analysis may vary depending upon actual site conditions and the specific engineering details developed during detailed design. Additional details regarding fast start combined cycle technology being developed by various turbine suppliers should be obtained directly from the suppliers of the respective gas turbines or integrated combined cycle plants. It should also be noted that the contents of this letter are the professional opinion of the author and are expressly and specifically limited to the Pio Pico project. Any responsibility for extrapolation of the analysis contained in this letter to other situations or projects without the direct involvement of the author are hereby disclaimed.

Combined cycle technology has traditionally been utilized in intermediate to base load operating facilities. This is primarily due to the high relative cost to start an F class gas turbine and the ancillary systems for a combined cycle plant. Historically, this startup cycle has varied in duration from 75-90 minutes for a hot start (overnight shutdown) to over 240 minutes for a cold start (multiple day shutdown). Recently, technology has been developed to improve the time required to safely start these types of plants. This new technology primarily consists of design modifications in the HRSG to allow faster heating of boiler components, and the use of terminal attemporators to de-couple the bottoming cycle from the gas turbine startup. This technology has been in development for several years but to our knowledge, none of these fast start facilities have been placed in operation in the United States. The first of these types of combined cycle facilities is expected to become operational in early 2013.

For this analysis, Kiewit compared a 3xLMS100 facility with a generic F class 1x1 combined cycle plant. Each of these facilities would offer approximately 300 MW of generation capability at base load. In regards to quick start capability, the LMS100 machine is capable of achieving full load (100MW) in less

than ten minutes from a cold start. This capability would allow the plant to produce up to the full capacity of 300 MW in this 10 minute time frame. The 1x1 combined cycle quick start facility would likely be capable of achieving a partial load (100-150MW) of the gas turbine in about 10 minutes. However, a significant portion of the facility output would not be available until the steam turbine is warmed and operating. This process would take significantly longer than the 10 minutes stated above for the LMS100 facility. The combined cycle gas turbine is capable of achieving full load operation in roughly 20 minutes (about 200MW) and full load (about 300 MW) for the entire combined cycle unit in 60-75 minutes for a hot start. It is important to remember that the combined cycle efficiency benefits of such a plant are not realized until both the gas turbine and HRSG/steam turbine are operating at full load. A cold start for the facility would be expected to take closer to 2 hours before the steam turbine would be operating at base load.

Operating combined cycle projects using F class gas turbines as peaking facilities, where numerous starts are required, would result in significantly higher operation and maintenance costs versus LMS100 technology. This is due to the significantly larger electrical load and gas consumption to start the larger machine along with the resultant impacts of multiple starts to turbine service intervals as discussed below.

Another aspect for consideration is the ability of the facility to offer a great range of load flexibility and turndown. A combined cycle configuration sized to provide 300 MW would consist of an F class gas turbine (nominal 200 MW for gas turbine only) and steam turbine sized to provide approximately 100MW. As such it would only be capable of reducing output in combined cycle mode to approximately 150 MW (50%-60% load on the GT, with corresponding reduction in steam turbine output) allowing for much less flexibility than the three LMS100 machines. The plant using multiple LMS100 machines will have the ability to vary load on each individual turbine and have the capability to reduce load to a single unit operating at 50% for an overall plant minimum output of approximately 50MW. This will result in a plant that offers much greater load range flexibility during operation (50 MW to 300 MW for the LMS100 configuration, vs. 150 MW to 300 MW for the F-class combined cycle configuration).

The ability to quickly change load is critical for peaking load facilities and is another area that the LMS100 has a significant advantage over a larger frame machine. Typically, an F class gas turbine can change load at a maximum ramp rate of up to approximately 30 MW/min. The LMS100, however, can change load at a rate of up to 50 MW/min per machine. For a facility utilizing three LMS100, the total ramping capability for the plant is nearly 150 MW/min which greatly increases the plant's ability to track sudden load changes on the grid due to fluctuating demand and intermittent renewable generation.

We have recently reviewed the construction and equipment costs for both the LMS100 machines and the quick start combined cycle plants. In our estimation the cost of constructing the combined cycle units is approximately 25%-30% greater than the cost for the facility using the LMS100 machines on a $/kW basis. In addition, if a combined cycle unit were started 500 times per year (as may be required under PPEC's contract with San Diego Gas and Electric), expensive, hot gas path inspections and maintenance outages may be required once every 1.5-2 years, instead of 24,000 hours (roughly 3-4 years for a typical intermediate loaded combined cycle operating 6,000-8,000 per year) between such

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outages. This increase in maintenance requirements would result in a much higher total operating cost than expected for the LMS100 whose criteria for hot gas path inspections is not determined based on equivalent starts.

In our opinion the LMS100 machines offer much greater peaking capability and flexibility at a significantly lower cost for the Pio Pico Project. Quick start combined cycle machines will offer greater efficiency when operated in combined cycle mode, but do not appear to meet the operational needs for this facility.

Please contact me if you require further information.

Very truly yours,

Jason Dedrickson

Jason Dedrickson, P.E.
Vice President, Natural Gas Market

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APPLICATION FOR CERTIFICATION
FOR THE *PIO PICO ENERGY CENTER, LLC*

Docket No. 11-AFC-1
PROOF OF SERVICE
(Revised 3/19/12)

Pio Pico Energy Center, LLC
Letter to Eric Solorio, California Energy Commission, dated March 20, 2012
Re PSD Permit Application, Supplemental Information

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DECLARATION OF SERVICE

I, Judith M. Warmuth, declare that on March 20, 2012:

☒ I deposited copies of the aforementioned document and, if applicable, a disc containing the aforementioned document in the United States mail at 500 Capitol Mall, Suite 1600, Sacramento, California 95814, with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list herein and consistent with the requirements of California Code of Regulations, Title 20, sections 1209, 1209.5, and 1210.

AND/OR

☒ I transmitted the document(s) herein via electronic mail only pursuant to California Energy Commission Standing Order re Proceedings and Confidentiality Applications dated November 30, 2011. All electronic copies were sent to all those identified on the Proof of Service list herein and identified as those who prefer email only, consistent with the requirements of California Code of Regulations, Title 20, sections 1209, 1209.5, and 1210.

OR

☐ On the date written above, I placed a copy of the attached document(s) in a sealed envelope, with delivery fees paid or provided for, and arranged for it/them to be delivered by messenger that same day to the office of the addressee, as identified on the Proof of Service list herein and consistent with the requirements of California Code of Regulations, Title 20, sections 1209, 1209.5, and 1210.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Judith M. Warmuth