Pio Pico Energy Center, LLC

Petition to Amend
Hourly Heat Input for
Pio Pico Energy Center
(11-AFC-1C)

Submitted to:
California Energy Commission

Prepared by:
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July 2014

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ACRONYMS AND ABBREVIATIONS

AFC	Application for Certification
AGL	above ground level
CEC	California Energy Commission
COC	Condition of Certification
CTG	combustion turbine generators
EPA	U.S. Environmental Protection Agency
LORS	Laws, Ordinances, Regulations, and Standards
MMBtu/hr	million British thermal units per hour
MW	megawatt
PPEC	Pio Pico Energy Center
PSD	Prevention of Significant Deterioration
PTA	Petition to Amend
SDAPCD	San Diego Air Pollution Control District
SDG&E	San Diego Gas & Electric
TAC	Toxic Air Contaminants
HHI	Hazard Health Index

SECTION 1
INTRODUCTION

1.1 Background

The California Energy Commission (CEC) certified the Pio Pico Energy Center (PPEC) project on September 17, 2012 (11-AFC-01C). The PPEC is a peaking and load following power plant with a nominal net generating capacity of 300 megawatts (MW) that uses three General Electric LMS100 natural gas-fired combustion turbine generators (CTGs). The PPEC is owned and operated by Pio Pico Energy Center, LLC (PPEC, LLC). The project site is adjacent to the Otay Mesa Generating Project, an existing natural gas-fired power plant, in an unincorporated area of San Diego County, California (refer to Figure 1). The PPEC site is comprised of a 10-acre parcel of disturbed and development-prepared land within an industrial area. The site is located in the southeast quadrant of the Alta Road and Calzada de la Fuente intersection. The project site comprises the entire parcel with Assessor's Parcel Number (APN) 648-040-45, and the construction laydown area consists of 6.00 acres of an adjacent parcel to the south (APN 648-040-46).

PPEC, LLC anticipates that construction of the PPEC will begin in September 2014.

Pursuant to Section 1769 of the CEC Siting Regulations, PPEC, LLC (also referred to herein as "Petitioner") petitions the CEC for approval to amend the Commission Decision for the PPEC to reflect a nominal (~10%) increase in hourly heat input to the gas turbines. Although there are no explicit limits on hourly heat input in the Conditions of Certification, Condition AQ-2 implicitly limits operations to the conditions described in the Application for Certification. (Condition of Certification AQ-2 requires the operator to operate the project "in accordance with all data and specifications submitted with the application under which this license is issued.") No changes are necessary to maximum daily or annual fuel consumption limits, or to maximum hourly, daily, or annual emission limits, as a result of the proposed increase in hourly heat input.

In conjunction with this PTA, an application for amendment to the Final Determination of Compliance/Authority to Construct permit was submitted to the San Diego Air Pollution Control District (SDAPCD). A copy of the District permit application is provided as Appendix A to this Petition.

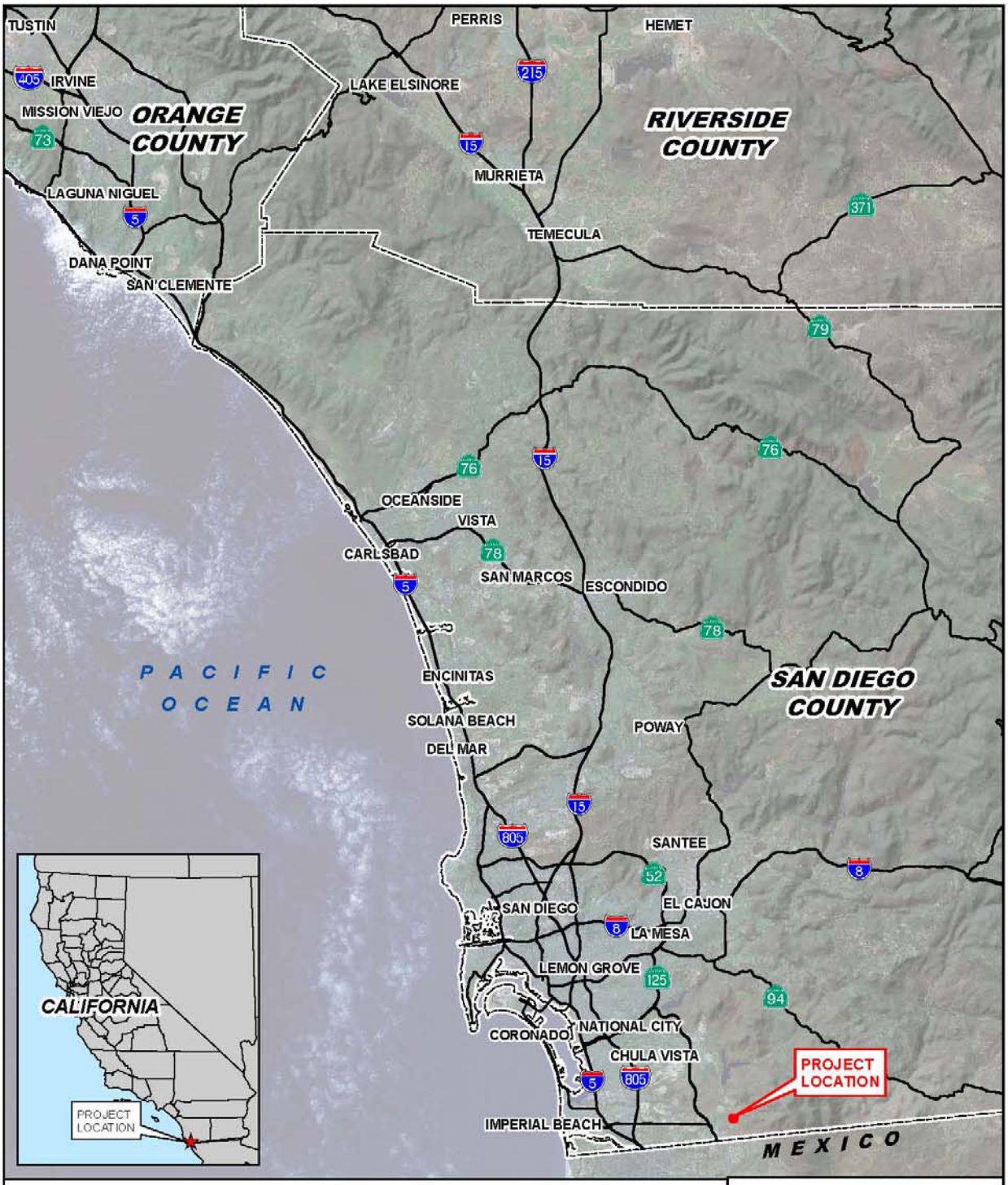

FIGURE 1
PROJECT LOCATION

PIO PICO
ENERGY CENTER

N

Miles
0 5 10

PROJECT NO.: 1790-1-2
DATE: June 2014

SAGE
ENVIRONMENTAL CONSULTING

1.2 Description of Proposed Amendment

The proposed change to the PPEC certification would be limited to the proposed nominal (~10%) increase in hourly heat input. This increase is a result of improved operational confidence and machine tuning rather than major changes to the LMS100 model.

Although there are no explicit limits on hourly heat input in the Conditions of Certification, condition AQ-2 implicitly limits operations to the conditions described in the Application for Certification. This PTA will address all issues associated with the proposed nominal increase in hourly heat input by the project, and will include the following:

- Demonstration that the increase does not result in applicability of previously inapplicable requirements;
- Screening modeling and impact analysis demonstrating compliance with all applicable standards potentially affected by the change; and
- Analysis of potential effect on thermal plumes.

The amendment proposed herein would result in only one minor change to an existing Condition of Certification and would not require the deletion of existing Conditions of Certification or the addition of new Conditions of Certification to the existing license. Specifically, the proposed change requires a minor change to the language regarding the height of the thermal plumes set forth in Condition of Certification TRANS-9.

1.3 Summary of Environmental Impacts

Section 1769 (a)(1)(E) of the CEC Siting Regulations requires that an analysis be conducted to address impacts that the proposed change may have on the environment and proposed measures to mitigate significant adverse impacts. Section 1769 (a)(1)(F) requires a discussion of the impacts of proposed change on the facility's ability to comply with applicable laws, ordinances, regulations, and standards (LORS).

The proposed change referenced in this PTA will not result in any additional impacts beyond those already identified in the original Commission Decision. Section 3 herein discusses the potential impacts of the proposed change on the environment, as well as the consistency of the proposed change with LORS.

1.4 Consistency of Amendment with License

Section 1769 (a)(1)(D) of the CEC Siting Regulations requires a discussion of the consistency of each proposed project revision with the assumptions, rationale, findings, or other basis of the Commission Decision and whether the revision is based on new information that changes or undermines the bases of the Commission Decision. Also required is an explanation of why the change should be permitted.

Consistent with the CEC Siting Regulations Section 1769(a)(1)(A), Section 2 herein includes a description of the proposed change, as well as the necessity for the change. As set forth in the following sections, the proposed change does not undermine the assumptions, rationale, findings, or other basis of the Commission Decision for the project.

SECTION 2
DESCRIPTION OF PROPOSED CHANGE

Consistent with Sections 1769(a)(1)(A) and (B) of the Siting Regulations, this section includes a complete description of the proposed change as well as a discussion of the necessity for the proposed change. Consistent with Section 1769(a)(1)(C) and (D) of the Siting Regulations, this section explains that the Petitioner was unaware of the need for the proposed change in allowable heat input prior to certification of PPEC, and that the proposed change is not based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the Commission Decision.

2.1 Proposed Change

PPEC consists of three simple cycle General Electric LMS100 gas turbines and a partial dry cooling system. The current air permits describe the gas turbines as having a maximum heat input of 903 million British thermal units per hour (MMBtu/hr), based on higher heating value, and a nominal output of 100 MW. Although the permit conditions do not specifically limit the hourly heat input to each gas turbine, the CEC's determination of compliance with applicable requirements was based on the 903 MMBtu/hr heat input and associated turbine operating characteristics presented in the San Diego Air Pollution Control District (SDAPCD) Authority to Construct (ATC) and U.S. Environmental Protection Agency (EPA) Prevention of Significant Deterioration (PSD) permit applications.

The proposed change to the PPEC certification would be limited to the proposed nominal (~10%) increase in hourly heat input. This increase is a result of improved operational confidence and machine tuning rather than major changes to the LMS100 model.

Therefore, PPEC is requesting that the CEC approve operation of the gas turbines at a maximum hourly heat input of 1,000 MMBtu/hr. PPEC is not requesting any changes in hourly or annual emissions limits as a result of the proposed increase in maximum hourly heat input. The proposed change will also result in slight increases in the thermal exhaust plumes from the gas turbines resulting in proposed minor revisions to the language of TRANS-9 related to the height of thermal plumes associated with the project. The slight increase in thermal exhaust plumes associated with the proposed change does not result in a significant impact.

2.2 Necessity of Proposed Change

Sections 1769 (a)(1)(B) and 1769 (a)(1)(C) of the CEC Siting Regulations require a discussion of the necessity for the proposed change to the project and whether this modification is based on information that was known by the Petitioner during the certification proceeding. Because these performance improvements were made by the gas turbine manufacturer after the project was licensed, PPEC, LLC was not aware of the information set forth herein during the certification proceeding.

Since the license was issued in 2012, GE has made performance improvements to the LMS100 gas turbines that allow slightly higher hourly heat input and higher electrical output. Therefore,

the gas turbines that will be delivered to PPEC will be capable of operating with a higher heat input and higher electrical output than the specifications and operating characteristics reflected in the nominal ratings upon which the permit was based. PPEC desires to take advantage of these performance improvements by increasing the maximum hourly heat input (at 63°F ambient temperature and based on the higher heating value of natural gas fuel) by about 10%, from 903 MMBtu/hr to 1,000 MMBtu/hr. The nominal gas turbine output will increase from 100 MW to approximately 106 MW. The increase in nominal gas turbine output is advantageous to SDG&E, with whom PPEC has a power purchase agreement, as it will allow PPEC to deliver up to an additional 18 MW without the need to construct additional power generation facilities.

SECTION 3
ENVIRONMENTAL ANALYSIS OF THE PROPOSED CHANGE

The only change being requested in this Petition to Amend is an increase in the maximum hourly heat input. There would be no changes to the environmental baseline or to the environmental effects of the PPEC as to most environmental disciplines.

3.1 Subject Matter Affected by the Proposed Change

The proposed change to the PPEC certification would be limited to the proposed increase to the hourly heat input. The resulting changes in exhaust characteristics could affect air quality and public health impacts of the project. Analysis was performed as part of this Petition to Amend to demonstrate that there are no significant impacts associated with the proposed change. The minor changes in the gas turbine operating characteristics will slightly increase the thermal exhaust plumes from the gas turbines, but will not affect the findings of no significant impact. Accordingly, the discussion that follows focuses on the disciplines of Air Quality, Public Health, and Traffic and Transportation. There would be no changes to the environmental effects of the PPEC regarding all other environmental areas addressed in the Commission Decision: the proposed change will not require changes to existing Conditions of Certification other than TRANS-9 as set forth below, nor are additional Conditions of Certification required or proposed. Moreover, the project will remain in compliance with all applicable LORS. In terms of potential impacts due to nitrogen deposition, annual emissions of nitrogen compounds (oxides of nitrogen, ammonia) will not be affected by the proposed change; therefore, there will be no change in nitrogen deposition as a result of the proposed increase in hourly heat input.

3.2 Air Quality

PPEC proposes to increase the maximum hourly heat input to each gas turbine from 903 to 1,000 MMBtu/hr without changing any emission limits in the existing Conditions of Certification. Maintaining compliance with the hourly mass emission limits, while operating with a nominal 10% increase in hourly heat input, will require the gas turbines to achieve criteria pollutant exhaust gas concentrations that are nominally 10% lower than permitted concentration limits at higher loads. PPEC has evaluated available emissions data from similar gas turbine installations and is confident that the existing hourly mass emission limits can be met at the proposed higher hourly heat input.

The increased hourly heat input will produce increased mass flow through each gas turbine, resulting in slight changes in exhaust characteristics. Based on new performance data for the gas turbines, exhaust temperatures will also be slightly different than those used in the previous modeling analysis. To assess the effects of these minor changes in exhaust characteristics on ambient air quality, a revised screening air quality modeling analysis was performed.

The results of the revised screening modeling analysis are summarized in Table 1 below. These results demonstrate that maximum modeled impacts from the gas turbines with proposed higher

heat input are less than or equal to the maximum modeled impacts that were evaluated for the original Application. The revised modeling analysis is described in more detail in Appendix B to the District permit application, included herewith as Appendix A.

Table 1
Comparison of Project Impacts: Screening Modeling Results

Pollutant	Averaging Time	Operating Mode	Maximum Modeled Impact, µg/m^3	
			With Proposed Change[a]	Original Design[b]
NO_2	1-hour	startup	116.7	133.3
	Annual	normal	0.3	0.3
SO_2	1-hour	normal	6.2	8.0
	3-hour	normal	2.3	2.7
	24-hour	normal	0.6	0.6
	Annual	normal	0.1	0.1
CO	1-hour	shutdown	234.4	267.8
	8-hour	shutdown	60.6	64.3
$PM_{10}/PM_{2.5}$	24-hour	normal	1.9	2.2
	Annual	normal	0.2	0.2

Notes:
a. Based on stack parameters that reflect proposed higher hourly heat input and final permitted emission limits (5.0 lb/hr $PM_{10}PM_{2.5}$). See Appendix A to this Petition to Amend.
b. Based on stack parameters for permitted design and emission limits from FDOC (5.5 lb/hr PM_{10} /$PM_{2.5}$). See Table 3-4 of Appendix A ("Air Quality Impact Analysis, Final Review Report") to the FDOC.

3.2.1 Conditions of Certification and Proposed Change

The Petitioner proposes to change only the hourly heat input to the gas turbines, which is not limited by or specifically addressed in any Condition of Certification. Therefore, no changes to any of the air quality-related COCs are required with the proposed change.

3.2.2 LORS

The Commission Decision certifying the PPEC concluded that the project is in compliance with all applicable LORS. Section III of Appendix A hereto further elaborates on LORS compliance. The PPEC project, as modified with the proposed change described in this PTA, will continue to comply with all applicable LORS.

3.3 Public Health

As described in Section 3.2 herein, the proposed increase in allowable hourly heat input to the gas turbines will affect the exhaust characteristics of the turbines. This increase in hourly heat input results in maximum modeled impacts from the gas turbines with proposed higher heat input that are less than or equal to the maximum modeled impacts that were evaluated for the original Application. However, since emissions of toxic air contaminants (TAC) from the gas turbines are assumed to be directly related to heat input, the proposed increase in hourly heat input may

produce slightly higher hourly emissions of TAC, potentially affecting the evaluation of acute health risks from the project that was prepared for the original licensing proceeding. Therefore, the Petitioner has reevaluated the acute health hazard index (HHI) to ensure that the acute HHI will remain at a less than significant level.

The revised acute screening health risk assessment is provided in Appendix C to the air district permit amendment application (Appendix A hereto). In the Commission Decision, the CEC evaluated a predicted acute HHI of 0.034 and determined that members of the public potentially exposed to TAC emissions of this project—including sensitive receptors such as the elderly, infants and children, and people with preexisting medical conditions—will not experience any significant acute health risk as a result of that exposure. The revised acute HRA shows that the acute incremental HHI under normal operating conditions is 0.051. The revised acute HHI is slightly higher than the total acute noncancer HHI of 0.034 previously evaluated during the application proceeding, but is well below the significant impact threshold of 1.0. Therefore, the previous determination of no significant acute impact is not affected.

3.3.1 Conditions of Certification

The proposed change to the PPEC project would not result in any necessary changes or additions to the Condition of Certification for Public Health.

3.3.2 LORS

The Commission Decision certifying the PPEC concluded that the project is in compliance with all applicable LORS. Section III of Appendix A to this PTA further elaborates on LORS compliance. The PPEC project, as modified with the proposed change in this PTA, will continue to comply with all applicable public health-related LORS.

3.4 Traffic and Transportation

In the Commission Decision, the CEC determined that PPEC would emit high velocity thermal plumes from its three 100-foot tall exhaust stacks during operation. The CEC also determined that high velocity thermal plumes can pose a threat to aviation safety, and that aircraft flying through plumes may experience significant air disturbances, such as turbulence and vertical shear. Because there is potential for aircraft to overfly PPEC thermal plumes, CEC staff evaluated average gas turbine exhaust plume vertical velocity to determine whether operation of the facility would pose a significant hazard to aircraft in the vicinity of the project and proposed a Condition of Certification to alert pilots of the presence and potential hazard to flight of the PPEC.

Because the increase in allowable hourly heat input to the gas turbines would affect gas turbine exhaust plume characteristics, the Petitioner has reevaluated thermal plume velocity based on the new gas turbine exhaust parameters. The detailed analysis is provided in Appendix B hereto. The analysis shows that the average vertical velocity for a single plume would be 4.3 m/s or higher up to an elevation of approximately 1,100 feet above ground level (AGL), slightly higher than the 1,080 feet AGL elevation calculated by CEC staff for the original proceeding. At this height, two adjacent plumes would be sufficiently large to merge. For the case of two merged plumes under these conditions, average plume vertical velocity would be 4.3 m/s or higher up to an

elevation of approximately 1,820 feet AGL, approximately 100 feet higher than the elevation of 1,720 feet AGL calculated by CEC staff in the original proceeding. In its Commission Decision, the CEC determined that the project was not within the traffic pattern of the Brown Field Municipal Airport, and that

> *"[g]iven the fact that aircraft do not need to fly over the project site to enter or depart the traffic pattern, the small 10-acre footprint of the project, and the wide open airspace in the general area, pilots would have the flexibility to avoid direct overflight of the PPEC while conducting their normal operations.*[1]

The proposed change in hourly heat input limit would not affect the location of the project site relative to the airport. Therefore, Petitioner believes that impacts to aviation would remain less than significant.

3.4.1 Conditions of Certification

Condition of Certification TRANS-9 requires PPEC to take several actions to ensure pilots are aware of the project location and potential hazards to aviation. Because the proposed change will slightly increase the elevation at which the potential thermal plume hazard may exist, notifications required under this COC would need to reflect the slightly higher elevation indicated in the thermal plume model and no new Conditions of Certification will be required. Below is the proposed change to the language of TRANS-9; no changes are proposed to the Verification language.

TRANS-9 Pilot Notification and Awareness

The project owner shall initiate the following actions to ensure pilots are aware of the project location and potential hazards to aviation:

- Submit a letter to the FAA requesting a Notice to Airmen (NOTAM) be issued advising pilots of the location of the PPEC and recommending avoidance of overflight of the project site below ~~1,720~~ **1,820** feet AGL. The letter should also request that the NOTAM be maintained in active status until all navigational charts and Airport Facility Directories (AFDs) have been updated.

- Submit a letter to the FAA requesting a power plant depiction symbol be placed at the PPEC site location on the San Diego Sectional Chart with a notice to "avoid overflight below ~~1,720~~ **1,820** feet AGL".

- Submit a request to and coordinate with the Brown Field Airport Manager to add a new remark to the Automated Surface Observing System (ASOS) identifying the location of the PPEC and advising pilots to avoid direct overflight below ~~1,720~~ **1,820** feet AGL as they approach or depart the airport.

[1] CEC-800-2012-003-CMF, Pio Pico Energy Center Commission Decision, September 2012, p. 8.2-18.

- Request that Southern California TRACON and/or the San Diego Air Traffic Control Center submit aerodrome remarks describing the location of the PPEC plant and advising against direct overflight below ~~1,720~~ **1,820** feet AGL to the:
    - FAA AeroNav Services, formerly the FAA National Aeronautical Charting Office (Airport/Facility Directory)
    - Jeppesen Sanderson Inc. (JeppGuide Airport Directory, Western Region)
    - Airguide Publications (Flight Guide, Western States)

3.4.2 LORS

The Commission Decision certifying PPEC concluded that the project is in compliance with all applicable LORS. The change proposed herein has the potential to affect only thermal plumes from the project. The analysis presented above demonstrates that the proposed change in thermal plume characteristics will not affect PPEC's LORS compliance. The PPEC project, as modified with the proposed change in this PTA, will continue to comply with all applicable LORS.

SECTION 4
POTENTIAL EFFECTS ON THE PUBLIC AND PROPERTY OWNERS

This section addresses potential effects of the PPEC proposed change set forth in this PTA on nearby property owners, the public, and parties in the application proceeding, pursuant to Section 1769(a)(1)(I) of the CEC Siting Regulations.

The PPEC project, as modified, will not differ in potential effects on adjacent land owners as compared with the previously approved project. PPEC would continue to have no significant environmental effects and would remain in compliance with applicable LORS. Therefore, the proposed change set forth in this PTA will have no adverse effects on nearby property owners, the public, or other parties to the application proceeding.

SECTION 5
LIST OF PROPERTY OWNERS

As required by the Section 1769(a)(1)(H) of the CEC Siting Regulations, a list of property owners potentially affected by the proposed change is provided herewith. A list of property owners within 1,000 feet of the PPEC site boundary is included as Appendix C. Fewer properties are potentially affected by the proposed change than the owners listed in the AFC because the proposed change does not affect the natural gas or electrical transmission lines.

APPENDIX A
APPLICATION FOR PERMIT AMENDMENT TO THE SDAPCD

sierra research

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July 7, 2014

Steven Moore
Senior Air Pollution Control Engineer
San Diego Air Pollution Control District
10124 Old Grove Road
San Diego, CA 92131-1649

Re: Application for Amendment to Permits for Pio Pico Energy Center
Application No. ADCP-2010-APP-001251

Dear Mr. Moore:

We are writing to correct an error in the annual PM_{10} emissions shown in Tables 1 and 2 of the application support document submitted with our June 16, 2014 application for amendment. Due to transposition errors, the annual PM_{10} emission rates shown in the tables are not correct. Although these errors do not materially affect the application, we are providing a replacement page, showing the corrected tables, which can be used to replace the corresponding page in the original application.

We sincerely apologize for the errors and any confusion they may have caused. Please do not hesitate to call me if you have any questions.

Sincerely,

Steve Hill

cc: David Jenkins, PPEC
Maggie Fitzgerald, Sage Environmental
Melissa Foster, Stoel Rives, LLC

Enclosure

II. EMISSIONS ASSESSMENT

A. Criteria Pollutants

The proposed increase in hourly heat input will not result in any increases in the hourly, daily, or annual potential to emit criteria pollutants.

Table 1 presents allowable emissions from the project. Emissions for all pollutants except PM_{10} and $PM_{2.5}$ are from District emission calculations in the FDOC issued on May 4, 2012. PM_{10} and $PM_{2.5}$ emission limits are from the Prevention of Significant Deterioration (PSD) permit issued on February 28, 2014, as they are lower than the corresponding limits in the FDOC.

Table 1
Potential to Emit, Each Gas Turbine

	Maximum Emissions				
	NOx	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$
lb/hr	8.2	8.0	2.3	1.9	5.0
lb/day	288.1	428.2	79.2	45.6	120
tons/year	23.5	32.1	6.5	1.4	~~10.4~~ 10.8

The only proposed change is an increase in allowable hourly heat input to the gas turbines, with no change in permitted annual fuel use, hourly or annual criteria pollutant emission rates, or other operating limitations. Table 2 shows that there will be no change in annual emissions from the facility due to the proposed amendment.

Table 2
Annual Emissions – Facility Total (TPY)

	Maximum Annual Emissions				
Equipment	NOx	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$
Evaluated in FDOC and PSD Permit					
Gas Turbines	70.4	96.4	19.4	4.1	~~31.2~~ 32.5
WSAC	0	0	0	0	~~0.7~~ 1.4
TOTAL	70.4	96.4	19.4	4.1	31.9 33.9
Allowed by Proposed Amendment					
Gas Turbines	70.4	96.4	19.4	4.1	~~31.2~~ 32.5
WSAC	0	0	0	0	~~0.7~~ 1.4
TOTAL	70.4	96.4	19.4	4.1	31.9 33.9
Net Change					
Gas Turbines	0	0	0	0	0
WSAC	0	0	0	0	0
TOTAL	0	0	0	0	0

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June 16, 2014

Steven Moore
Senior Air Pollution Control Engineer
San Diego Air Pollution Control District
10124 Old Grove Road
San Diego, CA 92131-1649

Re: Application for Amendment to Permits for Pio Pico Energy Center
Application No. ADCP-2010-APP-001251

Dear Mr. Moore:

On behalf of Apex Power Group, LLC (Apex), Sierra Research is submitting for District review the enclosed application for amendment to the existing permits for the Pio Pico Energy Center (PPEC), located in Otay Mesa, California. This project is subject to Certification by the California Energy Commission and a Petition to Amend will be submitted to the CEC within the next several weeks.

Attached for your review are District application forms and an application support document, as well as a check for the initial permit application fees (including the $95 filing fee and $13 database fee for each of three emission units) in the amount of $324. We understand that the District will send an invoice for the estimated evaluation fee after reviewing the application.

Please do not hesitate to call me if you have any questions.

Sincerely,

Steve Hill

cc: David Jenkins, PPEC
Maggie Fitzgerald, Sage Environmental
Melissa Foster, Stoel Rives, LLC

Enclosures

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0808

6/16/2014

PAY TO THE ORDER OF San Diego Air Pollution Control District $ **324.00

Three Hundred Twenty-Four and 00/100********** DOLLARS

San Diego APCD
Accounting
10124 Old Grove Road
San Diego CA 92131

MEMO Application No. ADCP-2010-APP-001251

Karen Rodgers MP

⑈000808⑈ ⑆121141819⑆ 992680686⑈

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San Diego Air Pollution Control District 6/16/2014

Date	Type	Reference	Original Amt.	Balance Due	Discount	Payment
6/16/2014	Bill		324.00	324.00		324.00
					Check Amount	324.00

Umpqua Checking Ac Application No. ADCP-2010-APP-001251 324.00

sierra research

Application to the San Diego Air Pollution Control District for an Amendment to the Air Quality Permits for Pio Pico Energy Center

prepared for:

Pio Pico Energy Center, LLC

June 2014

prepared by:

Sierra Research, Inc.
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APPLICATION TO THE
SAN DIEGO AIR POLLUTION CONTROL DISTRICT

for an

AMENDMENT TO THE AIR QUALITY PERMITS FOR
PIO PICO ENERGY CENTER

Submitted by:

Pio Pico Energy Center, LLC

June 2014

Prepared by:

Sierra Research, Inc.
1801 J Street
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SUMMARY

Pio Pico Energy Center, LLC, is applying for an amendment to the air quality permits for the Pio Pico Energy Center (PPEC).

PPEC consists of three simple cycle General Electric LMS100 gas turbines and a wet surface air cooler. The current permits describe the gas turbines as having a maximum heat input of 903 million British thermal units per hour (MMBtu/hr), based on higher heating value, and a nominal output of 100 MW. Although the permit conditions do not specifically limit the hourly heat input to each gas turbine, the District's determination of compliance (DOC) with applicable requirements was based on the rated heat input of 903 MMBtu/hr and associated turbine operating characteristics presented in the original permit application.

However, since the Final Determination of Compliance and final Prevention of Significant Deterioration permit were issued in May 2012 and February 2014, respectively, GE has made performance improvements to its LMS100 gas turbine with the result that the gas turbines that are to be delivered to PPEC will have a slightly higher hourly heat input than the 903 MMBtu/hr (HHV) heat input evaluated by the District (and a correspondingly higher maximum output). Therefore, PPEC is requesting that the District approve operation of the gas turbines at a maximum hourly heat input of 1,000 MMBtu/hr (HHV). This proposed change only affects the descriptions of the gas turbines subject to the District and PSD permits—PPEC is not requesting any changes in hourly or annual emissions limits or any other permit conditions as a result of the proposed change in heat input.

APPLICATION TO THE
SAN DIEGO AIR POLLUTION CONTROL DISTRICT
for an
AMENDMENT TO THE AIR QUALITY PERMITS FOR
PIO PICO ENERGY CENTER

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APPLICATION TO THE
SAN DIEGO AIR POLLUTION CONTROL DISTRICT
for an
AMENDMENT TO THE AIR QUALITY PERMITS FOR
PIO PICO ENERGY CENTER

I. PROJECT DESCRIPTION

A. Applicant's Name and Business Description

Name of Applicant:	Pio Pico Energy Center, LLC
Mailing Address:	1293 E Jessup Way, Mooresville, IN 46158
Facility Address:	7363 Calzada de la Fuente, Otay Mesa, CA 92154
SIC Code:	4911
General Business:	Power Generation
Submitting Officer:	David Jenkins
Consultants:	Sierra Research, Inc. 1801 J Street Sacramento, California 95811 Contact: Steve Hill (916) 444-6666
Type of Use Entitlement:	Pio Pico Energy Center, LLC, owns and operates Pio Pico Energy Center.
Estimated Construction Date:	No construction required.

B. Type of Application

Pio Pico Energy Center, LLC, (the Applicant) is applying for an amendment to the current Final Determination of Compliance/Authority to Construct (FDOC/ATC) and PSD permit for the Pio Pico Energy Center.

The current permit is based on an hourly heat input to each gas turbine of 903 MMBtu/hr (HHV).[1] The proposed amendment would increase the hourly heat input by

[1] Unless otherwise specified, all fuel flow rates and heat input values are expressed in this document on a higher heating value basis.

approximately 10%, to 1,000 MMBtu/hr. No changes in emissions limits or other permit conditions are being proposed.

The appropriate District permit application forms are included in Appendix A.

C. Equipment and Process Description

Pio Pico Energy Center (PPEC) is a simple-cycle turbine electrical generating facility with a total nominal base load net power output of 300 MW. The PPEC will utilize three GE LMS100 intercooled natural gas fired combustion turbine generators (CTGs), each equipped with water injection, a selective catalytic reduction (SCR) system, and an oxidation catalyst system. The nominal net power output of each gas turbine as permitted is 100 megawatts (MW) with a corresponding heat input of 903 million British thermal units per hour (MMBtu/hr) per turbine (at 63°F ambient temperature and based on the higher heating value of natural gas fuel). The facility includes a partial dry cooling system that consists of evaporative cooling and a wet surface air cooler (WSAC).

Since issuance of the FDOC/ATC and PSD permits, GE has made performance improvements to the LMS100 gas turbines that allow slightly higher hourly heat input and higher electrical output. Therefore, the gas turbines that will be delivered to PPEC will be capable of operating with a higher heat input and higher electrical output than the specifications and operating characteristics reflected in the nominal ratings upon which the permits were based. PPEC desires to take advantage of these performance improvements by increasing the maximum hourly heat input (at 63°F ambient temperature and based on the higher heating value of natural gas fuel) by about 10%, from 903 MMBtu/hr to 1,000 MMBtu/hr. The nominal gas turbine output will increase from 100 MW to approximately 106 MW.

D. Facility Operations

PPEC is not proposing any changes to facility operations or to emissions or operational limits as a result of the proposed amendment. Each gas turbine is still expected to operate the equivalent of up to 3,335 hours per year at full load under average conditions, with an additional 500 operating hours with startups and 500 operating hours with shutdowns. No changes in hourly or annual emissions limits are being requested. PPEC expects to be able to comply with all concentration- and mass-based emission limits in the existing permits even under the proposed higher hourly heat input conditions. The proposed increase in maximum hourly heat input will not affect the maximum hourly flow rate through the WSAC,[2] so there will be no increase in emissions from the WSAC as a result of this change.

[2] This is because the maximum WSAC flow rate occurs under high temperature conditions and not at the ambient temperature where the increase in maximum hourly heat input will occur.

II. EMISSIONS ASSESSMENT

A. Criteria Pollutants

The proposed increase in hourly heat input will not result in any increases in the hourly, daily, or annual potential to emit criteria pollutants.

Table 1 presents allowable emissions from the project. Emissions for all pollutants except PM_{10} and $PM_{2.5}$ are from District emission calculations in the FDOC issued on May 4, 2012. PM_{10} and $PM_{2.5}$ emission limits are from the Prevention of Significant Deterioration (PSD) permit issued on February 28, 2014, as they are lower than the corresponding limits in the FDOC.

Table 1
Potential to Emit, Each Gas Turbine

	Maximum Emissions				
	NOx	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$
lb/hr	8.2	8.0	2.3	1.9	5.0
lb/day	288.1	428.2	79.2	45.6	120
tons/year	23.5	32.1	6.5	1.4	10.4

The only proposed change is an increase in allowable hourly heat input to the gas turbines, with no change in permitted annual fuel use, hourly or annual criteria pollutant emission rates, or other operating limitations. Table 2 shows that there will be no change in annual emissions from the facility due to the proposed amendment.

Table 2
Annual Emissions – Facility Total (TPY)

	Maximum Annual Emissions				
Equipment	NOx	CO	VOC	SO_2	$PM_{10}/PM_{2.5}$
Evaluated in FDOC and PSD Permit					
Gas Turbines	70.4	96.4	19.4	4.1	31.2
WSAC	0	0	0	0	0.7
TOTAL	70.4	96.4	19.4	4.1	31.9
Allowed by Proposed Amendment					
Gas Turbines	70.4	96.4	19.4	4.1	31.2
WSAC	0	0	0	0	0.7
TOTAL	70.4	96.4	19.4	4.1	31.9
Net Change					
Gas Turbines	0	0	0	0	0
WSAC	0	0	0	0	0
TOTAL	0	0	0	0	0

While there will be no increase in maximum annual fuel use, the proposed increase in hourly fuel use will increase the mass flow through the turbines, resulting in slight changes in the exhaust characteristics. The Applicant is providing revised unit impact modeling analyses to demonstrate that these changes will not increase the maximum modeled impacts evaluated in the FDOC. The revised ambient air quality impact analysis is provided in Section IV.

B. Greenhouse Gas Emissions

The PPEC project was required to obtain a federal PSD permit because it would have the potential to emit more than 100,000 tons per year of greenhouse gases (GHG), a federally regulated pollutant. Greenhouse gas emissions were shown in the April 2011 PSD permit application[3] as 685,000 tons per year (tpy) of CO_2e.[4] In response to a request from EPA for an estimate of sulfur hexafluoride emissions from circuit breakers at the project, PPEC estimated that emissions from the circuit breakers would not exceed 336 pounds of SF_6 per year or 40.2 tpy of CO_2e.[5] The federal PSD permit includes several permit conditions that are intended to limit GHG, including an annual limit on heat input to each gas turbine, an annual limit on SF_6 emissions from circuit breakers, and a Best Available Control Technology (BACT) heat rate limit. The EPA's June 2012 Fact Sheet[6] shows total estimated GHG emissions from the facility as 685,626 tpy of CO_2e.

Because there will be no increase in annual fuel use or in the design or operation of the circuit breakers as a result of the proposed permit amendment, there will be no change in GHG emissions from the project.

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[3] *Application to the U.S. EPA for a Prevention of Significant Deterioration Permit, Pio Pico Energy Center, San Diego County, California*, April 2011, Table 1-1.

[4] CO_2equivalent (CO_2e) emissions are calculated by weighting emissions of individual GHG by their corresponding global warming potential (GWP).

[5] Letter from Steve Hill, Sierra Research, to Gerardo Rios, U.S. EPA Region 9, regarding Pio Pico Energy Center PSD Permit Application, March 7, 2012.

[6] USEPA, *Fact Sheet and Ambient Air Quality Impact Report For a Clean Air Act Prevention of Significant Deterioration Permit, Pio Pico Energy Center, PSD Permit Number SD 11-01*, June 2012.

III. COMPLIANCE WITH APPLICABLE RULES AND REGULATIONS

This section evaluates the applicability to this amendment of the rules and regulations listed below.

- Federal Prevention of Significant Deterioration (PSD)
- New Source Performance Standards
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Best Available Control Technology (BACT)/Lowest Achievable Emission Rate
- Offsets
- Compliance Certification
- District Prohibitory Rules

As shown in this section, the proposed increase in allowable hourly heat input will not trigger any requirements that were not previously applicable.

Because an increase in allowable hourly heat input will be a modification under District rules, the Applicant has prepared an updated BACT analysis. As discussed in Section III.D, the existing permit limits will continue to meet BACT requirements.

A. Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) is the federal preconstruction review program. It applies to *significant modifications* at *major stationary sources*. It also applies to *new major stationary sources*. A major source is a listed facility (one of 28 PSD source categories listed in Rule 20.1, NSR General Provisions) that emits at least 100 tons/year of an attainment pollutant, or any other facility that emits at least 250 tons/year of an attainment pollutant. The PSD threshold for greenhouse gases (GHGs) is 100,000 tons/year.

The District has adopted Rule 20.3.1, Prevention of Significant Deterioration—Federal Requirements, which adopts most of the provisions of 40 CFR 52.21 by reference. The District rule requires an owner or operator to obtain a PSD permit prior to beginning actual construction of a new major stationary source. [7]

PPEC was determined to be a major stationary source for GHG, and was required to undergo PSD review for NOx, PM_{10}/$PM_{2.5}$, and GHG. EPA issued a PSD permit for the PPEC project on February 28, 2014. The PSD permit describes each gas turbine as a "100 MW (nominal net) combustion turbine generator (CTG), with a maximum heat input rate of 903 MMBtu/hr (HHV)." PPEC is seeking an amendment to the PSD permit to change the equipment description to reflect the increase in nominal net electrical output and maximum hourly heat input. Because no changes are being proposed to the emission limits or other conditions of the permit, no other amendments to the PSD permit are being requested.

[7] PPEC is submitting this request to the District in anticipation of EPA approval of the District's PSD permit program into the State Implementation Plan later this year. EPA's approval is expected to transfer authority to issue and amend PSD permits from EPA to the District.

EPA policy[8] on PSD permit modifications indicates that a permit modification that involves no increase in either emissions or impacts and involves no fundamental change in either the source or any of its emission units can be handled as an administrative amendment. An administrative amendment "…may be quickly processed without any major reevaluation of the decisions originally made in permitting the source."[9] The net increase in emissions for determining PSD applicability is the difference between actual emissions and potential to emit following the modification. For PSD purposes, the actual emissions for a source not yet constructed are the permitted levels, and Table 2 shows there will be no increase in annual emissions as a result of the proposed project.

Table 3 shows that because there will be no increase in annual project emissions as a result of the proposed increase in hourly heat input, the proposed change would not constitute a major modification of the existing major source.

Table 3
PSD Applicability

Pollutant	Major Source Modification Threshold (TPY)	Change in Facility Potential to Emit Due to Proposed Modification (TPY)	Major Modification? (Y/N)
NOx	40	0	N
CO	100	0	N
VOC	40	0	N
SO_2	40	0	N
PM_{10}	15	0	N
$PM_{2.5}$	10	0	N
Greenhouse Gases	75,000	0	N

As discussed previously, the proposed increase in hourly heat input potentially affects the ambient impact analysis prepared for the current PSD permit due to an increase in stack gas flow rates, despite the fact that no increase in maximum hourly, daily or annual emissions are proposed. The revised ambient impact analysis is presented in Section IV. Because the GHG BACT analysis prepared for the original project design relied on gas turbine output ratings that are being changed as part of this revision, GHG BACT is addressed with NOx and $PM_{10}/PM_{2.5}$ BACT in Section D.3 below.

[8] Memo from Darryl D. Tyler, Director, Control Programs Development Division, U.S. EPA, to Air Division Directors, Regions I-X, "Revised Draft Policy on Permit Modifications and Extensions," July 5, 1985.
[9] Ibid., p. 11.

B. New Source Performance Standards

Regulations in 40 CFR Part 60 establish standards of performance to limit emissions from new or modified facilities in specific source categories. These standards are implemented at the local level with federal oversight. The applicability of these regulations depends on the equipment size, process rate, and/or the date of construction, modification, or reconstruction of the affected facility.

For the purposes of NSPS applicability, 40 CFR 60.14 (a) defines "modification" as "any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies…." 40 CFR 60.14(b) states "Emission rate shall be expressed as kg/hr of any pollutant discharged to the atmosphere for which a standard is applicable." Taken together, this means that NSPS applicability is determined based on an increase in the hourly potential to emit a pollutant to which the NSPS applies. The applicable NSPS (40 CFR 60 Subpart KKKK) regulates only NOx and SO_2 emissions from gas turbines.

This permit application seeks an increase in hourly heat input, but will not result in an increase in the allowable hourly NOx or SO_2 emission rates of any of the affected emission units.[10] Therefore, the change requested in this application is not a modification under any NSPS currently in effect. EPA has proposed, but has not yet adopted, a new NSPS that would limit GHG emissions from electric utility generating units. Once a final rule has been promulgated, its applicability to PPEC will be assessed and a demonstration of compliance will be provided.

C. National Emission Standards for Hazardous Air Pollutants (NESHAP)

NESHAP Subpart YYYY (40 CFR 63.6080 et seq.) is the federal standard that regulates hazardous air pollutants (HAPs) emitted by gas turbines at facilities that are major sources for HAPs. A facility is a major source for HAPs if it emits more than 10 tons/year of any individual HAP, or 25 tons/year of all HAPs combined. PPEC is not a major facility for HAPs, and NESHAP Subpart YYYY does not apply.

D. Best Available Control Technology/Lowest Achievable Emission Rate

District Rule 20.3(d)(1) requires application of Best Available Control Technology (BACT) to permit units that are modified and that emit ten (10) pounds per day or more of PM_{10}, NOx, VOCs, or SOx. Subsection 20.3(d)(1)(v) also requires that Lowest Achievable Emission Rate (LAER) be installed for a project that results in an emission increase that constitutes a new major source or a major modification. Because the project did not trigger PSD review for CO, no BACT review is required for that pollutant.

[10] To be conservative, the TAC analysis presented in this document assumes that the proposed increase in maximum hourly heat input may result in a small increase in hourly TAC emissions, as discussed further in Section G.2. below. Because TACs are not pollutants to which Subpart KKKK applies, the proposed project is not a modification for purposes of Subpart KKKK.

LAER does not apply, since the proposed project will not result in any increase in emissions. BACT applies for NOx, VOCs, SOx, PM_{10} and $PM_{2.5}$ as a subset of PM_{10} emissions because emissions of these pollutants are more than 10 pounds per day.

1. Normal Operation

The District's 2012 BACT analysis has been updated in Table 4. To our knowledge, no new simple-cycle LMS100 gas turbine projects have been permitted in California since the PPEC FDOC/ATC was issued in 2012 that would change the District's and EPA's BACT determination for these turbines.

PPEC's VOC BACT limit of 2 ppmc is consistent with more recent BACT limits for comparable turbines, as shown in Table 4. PPEC's SOx BACT limit reflects the use of natural gas that contains less than 0.75 grain of sulfur compound per 100 scf of gas, and is consistent with current BACT.

EPA's PM_{10}/$PM_{2.5}$ BACT determination for PPEC was issued in February, 2014. Therefore, we believe that the emission limits in the existing permits still represent BACT for normal operation.

2. Startup/Shutdown

In the FDOC issued in May 2012 for the PPEC project, the District determined that limiting allowable startup and shutdown times to 30 and 11 minutes, respectively, and limiting mass emission limits per startup and shutdown event constituted BACT for NOx, CO, and VOC during these periods. EPA also made BACT determinations for NOx during startup and shutdown events. The proposed increase in maximum allowable heat input is not expected to affect startup and shutdown times or emissions, and PPEC is not requesting any changes to the limits in the existing FDOC/ATC and PSD permit. These limits are believed to represent current BACT.

Table 4
BACT Determinations – Simple-Cycle Gas Turbines

Capacity	Year	Facility	Location	Pollutant		
				NOx	VOC	$PM_{10}/PM_{2.5}$
4x100 MW (LMS100)	2007 (CEC approval) 2009 (operational)	Panoche Energy Center	SJVAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 3 hours	6.0 lb/hr (0.0066 lb/MMBtu)
2x56 MW (P&W FT8-3)	2008 (CEC approval) 2009 (operational)	Starwood Power Project	SJVAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 3 hours	1.85 lb/hr
2x48 MW (LM6000 PC SPRINT)	2009 (CEC approval) 2011 (operational)	Riverside Energy Resource Center	SCAQMD	2.5 ppmc, 1 hour	2.0 ppmc, 1 hour	3.00 lb/hr (0.00612 lb/MMBtu)
2x49.5 MW (GE LM6000 PC SPRINT)	2009 (CEC approval) 2010 (operational)	Orange Grove Energy Center	SDAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 1 hour	3.0 lb/hr (0.0064 lb/MMBtu)
3x54.2 MW (GE LM6000 PC SPRINT)	2010 (CEC approval) 2012 (operational)	Turlock Irrigation District Almond 2 Power Plant	SJVAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 3 hours	2.5 lb/hr (0.0048 lb/MMBtu)
4x49.5 MW (GE LM6000 PC SPRINT)	2011 (CEC approval) 2012 (operational)	Mariposa Energy Project	BAAQMD	2.5 ppmc, 1 hour	1.0 ppmc, 1 hour	3.0 lb/hr[a]
8x100 MW (LMS100)	2010 (CEC approval) 2013 (operational)	CPV Sentinel, LLC	SCAQMD	2.5 ppmc, 1 hour	2.0 ppmc, 1 hour	11 lb/hr (0.012 lb/MMBtu)
1x49.95 MW (GE LM6000 PC SPRINT)	2010	El Cajon Energy Project	SDAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 1 hour	n/a
3x100 MW (LMS100)	2012	Pio Pico Energy Center	SDAPCD	2.5 ppmc, 1 hour	2.0 ppmc, 1 hour	5.0 lb/hr (0.0053 lb/MMBtu)

Notes:
a. Used for analysis but no permit limit.

3. Greenhouse Gas Emissions

In its 2012 determination of BACT for GHG emissions, EPA determined that BACT for PPEC is the use of new thermally efficient simple-cycle combustion turbines combined with good combustion and maintenance practices to maintain optimum efficiency. EPA observed that the GE LMS100 gas turbines proposed by the Applicant have a maximum efficiency of 44% under ISO conditions, which is at the high end of the efficiency range for gas turbines of this size category.[11] No changes are being proposed to the project or the gas turbines that would affect this determination; GE's most current fact sheet for the LMS100 gas turbine continues to provide thermal efficiencies of up to 44%.[12] With the proposed higher maximum hourly heat input, the PPEC gas turbines will be able to comply with the BACT emission limit of 1,328 lbs CO_2e/MWh_{gross} on a 720-hour rolling average basis.[13]

E. Offsets

District Rule 20.3(d)(5) requires offsets for projects that result in an emission increase of any federal nonattainment criteria pollutant, or its precursors, which exceed new major source or major modification thresholds. As demonstrated in Section II, the proposed increase in allowable hourly heat input will not result in any emission increases, so no offsets will be required for the proposed project.

F. Compliance Certification

Rule 20.3(e)(1) requires that before receiving a Final Determination of Compliance, an applicant for any new or modified stationary source subject to LAER or offset requirements of the District rules must certify that all major sources operated by the applicant in the state are in compliance with all applicable emissions limitations and standards under the federal Clean Air Act. As discussed in previous sections, the proposed project is not subject to LAER or offset requirements, so the compliance certification requirement does not apply.

G. District Prohibitory Rules

The District determined in the FDOC that PPEC as permitted would be in compliance with applicable District prohibitory rules. PPEC is not proposing any changes to the project that would change this determination, with the possible exception of Rules 53 (Specific Air Contaminants: Particulates) and Rule 1200 (Toxic Air Contaminants).

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[11] EPA 2012, pp. 20-21.
[12] GE LMS100 Gas Turbine fact sheet, GEA18632B, October 2013.
[13] EPA's GHG BACT analysis included a BACT determination for SF_6 emissions from circuit breakers. No changes are proposed that would affect the circuit breakers, so no review of this BACT determination is required.

1. Rule 53: Particulates

The maximum hourly natural gas use would increase from 40,035 lb/hr to 43,786 lb/hr, with a maximum particulate emission rate of 5.0 lb/hr. Combustion particulate matter grain loading is calculated as follows:

Grain loading = [(5.0 lb/hr)(7,000 gr/lb)] / [(198.025 scf/lb fuel)(43,786 lb fuel/hr)]
= 0.004 gr/dscf

This is lower than the calculated grain loading of 0.005 gr/dscf in the FDOC, and well below the Rule 53 emission limits of 0.1 gr/dscf. Therefore, compliance with the grain loading limit of Rule 53 is assured.

2. Rule 1200: Toxic Air Contaminants

Because hourly TAC emissions for PPEC were calculated on a heat input basis, increasing the allowable hourly heat input to the gas turbines could potentially affect the health risks attributable to the project; however, only acute impacts would be affected. Because total annual heat input will not change, annual TAC emissions and chronic and cancer risks from the project will not be affected.

A revised screening assessment of potential acute health risks is presented in Appendix C. The revised acute HRA shows that the acute incremental Health Hazard Index (HHI) under normal operating conditions is 0.051, well below the significant impact threshold of 1.0. In the May 2012 FDOC, the District determined that maximum potential acute impacts would occur during an operating hour that included a shutdown. An assessment of potential acute impacts during an hour in which all three gas turbines shut down resulted in a maximum acute HHI of 0.13. The revised acute HHI is slightly higher than the total acute noncancer HHI of 0.11 as evaluated by the District in the FDOC, but well below the significant impact threshold of 1.0.

IV. AMBIENT AIR QUALITY IMPACT ANALYSIS

As discussed above in Section II, the proposed increase in maximum hourly heat input will not affect emissions of criteria pollutants from the gas turbines. However, the proposed increase in hourly fuel use will increase the mass flow through the turbines, resulting in slight changes in the exhaust characteristics. The Applicant is providing revised unit impact modeling analyses to demonstrate that these changes will not increase the maximum modeled impacts evaluated in the FDOC.

A. Screening Modeling Procedures

EPA's AERMOD guideline dispersion model was used to screen the various turbine stack emission and ambient temperature parameters to determine which operating conditions generate the highest ground-level concentrations of criteria pollutants. Gas turbine exhaust parameters (exhaust gas flow rate, temperature and velocity) were developed and modeled for three temperature scenarios: extreme hot temperature (110°F), annual average temperature (63°F), and extreme low temperature (30°F). Criteria pollutant emission rates were also provided at each of these three ambient temperatures. Similarly, stack parameters and emission rates were provided at each ambient temperature for the turbines running at 100% and 50% load. The stack parameters used in the updated screening modeling are presented in Table 5**.**

Table 5
Exhaust Parameters Used for Updated Screening Modeling Analysis

Operating Mode	Ambient Temp, °F	Turbine Load, %	Stack Height, meters	Stack Diam, meters	Stack Flow, m3/sec	Stack Velocity, m/sec	Stack Temp, °K
Hot Peak	110	100	30.48	4.42	432.76	28.21	700.3
Average Peak	63	100	30.48	4.42	482.32	31.44	691.6
Cold Peak	30	100	30.48	4.42	444.62	28.98	676.7
Hot Low	110	50	30.48	4.42	306.42	19.97	708.8
Average Low	63	50	30.48	4.42	318.24	20.74	702.0
Cold Low	30	50	30.48	4.42	315.24	20.55	699.0

B. Meteorological Data Used for Dispersion Modeling

Meteorological data were provided by the District and represented meteorological conditions during the 2010-2012 time period.[14] The data were processed by the District using EPA's AERMET meteorological data processor (Version 13350) to produce AERMOD-ready files. Data sources are listed below.

- Onsite Data: Wind speed, wind direction, standard deviation of the horizontal wind direction, and temperature collected at the District's Otay Mesa monitoring station.

- Upper Air Data: Twice-daily upper-air soundings collected at Miramar Marine Corps Air Station, San Diego.

- Surface Data: Cloud height and total opaque cloud amount collected at Brown Field Airport, Otay Mesa. Wind speed, wind direction, and temperature data from Brown Field Airport, Otay Mesa, were also used for replacement of missing data in the Otay Mesa data set.

C. Results of the Screening Modeling Analysis

The screening modeling analysis was performed using a 1 gram per second emission rate from each turbine, and the results were scaled by the actual emission rates to calculate total impacts at each turbine load and ambient condition. The minimum load (50% load) case with the highest unit impacts (hot ambient temperature) was used to evaluate impacts during gas turbine startups.

The screening results for the revised gas turbine operating parameters are shown in Appendix B, Table B-1. Table 6 compares the screening results for the revised gas turbine operating parameters with the screening results for the original approved design, as presented in the May 2012 FDOC.

[14] These data are from the same meteorological monitoring station used for the original permit application, but reflect data from more recent years.

Table 6 Comparison of Project Impacts: Screening Modeling Results				
Pollutant	Averaging Time	Operating Mode	Maximum Modeled Impact, μg/m^3	
			Proposed Change[a]	Original Design[b]
NO_2	1-hour	startup	116.7	133.3
	Annual	normal	0.3	0.3
SO_2	1-hour	normal	6.2	8.0
	3-hour	normal	2.3	2.7
	24-hour	normal	0.6	0.6
	Annual	normal	0.1	0.1
CO	1-hour	shutdown	234.4	267.8
	8-hour	shutdown	60.6	64.3
$PM_{10}/PM_{2.5}$	24-hour	normal	1.9	2.2
	Annual	normal	0.2	0.2

Notes:
a. Based on stack parameters that reflect proposed higher hourly heat input and final permitted emission limits (5.0 lb/hr PM_{10} /$PM_{2.5}$). See Appendix B.
b. Based on stack parameters for permitted design and emission limits from FDOC (5.5 lb/hr PM_{10} /$PM_{2.5}$). See Table 3-4 of Appendix A ("Air Quality Impact Analysis, Final Review Report") to the FDOC.

Screening modeling results for all pollutants and averaging periods show that maximum modeled impacts from the gas turbines with proposed higher heat input are less than or equal to the maximum modeled impacts that were evaluated for the original application. Therefore, the District can conclude that ambient impacts from PPEC operations at a slightly higher heat input will not be any higher than the ambient impacts evaluated for the original project, and thus will not cause or contribute to additional violations of state or federal ambient air quality standards.

V. PROPOSED PERMIT CONDITIONS

PPEC LLC is not requesting any changes to the conditions in the FDOC.

Appendix A

SDAPCD Application Forms

APCD 116 (Rev. 04/07)

SAN DIEGO AIR POLLUTION CONTROL DISTRICT
10124 OLD GROVE ROAD, SAN DIEGO CA 92131-1649
PHONE (858) 586-2600 • FAX (858) 586-2601

PERMIT / REGISTRATION APPLICATION

SUBMITTAL OF THIS APPLICATION DOES NOT GRANT PERMISSION TO CONSTRUCT OR TO OPERATE EQUIPMENT EXCEPT AS SPECIFIED IN RULE 24(d)

IMPORTANT REMINDERS: Read instructions on the reverse side of this form prior to completing this application. Please ensure that all of the following are included before you submit the application:
☒ Appropriate Permit Fee ☒ Completed Supplemental Form(s) ☒ Signature on Application

REASON FOR SUBMITTAL OF APPLICATION: (check the appropriate item and enter Application (AP) or Permit to Operate (PO) number if required)

1. ☐ New Installation 2. ☐ Existing Unpermitted Equipment or Rule 11 Change 3. ☐ Modification of Existing Permitted Equipment
4. ☒ Amendment to Existing Authority to Construct or AP 5. ☐ Change of Equipment Location 6. ☐ Change of Equipment Ownership
7. ☐ Change of Permit Conditions 8. ☐ Change Permit to Operate Status to Inactive 9. ☐ Banking Emissions
10. ☐ Registration of Portable Equipment 11. ☐ Other (Specify) APCD2010-APP-001251
12. List affected AP/PO#(s): _____

APPLICANT INFORMATION

13. Name of Business (DBA) Pio Pico Energy Center, LLC
14. Nature of Business Electric Power Generation
15. Does this organization own or operate any other APCD permitted equipment at this or any other adjacent locations in San Diego County? ☐Yes ☒No
If yes, list assigned location ID's listed on your PO's _____
16. Type of Ownership ☒ Corporation ☐ Partnership ☐ Individual Owner ☐ Government Agency ☐ Other _____
17. Name of Legal Owner (if different from DBA) _____

		A. Equipment Owner	B. Authority to Construct (if different from A)
18.	Name	Pio Pico Energy Center, LLC	
19.	Mailing Address	1293 E Jessup Way	
20.	City	Mooresville	
21.	State	IN Zip 46158	Zip
22.	Phone	(317) 431-1004 FAX ( )	( ) FAX ( )

		C. Permit to Operate (if different from A)	D. Billing Information (if different from A)
23.	Name		
24.	Mailing Address		
25.	City		
26.	State	Zip	Zip
27.	Phone	( ) FAX ( )	( ) FAX ( )

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: ☒ Stationary ☐ Portable.
If portable, will operation exceed 12 consecutive months at the same location ☐ Yes ☐ No

28. Equipment Location Address Alta Road and Calzada de la Fuente Road City Otay Mesa Parcel No. APN648-040-45
29. State California Zip 92154 Phone ( ) FAX ( )
30. Site Contact Dave Jenkins Title Project Manager Phone (317) 431-1004
31. General Description of Equipment/Process
Simple-cycle natural gas-fired turbines for electrical power generation
32. Application Submitted by ☐ Owner ☐ Operator ☐ Contractor ☒ Consultant Affiliation Sierra Research

EXPEDITED APPLICATION PROCESSING: ☐ **I hereby request Expedited Application Processing and understand that:**

33. a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details).
b) Expedited processing is contingent on the availability of qualified staff. c) Once engineering review has begun this request cannot be cancelled.
d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

I hereby certify that all information provided on this application is true and correct.

34. SIGNATURE _____ Date June 12, 2014
35. Print Name Steve Hill Title Senior Engineer
36. Company Sierra Research Phone (510) 684-3671 E-mail Address shill@sierraresearch.com

APCD USE ONLY

AP # _____ ID # _____ Cust. No. _____ Sector: _____ UTM's X _____ Y _____ SIC _____
Receipt # _____ Date _____ Amt Rec'd $ _____ Fee Code _____
Engineering Contact _____ Fee Code _____ AP Fee $ _____ T&M Renewal Fee $ _____
Refund Claim # _____ Date _____ Amt $ _____
Application Generated By NV# _____ NC # _____ Other _____ Date _____ Inspector _____

SAN DIEGO AIR POLLUTION CONTROL DISTRICT

SUPPLEMENTAL APPLICATION INFORMATION
FEE SCHEDULE 20 D, E, F, G, H

San Diego APCD Use Only
Appl. No.:
ID No.:

GAS TURBINE

COMPANY NAME: Pio Pico Energy Center, LLC

ADDRESS: Alta Road and Calzada de la Fuente Road

A. EQUIPMENT AND PROCESS DESCRIPTION

ENGINE USE: *(Check all that apply.)*

Power Generation: 318000 kw Steam Generation: _____ lbs/hr steam

Other (Specify capacity.): three identical units, each rated at 106,000 kW

ENGINE SPECIFICATIONS:

Manufacturer: General Electric Model No.: LMS 100 PA S/N: _____

HP Rating: _____ Fuel Consumption Rate: 1000 MM BTU/HR

1. Type of Liquid Fuel Used*: N/A Fuel Rate(Specify Units): N/A

   Maximum %sulfur by wt. in fuel*: N/A %

2. Type of Gaseous Fuel Used*: Natural Gas Fuel Rate: 982,200 cfh

   Maximum Grains PM/100DSCF @ 12% O_2: 0.004 grains/100dscf

B. EMISSION CONTROL EQUIPMENT *(Check all that apply)*

☐ Low NOx burner ☒ Water injection ☒ SCR w/ Ammonia injection ☐ Hydrogenous ☒ Aqeuous

Describe the control equipment to be installed and submit its technical data:

Each gas turbine will be equipped with an evaporative cooler for inlet air; a compressor intercooler using a heat exchanger; water injection, selective catalytic reduction and an oxidation catalyst.

C. EMISSION DATA

Provide the manufacturer's specifications and emission factors (lbs/1,000 lbs of fuel) for oxides of nitrogen (NOx), Carbon monoxide (CO), Hydrocarbons (HC), and particulate matter (PM) for the engine at different power settings with corresponding engine exhaust flow rates and temperatures.

D. EXHAUST STACK AND BLDG. DIMENSIONS *(if air quality modeling is required).*

Stack location: ground (i.e., roof top, wall, ground), direction: ☒ vertical ☐ horizontal

Stack dimensions: internal 14.5 ft. diameter, or _____ ft. wide x _____ ft. long

Stack dimensions: external _____ ft. diameter, or _____ ft. wide x _____ ft. long

(If other shape, then supply sketch of stack cross section)

Use an attached page to provide this information for each engine at each power setting.

Stack height: Above roof: _____ ft. Above ground level: 100 ft.

Site elevation above mean sea level (MSL) 635 ft.

Building dimensions: length _____ ft.; width _____ ft.; height _____ ft.

(Supply sketch w/position of exhaust stack)

Supply a plot plan showing the test cell/stand location with respect to nearby streets, property lines, and buildings.

E. OTHER EMISSION PRODUCING EQUIPMENT AT THE SITE

APCD permitted ☒ Yes ☐ No

Non permitted ☒ Yes ☐ No

F. ADDITIONAL INFORMATION For detailed data please see attached documentation

Fuel use reported in Section A is per turbine. This application is for three turbines.

Firing rate on line 9 is HHV. Anticipated annual operating schedule is 4335 hours/yr, including startup and shutdown..

G. OPERATING SCHEDULE:* Hours/day: 16 Days/yr: 250

* Emission calculations will be performed using these values and permit conditions may result to comply with applicable rules.

Name of Preparer: Steve Hill **Title:** Senior Engineer

Phone Number: (510) 684-3671 **Date:** June 16, 2014

NOTE TO APPLICANT:

Before acting on an application for Authority to Construct or Permit to Operate, the District may require further information, plans, or specifications. Forms with insufficient information may be returned to the applicant for completion, which will cause a delay in application processing and may increase processing fees. The applicant should correspond with equipment and material manufacturers to obtain the information requested on this supplemental form.

Appendix B

Results of the Screening Modeling Analysis

Table B-1

Screening Modeling Inputs

Pio Pico Energy Center: Heat Input Amendment

Operating Mode	Amb Temp deg F	Stack height feet	Stack Diam feet	Stack flow wacfm	Stack Vel ft/sec	Stack Temp deg F	Stack Height meters	Stack Diam meters	Stack flow m3/sec	Stack Vel m/sec	Stack Temp deg K
Hot Peak	110	100	14.5	916,845	92.54	801	30.48	4.4196	432.76	28.21	700.3
Avg Peak	63	100	14.5	1,021,848	103.14	785	30.48	4.4196	482.32	31.44	691.6
Cold Peak	30	100	14.5	941,972	95.07	758	30.48	4.4196	444.62	28.98	676.7
Hot Low	110	100	14.5	649,177	65.52	816	30.48	4.4196	306.42	19.97	708.8
Avg Low	63	100	14.5	674,227	68.05	804	30.48	4.4196	318.24	20.74	702.0
Cold Low	30	100	14.5	667,877	67.41	799	30.48	4.4196	315.24	20.55	699.0

Operating Mode	NOx lb/hr	CO lb/hr	SOx lb/hr	PM10 lb/hr	NOx g/sec	CO g/sec	SOx g/sec	PM10 g/sec
Startup/Shutdown	26.63	53.51	n/a	n/a	3.36	6.74	n/a	n/a
Hot Peak	7.27	7.08	1.69	5.00	0.92	0.89	0.21	0.63
Avg Peak	8.18	7.97	1.90	5.00	1.03	1.00	0.24	0.63
Cold Peak	7.51	7.32	1.75	5.00	0.95	0.92	0.22	0.63
Hot Low	4.38	4.27	1.02	5.00	0.55	0.54	0.13	0.63
Avg Low	4.59	4.47	1.07	5.00	0.58	0.56	0.13	0.63
Cold Low	4.54	4.43	1.06	5.00	0.57	0.56	0.13	0.63

Table B-2
Screening Level Modeling Unit Impacts
Pio Pico Energy Center: Heat Input Amendment

Operating Mode/Year	Conc. (ug/m3 per g/s)				
	1-hr unit	3-hr unit	8-hr unit	24-hr unit	Annual Unit
2010 Met Data					
1. Hot Peak	26.9057	9.2755	7.6845	2.5756	0.1929
2. Avg Peak	25.5202	8.6295	7.2895	2.4442	0.1718
3. Cold Peak	26.8754	9.2620	7.6757	2.5727	0.1925
4. Hot Low	31.4476	11.6049	**8.9822**	**3.0135**	0.2816
5. Avg Low	30.9446	11.4026	8.8382	2.9652	0.2723
6. Cold Low	31.1457	11.4898	8.8957	2.9845	0.2759
2011 Met Data					
1. Hot Peak	27.3824	9.5442	3.6058	1.2235	0.1911
2. Avg Peak	25.8141	8.9736	3.3887	1.1494	0.1732
3. Cold Peak	27.3483	9.5315	3.6010	1.2218	0.1906
4. Hot Low	31.2505	10.8276	4.0866	1.4706	0.2786
5. Avg Low	30.9982	10.6812	4.0406	1.4187	0.2694
6. Cold Low	31.1019	10.7198	4.0556	1.4390	0.2730
2012 Met Data					
1. Hot Peak	23.6644	10.3720	4.7769	1.9599	0.2609
2. Avg Peak	21.2834	9.5318	4.3904	1.7988	0.2435
3. Cold Peak	23.6148	10.3580	4.7703	1.9569	0.2605
4. Hot Low	**34.7748**	**13.1623**	6.1605	2.6414	**0.3293**
5. Avg Low	33.7847	12.8984	6.0273	2.5670	0.3175
6. Cold Low	34.1812	13.0045	6.0807	2.5965	0.3221
Maximum	**34.7748**	**13.1623**	**8.9822**	**3.0135**	**0.3293**
Case	**Hot Low**	**Hot Low**	**Hot Low**	**Hot Low**	**Hot Low**
Year	**2012**	**2010**	**2010**	**2010**	**2012**

Table B-3
Screening Level Ambient Impacts
Pio Pico Energy Center: Heat Input Amendment

	Conc. (ug/m3)									
Operating Mode/Year	NO2 1-hr	CO 1-hr	SO2 1-hr	SO2 3-hr	CO 8-hr	PM10 24-hr	SO2 24-hr	NO2 Annual	PM10 Annual	SO2 Annual
2010 Met Data										
Startup/Shutdown	105.5	212.0	n/a	n/a	**60.6**	n/a	n/a	n/a	n/a	n/a
Hot Peak	24.6	24.0	5.7	2.0	6.9	1.6	0.55	0.18	0.12	0.04
Avg Peak	26.3	25.6	6.1	**2.1**	**7.3**	1.5	**0.59**	0.18	0.11	0.04
Cold Peak	25.4	24.8	5.9	2.0	7.1	1.6	0.57	0.18	0.12	0.04
Hot Low	17.4	16.9	4.0	1.5	4.8	**1.90**	0.4	0.16	0.18	0.04
Avg Low	17.9	17.4	4.2	1.5	5.0	1.87	0.4	0.16	0.17	0.04
Cold Low	17.8	17.4	4.1	1.5	5.0	1.88	0.4	0.16	0.17	0.04
2011 Met Data										
Startup/Shutdown	104.9	210.7	n/a	n/a	27.6	n/a	n/a	n/a	n/a	n/a
Hot Peak	25.1	24.4	5.8	2.0	3.2	0.8	0.3	0.18	0.12	0.04
Avg Peak	**26.6**	**25.9**	**6.2**	2.1	3.4	0.7	0.3	0.18	0.11	0.04
Cold Peak	25.9	25.2	6.0	2.1	3.3	0.8	0.3	0.18	0.12	0.04
Hot Low	17.2	16.8	4.0	1.4	2.2	0.9	0.2	0.15	0.18	0.04
Avg Low	17.9	17.4	4.2	1.4	2.3	0.9	0.2	0.16	0.17	0.04
Cold Low	17.8	17.3	4.1	1.4	2.3	0.9	0.2	0.16	0.17	0.04
2012 Met Data										
Startup/Shutdown	**116.7**	**234.4**	n/a	n/a	41.5	n/a	n/a	n/a	n/a	n/a
Hot Peak	21.7	21.1	5.0	2.2	4.3	1.2	0.4	0.24	0.16	0.056
Avg Peak	21.9	21.4	5.1	2.3	4.4	1.1	0.4	**0.25**	0.15	**0.058**
Cold Peak	22.4	21.8	5.2	2.3	4.4	1.2	0.4	0.25	0.16	0.057
Hot Low	19.2	18.7	4.5	1.7	3.3	1.7	0.3	0.18	**0.21**	0.04
Avg Low	19.5	19.0	4.5	1.7	3.4	1.6	0.3	0.18	0.20	0.04
Cold Low	19.6	19.1	4.5	1.7	3.4	1.6	0.3	0.18	0.20	0.04
ximum (excluding SU/SD)	**26.6**	**25.9**	**6.2**	**2.3**	**7.3**	**1.90**	**0.59**	**0.25**	**0.21**	**0.058**
Case	**Avg Peak**	**Avg Peak**	**Avg Peak**	**Avg Peak**	**Avg Peak**	**Hot Low**	**Avg Peak**	**Avg Peak**	**Hot Low**	**Avg Peak**
Year	**2011**	**2011**	**2011**	**2010**	**2010**	**2010**	**2010**	**2012**	**2012**	**2012**
Maximum SU/SD	**116.7**	**234.4**			**60.6**					
Case	**Hot Low**	**Hot Low**			**Hot Low**					
Year	**2012**	**2012**			**2010**					

Appendix C

Revised Screening Health Risk Assessment for Acute Impacts

Revised Screening Health Risk Assessment for Acute Impacts

The screening health risk assessment for acute impacts has been revised to reflect the higher maximum hourly heat input for the gas turbines that is the subject of the proposed amendment. Emission factors and operating assumptions are identical to those in the 2011 application and the May 2012 FDOC.

Hourly emissions of TACs during a normal turbine operating hour are shown in Table **C-1**. The District identified a shutdown hour as having the highest hourly Toxic Air Contaminant (TAC) emissions;[1] hourly TAC emissions during a shutdown hour are shown in Table C-2.

The highest one-hour average impacts from the screening modeling assessment occur under hot temperature, low-load conditions, using 2012 meteorological data.[2] The California Air Resources Board's HARP model was run using these stack parameters, 2012 meteorological data, and the hourly TAC emission rates for a normal and a shutdown hour. The resulting health hazard indices (HHI) are 0.051 and 0.13, respectively. Both are well below the Rule 1200 significant impact level of 1.0.

The HARP model does not have the ability to evaluate a HHI for the 8-hour averaging period, so the calculation was performed manually (see Tables C-3 and C-4). The worst-case 8-hour health hazard index was calculated as the combined total for acetaldehyde, acrolein, and formaldehyde. The calculated 8-hour HHI of 0.049 is well below the Rule 1200 significant impact level of 1.0.

[1] See May 2012 FDOC, Appendix B, "Approval of Health Risk Assessment."
[2] See Appendix B, Table B-2.

Table C-1 Hourly Emissions, Normal Operation, Each Gas Turbine						
		Emission Factor			Heat Input	Emissions
CAS No.	Pollutant	lb/MMSCF	Source	lb/MMBtu	MMBtu/hr	lbs/hr
Toxic Air Contaminants (TACs) that are not HAPs						
7664417	Ammonia	7	SDAPCD Permit	6.88E-03	1000.0	6.88
115071	Propylene	3.86E-01	District workbook	3.79E-04	1000.0	3.79E-01
Hazardous Air Pollutants (HAPs, federal)						
75070	Acetaldehyde	2.04E-02	0.5*AP-42[1]	2.00E-05	1000.0	2.00E-02
107028	Acrolein	3.27E-03	0.5*AP-42[1]	3.21E-06	1000.0	3.21E-03
71432	Benzene	6.10E-03	0.5*AP-42[1]	5.99E-06	1000.0	5.99E-03
106990	1,3-Butadiene	2.20E-04	0.5*AP-42[1]	2.16E-07	1000.0	2.16E-04
100414	Ethylbenzene	1.63E-02	0.5*AP-42[1]	1.60E-05	1000.0	1.60E-02
50000	Formaldehyde	4.59E-01	CATEF	4.50E-04	1000.0	4.50E-01
110543	Hexane, n-	1.30E-01	CATEF	1.27E-04	1000.0	1.27E-01
91203	Naphthalene	6.65E-04	0.5*AP-42[1]	6.53E-07	1000.0	6.53E-04
PAHs (listed individually below)		3.28E-04	SUM	3.22E-07	1000.0	3.22E-04
83329	*Acenaphthene*	*9.50E-06*	*CATEF*	*9.33E-09*	*1000.0*	*9.33E-06*
208968	*Acenapthyene*	*7.35E-06*	*CATEF*	*7.22E-09*	*1000.0*	*7.22E-06*
120127	*Anthracene*	*1.69E-05*	*CATEF*	*1.66E-08*	*1000.0*	*1.66E-05*
56553	*Benzo(a)anthracene*	*1.13E-05*	*CATEF*	*1.11E-08*	*1000.0*	*1.11E-05*
50328	*Benzo(a)pyrene*	*6.95E-06*	*CATEF*	*6.83E-09*	*1000.0*	*6.83E-06*
192972	*Benzo(e)pyrene*	*2.72E-07*	*CATEF*	*2.67E-10*	*1000.0*	*2.67E-07*
205992	*Benzo(b)fluoranthrene*	*5.65E-06*	*CATEF*	*5.55E-09*	*1000.0*	*5.55E-06*
207089	*Benzo(k)fluoranthrene*	*5.50E-06*	*CATEF*	*5.40E-09*	*1000.0*	*5.40E-06*
191242	*Benzo(g,h,i)perylene*	*6.85E-06*	*CATEF*	*6.73E-09*	*1000.0*	*6.73E-06*
218019	*Chrysene*	*1.26E-05*	*CATEF*	*1.24E-08*	*1000.0*	*1.24E-05*
53703	*Dibenz(a,h)anthracene*	*1.18E-05*	*CATEF*	*1.15E-08*	*1000.0*	*1.15E-05*
206440	*Fluoranthene*	*2.16E-05*	*CATEF*	*2.12E-08*	*1000.0*	*2.12E-05*
86737	*Fluorene*	*2.90E-05*	*CATEF*	*2.85E-08*	*1000.0*	*2.85E-05*
193395	*Indeno(1,2,3-cd)pyrene*	*1.18E-05*	*CATEF*	*1.15E-08*	*1000.0*	*1.15E-05*
85018	*Phenanthrene*	*1.57E-04*	*CATEF*	*1.54E-07*	*1000.0*	*1.54E-04*
129000	*Pyrene*	*1.39E-05*	*CATEF*	*1.37E-08*	*1000.0*	*1.37E-05*
75569	Propylene oxide	1.48E-02	0.5*AP-42[1]	1.45E-05	1000.0	1.45E-02
108883	Toluene	6.65E-02	0.5*AP-42[1]	6.53E-05	1000.0	6.53E-02
1210	Xylene	3.27E-02	0.5*AP-42[1]	3.21E-05	1000.0	3.21E-02

Note:
1. Assumes oxidation catalyst reduces emissions by 50%.

Table C-2 Hourly Emissions, Shutdown (Worst Case), Each Gas Turbine			
CAS No.	**Pollutant**	**Emission Factor lb/MMBtu**	**Emissions lbs/hr**
Toxic Air Contaminants (TACs) that are not HAPs			
7664417	Ammonia	6.88E-03	6.88
115071	Propylene	3.79E-04	1.08
Hazardous Air Pollutants (HAPs, federal)			
75070	Acetaldehyde	2.00E-05	5.73E-02
107028	Acrolein	3.21E-06	9.19E-03
71432	Benzene	5.99E-06	1.71E-02
106990	1,3-Butadiene	2.16E-07	6.17E-04
100414	Ethylbenzene	1.60E-05	4.58E-02
50000	Formaldehyde	4.50E-04	1.29E
110543	Hexane, n-	1.27E-04	3.64E-01
91203	Naphthalene	6.53E-07	1.87E-03
PAHs (listed individually below)		3.22E-07	3.22E-04
83329	*Acenaphthene*	*9.33E-09*	*2.67E-05*
208968	*Acenapthyene*	*7.22E-09*	*2.06E-05*
120127	*Anthracene*	*1.66E-08*	*4.75E-05*
56553	*Benzo(a)anthracene*	*1.11E-08*	*3.17E-05*
50328	*Benzo(a)pyrene*	*6.83E-09*	*1.95E-05*
192972	*Benzo(e)pyrene*	*2.67E-10*	*7.64E-07*
205992	*Benzo(b)fluoranthrene*	*5.55E-09*	*1.59E-05*
207089	*Benzo(k)fluoranthrene*	*5.40E-09*	*1.54E-05*
191242	*Benzo(g,h,i)perylene*	*6.73E-09*	*1.92E-05*
218019	*Chrysene*	*1.24E-08*	*3.54E-05*
53703	*Dibenz(a,h)anthracene*	*1.15E-08*	*3.30E-05*
206440	*Fluoranthene*	*2.12E-08*	*6.07E-05*
86737	*Fluorene*	*2.85E-08*	*8.15E-05*
193395	*Indeno(1,2,3-cd)pyrene*	*1.15E-08*	*3.30E-05*
85018	*Phenanthrene*	*1.54E-07*	*4.41E-04*
129000	*Pyrene*	*1.37E-08*	*3.90E-05*
75569	Propylene oxide	1.45E-05	4.15E-02
108883	Toluene	6.53E-05	1.87E-01
1210	Xylene	3.21E-05	9.17E-02

Table C-3 Calculation of Maximum 8-hour Concentrations for Compounds with 8-hour RELs			
Pollutant	**Emission Rate, g/s[a]**	**8-hr unit impact, ug/m^3 per g/s[b]**	**Max. 8-hour Average Concentration, µg/m^3**
Acetaldehyde	2.52E-03	8.9822	2.27E-02
Acrolein	4.05E-04	8.9822	3.63E-03
Formaldehyde	5.67E-02	8.9822	5.10E-01
Notes: a. From Table C-1. b. From Table B-1.			

Table C-4 **Calculation of 8-Hour Health Hazard Index (HHI)**			
Pollutant	**8-hour REL, µg/m^3 [a]**	**Max. 8-hour Average Concentration, µg/m^3**	**HHI**
Acetaldehyde	300	0.02	6.7E-05
Acrolein	0.7	0.003	4.3E-03
Formaldehyde	9	0.4	4.4E-02
Total			0.049
Note: a. OEHHA, Table of All Acute, Chronic and 8 hour Reference Exposure Levels, http://www.oehha.ca.gov/air/allrels.html, January 2014.			

APPENDIX B
THERMAL PLUME ANALYSIS

PPEC Hourly Heat Input Increase
PPEC Predicted Calm Wind Plume velocities
PPEC Stack Parameters

Case	Cold Peak	Cold Low	Average Peak	Average Low	Hot Peak	Hot Low	g=	9.8 m/s^2
Ambient Temperature (F)	30	30	63	63	110	110		
Ambient Temperature (k)	272.039	272.039	290.372	290.372	316.483	316.483		
Stack Height (m)	30.48	30.48	30.48	30.48	30.48	30.48		
Stack diameter (m)	4.4196	4.4196	4.4196	4.4196	4.4196	4.4196		
Stack Velocity (m/s)	28.98	20.55	31.44	20.74	28.21	19.97		
Exhaust Temperature (K)	676.7	699	691.6	702	700.3	708.8		
Zv Virtual source Height (m)	10.11	10.39	9.72	9.86	9.05	9.16		
F^0 initial stack buoyancy (m^4/s^3)	829.33	600.70	872.87	581.98	739.90	528.96		
$(V*a)_0$	40.60	28.33	45.02	29.48	41.91	29.49		

PPEC Plume Velocity (m/s)

Ht above AGL (ft)	Height above AGL (m)	Cold Base	Cold Low	Average Base	Average Low	Hot Base	Hot Low	Max
300	91.44	6.81	6.02	6.97	5.95	6.56	5.75	6.971
400	121.92	6.07	5.41	6.20	5.35	5.84	5.17	6.196
500	152.40	5.58	4.99	5.69	4.93	5.37	4.77	5.689
600	182.88	5.22	4.67	5.32	4.62	5.02	4.47	5.318
700	213.36	4.94	4.43	5.03	4.38	4.75	4.24	5.03
800	243.84	4.71	4.22	4.80	4.18	4.53	4.04	4.796
900	274.32	4.52	4.06	4.60	4.01	4.35	3.88	4.601
1000	304.80	4.36	3.91	4.43	3.87	4.19	3.74	4.435
1100	335.28	4.22	3.78	4.29	3.74	4.06	3.62	4.29
1200	365.76	4.09	3.67	4.16	3.63	3.94	3.52	4.163
1300	396.24	3.98	3.57	4.05	3.53	3.83	3.42	4.049
1400	426.72	3.88	3.48	3.95	3.45	3.73	3.34	3.948
1500	457.20	3.79	3.40	3.86	3.37	3.65	3.26	3.855
1600	487.68	3.71	3.33	3.77	3.29	3.57	3.19	3.771
1700	518.16	3.63	3.26	3.69	3.23	3.49	3.12	3.694
1800	548.64	3.56	3.20	3.62	3.16	3.43	3.06	3.623
1820	554.74	3.55	3.19	3.61	3.15	3.41	3.05	3.609
1900	579.12	3.50	3.14	3.56	3.11	3.36	3.01	3.557
2000	609.60	3.44	3.09	3.50	3.05	3.31	2.96	3.495
2100	640.08	3.38	3.03	3.44	3.00	3.25	2.91	3.438
2200	670.56	3.33	2.99	3.38	2.96	3.20	2.86	3.384
2300	701.04	3.28	2.94	3.33	2.91	3.15	2.82	3.333
2400	731.52	3.23	2.90	3.29	2.87	3.11	2.78	3.286
2450	746.76	3.21	2.88	3.26	2.85	3.09	2.76	3.263
2500	762.00	3.19	2.86	3.24	2.83	3.07	2.74	3.24
2550	777.24	3.16	2.84	3.22	2.81	3.05	2.72	3.219
2600	792.48	3.14	2.82	3.20	2.79	3.03	2.70	3.198
2700	822.96	3.10	2.79	3.16	2.76	2.99	2.67	3.157
2800	853.44	3.07	2.75	3.12	2.72	2.95	2.64	3.119

Ht above AGL (ft)	Height above stacktop (m)	PPEC plume top-hat radius (m)					
		Cold Base	Cold Low	Average Base	Average Low	Hot Base	Hot Low
300	91.44	13.01	12.97	13.07	13.05	13.18	13.16
400	121.92	17.89	17.84	17.95	17.93	18.06	18.04
500	152.40	22.77	22.72	22.83	22.81	22.94	22.92
600	182.88	27.64	27.60	27.70	27.68	27.81	27.79
700	213.36	32.52	32.48	32.58	32.56	32.69	32.67
800	243.84	37.40	37.35	37.46	37.44	37.57	37.55
900	274.32	42.27	42.23	42.34	42.31	42.44	42.42
1000	304.80	47.15	47.11	47.21	47.19	47.32	47.30
1100	335.28	52.03	51.98	52.09	52.07	52.20	52.18
1200	365.76	56.90	56.86	56.97	56.94	57.07	57.06
1300	396.24	61.78	61.74	61.84	61.82	61.95	61.93
1400	426.72	66.66	66.61	66.72	66.70	66.83	66.81
1500	457.20	71.53	71.49	71.60	71.57	71.70	71.69
1600	487.68	76.41	76.37	76.47	76.45	76.58	76.56
1700	518.16	81.29	81.24	81.35	81.33	81.46	81.44
1800	548.64	86.17	86.12	86.23	86.21	86.33	86.32
1820	554.74	87.14	87.10	87.20	87.18	87.31	87.29
1900	579.12	91.04	91.00	91.10	91.08	91.21	91.19
2000	609.60	95.92	95.87	95.98	95.96	96.09	96.07
2100	640.08	100.80	100.75	100.86	100.84	100.96	100.95
2200	670.56	105.67	105.63	105.73	105.71	105.84	105.82
2300	701.04	110.55	110.50	110.61	110.59	110.72	110.70
2400	731.52	115.43	115.38	115.49	115.47	115.59	115.58
2450	746.76	117.86	117.82	117.93	117.90	118.03	118.02
2500	762.00	120.30	120.26	120.36	120.34	120.47	120.45
2550	777.24	122.74	122.70	122.80	122.78	122.91	122.89
2600	792.48	125.18	125.13	125.24	125.22	125.35	125.33

Distance between stacks:

54.00 m

PPEC Plume Velocity Two Stack Merged Exit Velocity, m/s)

AGL	Height above stacktop (m)	Cold Base	Cold Low	Average Base	Average Low	Hot Base	Hot Low		No. of stacks
300	91.44	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge		2
400	121.92	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge		2
500	152.40	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge		2
600	182.88	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge		2
700	213.36	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge		2
800	243.84	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	0	2
900	274.32	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	0	2
1000	304.80	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	0	2
1100	335.28	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	Not Merge	0	2
1200	365.76	4.87	4.37	4.95	4.32	4.68	4.18	4.95	2
1300	396.24	4.73	4.25	4.82	4.20	4.55	4.07	4.816	2
1400	426.72	4.61	4.14	4.69	4.10	4.44	3.97	4.695	2
1500	457.20	4.51	4.05	4.58	4.00	4.34	3.88	4.585	2
1600	487.68	4.41	3.96	4.48	3.92	4.24	3.79	4.485	2
1700	518.16	4.32	3.88	4.39	3.84	4.16	3.71	4.393	2
1800	548.64	4.24	3.80	4.31	3.76	4.08	3.64	4.308	2
1820	554.74	4.22	3.79	4.29	3.75	4.06	3.63	4.292	2
1900	579.12	4.16	3.73	4.23	3.69	4.00	3.58	4.229	2
2000	609.60	4.09	3.67	4.16	3.63	3.93	3.51	4.156	2
2100	640.08	4.02	3.61	4.09	3.57	3.87	3.46	4.088	2
2200	670.56	3.96	3.55	4.02	3.51	3.81	3.40	4.024	2
2300	701.04	3.90	3.50	3.96	3.46	3.75	3.35	3.964	2
2400	731.52	3.84	3.45	3.91	3.41	3.70	3.30	3.907	2
2450	746.76	3.81	3.43	3.88	3.39	3.67	3.28	3.88	2
2500	762.00	3.79	3.40	3.85	3.37	3.65	3.26	3.854	2
2550	777.24	3.76	3.38	3.83	3.34	3.62	3.24	3.828	2
2600	792.48	3.74	3.36	3.80	3.32	3.60	3.22	3.803	2

APPENDIX C
LIST OF PROPERTY OWNERS
WITHIN 1,000 FEET OF PROJECT SITE

Pio Pico Energy Center
List of Property Owner's Within 1,000 Feet of Project Site

APN	OWNER NAME		OWNER ADDRESS			Detail
64804011	INTERNATIONAL INDUSTRIAL PARK INC		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804013	LEE SOON WOO & YUEN LING FAMILY TRUST 01-14-91		2760 E 4TH ST #515	NATIONAL CITY CA	91950	Within 1,000 feet of Site
64804023	RANCHO VISTA DEL MAR		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804026	STATE OF CALIFORNIA	PUBLIC AGENCY			00000	Within 1,000 feet of Site
64804035	O M C PROPERTIES L L C		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804038	O M C PROPERTIES L L C	C/O CALPINE CORP	ATTN:PROPERTY TAX	717 TEXAS ST #1000	77002	Within 1,000 feet of Site
64804045	ALTA PARCELS L P		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804046	ALTA PARCELS L P		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804047	CALPINE CORP	CALIFORNIA STATE ASSESSED			00000	Within 1,000 feet of Site
64804048	ALTA PARCELS L P		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804049	INTERNATIONAL INDUSTRIAL PARK INC		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804051	INTERNATIONAL INDUSTRIAL PARK INC		5440 MOREHOUSE DR #4000	SAN DIEGO CA	92121	Within 1,000 feet of Site
64804056	C C A WESTERN PROPERTIES INC	ATTN: CLINTON JAGGER	10 BURTON HILLS BLVD	NASHVILLE TN	37215	Within 1,000 feet of Site