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FILED ELECTRONICALLY

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Re: Public Comments of the Sierra Club
Pio Pico Energy Center, Permit Application SD 11-01

Mr. Kohn,

These comments are submitted on behalf of the Sierra Club and its members.

1. The Particulate Matter (PM, PM10 and PM2.5) BACT Limit Lacks A Basis In The Record

The permit establishes a limit of 0.0065 lb/MMBtu (HHV) on a 9-hour average for PM, PM10 and PM2.5. The basis for this limit does not appear in the Region's Fact Sheet. Nor is it apparent anywhere else in the record. In the Fact Sheet, the Region says that it evaluated "recent PM performance test data from other similar simple cycle plants in southern California." The test data that the Region refers to, however, are significantly lower than 0.0065 lb/MMBtu. The data in the fact Sheet show averages from 0.0008 lb/MMBtu to 0.0049 lb/MMBtu, with three of the five plants averaging

0.0031 lb/MMBtu. The Fact Sheet does not explain how the Region derived a 0.0065 lb/MMBtu limit based on these emission data. The proposed limit represents more than eight times the average from El Cajon Energy and is higher even than even the maximum from the Region's data: Orange Grove Unit 2 (0.0049 lb/MMBtu). The BACT limit should be based on the lowest rate achieved in practice with the same technology (efficient combustion)—0.0008 lb/MMBtu.

Even assuming that the Region should set the limit based on the highest emission rate from similar facilities—0.0065 lb/MMBtu is well above the emission data the Region provided in the record. To the extent the Region intends to include a "margin" above demonstrated emission rates, it must do so on an adequate record and with sufficient explanation. That record and explanation does not exist here.

Additionally, the record does not explain why a 9-hour averaging period is appropriate, especially where the emission data reviewed by the region for other combustion turbines are likely based on measurements taken over shorter periods.

2. Combined-Cycle Gas Turbines (CCGT) are Technically Feasible.

In the Fact Sheet, the Region contends that using CCGT is not technically feasible because:

- The purpose of the project is to supply San Diego Gas & Electric (SDG&E) with energy to meet SDG&E's 2009 Request for Offers and resulting contractual requirements.
- The Request for Offers and contract with SDG&E requires the applicant to "support[] renewable power generation… whose overall output varies,"

requiring the applicant "to come online quickly to make up the lost grid capacity."

- To fulfill its contractual obligation, the applicant must therefore construct units that can provide energy during morning and evening "ramps," can be repeatedly started and shut down," and can be brought online quickly (even from a cold start).

The Fact Sheet then states that because of the longer startup process, a CCGT cannot complete a cold start as quickly as a combustion turbine (CT). Specifically, the Fact Sheet states that a complete (cold) start for a CT is less than 30 minutes, whereas the cold start period for a CCGT is up to 3.5 hours. This does not demonstrate technological infeasibility.

A. The project "purpose" in EPA's Fact Sheet does not match that in the facility's application to the California Energy Commission.

First, according to the application that the Pio Pico plant submitted to the California Energy Commission, the "purpose" is not to provide 300 MW of peaking power. Rather, the purpose according to that application includes a "minimum of 100 megawatts (MW) of peaking and intermediate-class resources." CEC Staff Report at p. 3-1. According to EPA's Fact Sheet, a 107FA power block combined cycle plant can achieve quick start capacity of at least 160 MW. That technology would fulfill the energy requirement in the project "purpose" of at least 100 MW.[1]

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[1] EPA's Fact Sheet does not appear to rely on the additional wear to combined cycle units from frequent startups to find CCGT technology infeasible, although that issue is mentioned. See Fact Sheet at 17. Any such finding would require, at a minimum, actual documentation in the record that the number of startups expected would render the technology infeasible, instead of merely more costly due to increased maintenance needs. The latter, which is more likely, would be considered in the cost-effectiveness analysis but would not render the technology infeasible.

B. The Region's own analysis highlights why a CCGT is not actually technologically infeasible.

Moreover, even if the project purpose required the ability to achieve a full 300 MW within a short (~30 minutes) period, a CCGT, either alone or when paired with a supplemental simple cycle turbine, fulfills that project purpose while offering the increased efficiency and therefore lower emissions of a combined cycle unit.

A CCGT consists of one or more gas turbines, followed by a heat recovery steam generator (HRSG) that turns the waste heat from the CT combustion into steam that produces energy. The front half of a CCGT, however, is the same as the simple cycle CTs in the draft permit. Thus, the project purpose could be met with a CCGT that is sufficiently sized so that it could produce 300 MW with the turbines alone in 30 minutes (and ~100 MW in 10 minutes), while also allowing the turbines' fuel use and operating rate to be scaled back after the HRSG comes online. In other words, making a CCGT meet a project purpose of 300 MW of quick-start energy production simply requires the appropriate sizing of the plant so that the turbines provide the quick-start capacity needs before the additional capacity of the HRSG is available.

Properly sizing the plant provides both the faster start time for the full 300 MW (if that were the project purpose), while also providing the opportunity for lower fuel usage per MW after the steam cycle is brought online a few hours after cold start occurs. In other words, by increasing the size of the turbines or using an additional turbine, the plant could provide the full needed capacity immediately, and for the first 1-3 hours of operation, with just the turbines; however, by designing a HRSG into the system, once the system was warmed up and synchronized, the turbine fuel use could be scaled back and/or one or more turbines taken off-line as the HRSG generates some of the required energy. This could be done in a number of different ways—none of which were analyzed for the draft permit. First, the plant would be constructed as a 2x1 CCGT paired with a single simple cycle turbine. This allows the three turbines with a combined capacity of 300 MW to be fired and reach capacity over a short time period while the HRSG is being prepared. Once the HRSG is prepared and ready for operation, the simple cycle turbine can be turned off and its generation provided by the HRSG. Second, with appropriate engineering upgrades, see Henkel, et al., supra, all three of the planned combustion turbines can deliver close to their rated capacity quickly while also allowing them to be ducted to a single HRSG in a 3x1 formation.

Second, the examples used in the Fact Sheet are not representative of all CCGTs. The Region's Fact Sheet notes that a GE 107FA power block CCGT could only provide 160 MW of power in 30 minutes, compared to the 300 MW that the proposed three CTs could provide. However, with certain upgrades, a 400 MW CCGT can reach full power within 40 minutes after a cold start. See Henkel, et al., Operational Flexibility Enhancements of Combined Cycle Power Plants, Siemens AG (2008).

3. The Fact Sheet Does Not Establish A Basis for Determining That 5,600 ppm TDS Limit As BACT For the Cooling Water System

In the BACT limit for the recirculating water cooling system the Region assumes a drift rate of 0.001% and explains that a lower drift rate for wet cooling is not representative of a semi-dry cooling system drift. However, the drift rate is only part of the equation. The concentration of solids in the circulating water also determines the particulate matter emission rate. The Region provides no basis for its decision to limit TDS in the cooling tower water to 5,600 ppm.

A lower TDS concentration results in lower particulate matter emissions. We note that water filtering can reduce TDS to nominal values, yet the Region's BACT analysis fails to consider any filtration to reduce TDS as part of the BACT analysis. Modern filtration technologies for recirculating water can reduce dissolved solids to nominal concentrations. Doing so would significantly reduce the particulate emissions (PM, PM10 and PM2.5) from the cooling system at the plant. This was not considered in the Fact Sheet or in EPA's review.

The application shows that the two sources of water to be used at the plant (recycled and potable) have TDS concentrations of 887 and 545 ppm, respectively. It is unclear how the Region derived 5,600 ppm from these sources. In fact, nowhere in the permit record is any apparent consideration of filtration of these sources prior to use in cooling water, which would further reduce the TDS concentrations.[2]

Furthermore, we note that most cooling towers have a TDS upper limit of 2,000 ppm. (Stainless steel tubes often can stand only up to 2,400 ppm TDS.) Any concentrations above 2000 ppm usually result in automatic blowdown of the cooling

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[2] While the application states that the upper limit of TDS in the system design is "<5000" ppm, it does not identify the actual concentration, nor discuss whether this considers the use of filtration and reverse osmosis or why the cooling water concentration of TDS cannot be reduced through available filtration technologies.

water into a sewer, water treatment, or other use. In other words, the TDS limit used on the BACT analysis here is almost three times the typical technological maximum TDS concentration that most cooling towers are limited to.

4. **The GHG BACT Limit Should Include A Shorter Averaging Time.**

The draft permit's BACT limit for GHG emissions (specifically CO_2 emissions) from the combustion turbines is based on an average of 8,760 operating hours. However, according to page 7 of the draft permit, each turbine is only permitted to operate 4000 hours per year. That means compliance is based on an average that extends more than two years. In fact, if used only as backup to other generation, the actual operating hours will likely be fewer, so compliance will likely be based on an average spanning three or more years. EPA's guidance on Practical Enforceability, http://www.epa.gov/region9/air/permit/titlev-guidelines/practical-enforceability.pdf, suggests that limits on potential to emit be averaged over short time periods that are no longer than one day or on a rolling basis calculated no less frequently than every day. One concern is the need to wait multiple years before compliance can be determined, at which time it may be too late to take corrective actions that could have minimized the violation. There is no reason that this EPA guidance should only apply to PTE limits. It should apply equally to the GHG limit here.

We also note that it is highly unusual (if not unprecedented) for a BACT limit to include an averaging period that spans more than two years of operation. The CO2 emission limit should be calculated based on a shorter averaging period, such as 24 hours or at most 30 days. We note that EPA has proposed to average emissions over 12 months in the proposed New Source Performance Standard for certain generating units. While this may still be too long for the plant at issue here, it is significantly shorter than the 2-3 years that the draft permit limit will be averaged over.

5. **EPA Should Not Use A Monitored Three-Year 98% Average Concentration As Background When Combined With A 98th Percentile of Modeled Concentrations To Determine Cumulative Impact.**

According to the Fact Sheet, the background concentration used in EPA's 1-hour NOx NAAQS analysis was determined based on the 98th percentile average of three years. (Fact Sheet p. 36.) If this is true, the facility's modeled impact (98th percentile of 3 year average for NOx) would be added for a cumulative impact that does not represent the worst case (as required by the Modeling Guidelines).

According to EPA's own guidance, a combination of the modeled 98th percentile and the monitored/background 98th percentile does not represent the maximum 98th percentile of total impacts and therefore not protective of the NAAQS. Therefore, EPA guidance cautions that if the 3-year 98th percentile design value is used as background, then the modeled concentration used in the cumulative impact analysis should be the average of the highest modeled concentration—not the 98th percentile concentration. *See e.g.*, Memorandum from Stephen Page, Modeling Procedures for Determining Compliance with PM2.5 NAAQS at p. 8 (March 23, 2010). Alternatively, if the modeled result is expressed based on the form of the standard (e.g., 98th percentile), then it should be added to the single highest monitored value and not the 98th percentile of the monitored values. *See* Memorandum from Anna Marie Wood, EPA OAQPS, General Guidance for Implementing the 1-hour NO2 National Ambient Air Quality Standard in Prevention of the Significant Deterioration Permits, Including an Interim 1-hour NO2 Significant Impact Level at p. 18 (June 28, 2010)

Therefore, because EPA's air quality impact analysis appears to fail to account for maximum possible ambient concentrations due to the form of the standard, the analysis must be redone. Once redone, the results must be included in a new public notice and EPA must provide for a new public comment period.

6. The Background Concentrations Used in EPA's NAAQS Analysis Do Not Meet the Requirements of the Guidelines and is Not Representative.

The NOx and particulate matter (both PM10 and PM2.5) background concentrations used by EPA are from a monitor located 9 miles northwest of the site at an urban location referred to as Chula Vista. This location was apparently chosen because a closer existing monitor was located close to the Mexico-United States border and influenced by vehicle emissions blowing in from Mexico. However, EPA has not:

- explained why consideration of air quality impacts from Mexican vehicles should be avoided when determining background concentrations near the Pio Pioc plant site;
- determined that the vehicle emissions monitored by the Otay Mesa-Paseo International station are not representative of the air quality anywhere within the area that will be impacted by the Pio Pico plant;
- considered requiring the applicant to collect site-specific monitoring, which is supposed to be the default option under agency guidance and the binding Modeling Guidelines; or

- shown that the background air quality from a monitor located 9 miles away, with likely little or no impact from vehicle emissions, is a better representation of air quality in the Pio Pico's plume.

The Region must provided a better explanation for why it chose the Chula Vista monitor—specifically, why that monitor is representative of the ambient air at and around the areas of peak impact from the proposed Pio Pico plant.

We note that the wind rose data in the record shows that the prevailing winds are rarely from the area northwest of the plant site (where the Chula Vista monitor is located). Instead, the predominant winds are from the northeast or southwest. A significant number of hours appear, from the wind roses in the record, to come from Mexico. This means that background concentrations including emissions from Mexico are likely more representative then monitoring results from the Chula Vista monitor.

Moreover, the Chula Vista monitor does not appear to meet the requirements for substituted existing regional monitoring data. First, the Chula Vista monitoring station does not meet the requirements for the use of an off-site monitor. PSD permitting must include an analysis of the permittee's air quality impacts, combined with the impacts from nearby sources and background concentrations. *NSR Manual* at C.3; *Ambient Monitoring Guidelines* § 2.4.1, at 6-8; see also 42 U.S.C. § 7475(a)(7), (e); 40 C.F.R. § 52.21(m)(f). There are limited instances where background concentrations can be taken from existing regional monitors (such as the Chula Vista station here). However, to do so, specific criteria of location, data quality, and the currentness of the data must be met by the existing monitor. *See NSR Manual* at C.18-.19. For example, if data from an existing off-site monitor are used, the monitor must be located in the area of maximum concentration increase from the proposed facility, the maximum concentration from existing sources, and the area of maximum combined impact from existing and new sources. Moreover, the applicant and the permitting agency must provide a specific basis in the permit record for using off-site monitors for background concentrations. These requirements are not met by the Chula Vista monitor.

Second, the Pio Pico site and the area of its peak impacts (especially 1-hour NOx) are near to large international highways. As EPA's background documents for the 1-hour NOx NAAQS make clear, the highest background levels of 1-hour NOx are near to roadways. Impacts of regional monitors, that is, those located more than a few hundred feet from a major roadway, are expected to be 50 to 60% lower than the concentrations around transportation corridors. Thus, EPA noted when promulgating the 100 ppb 1-hour NOx NAAQS, that if it were to rely on regional monitoring instead of concentrations closer to transportation sources, it would likely have set the standard at 50 ppb. Here, under EPA guidance and the binding Guidelines, the background concentrations for purposes of PSD NAAQS analysis should be from monitors located at the points of highest existing concentrations—which is almost certainly closer to the major international roadways near the Pio Pico plant than the Chula Vista monitor.

Thank you again for providing this opportunity for the public to comment on the proposed permit for the Pio Pico plant. If you have any questions about these comments, or if we can provide further information, please do not hesitate to contact us.

Regards,

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Sierra Club