DOCKETED

Docket Number:	07-AFC-06C
Project Title:	Carlsbad Energy Center - Compliance
TN #:	202287-3
Document Title:	PT 2 Petition to Amend Carlsbad Energy Center
Description:	List of Property Owners Appendix 2A - Appendix 5.11A
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Organization:	Locke Lord, LLP
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Due to size this document has been separated into two parts. This is Part 2 which begins with:

7.0 List of Property Owners

Through

Appendix 5.11A Soil Loss Calculations

SECTION 7.0

List of Property Owners

Consistent with the CEC Siting Regulations Section 1769(a)(1)(H), a list of property owners within 1,000 feet of the Cabrillo Parcel has been provided to the CEC under separate cover. The Project Owner has provided this list under separate cover to preserve the privacy of this information.

SECTION 8.0

Potential Effects on Property Owners

This section addresses potential effects of the changes proposed in this Petition to Amend on nearby property owners, the public, and parties in the application proceeding, pursuant to CEC Siting Regulations (Title 20, CCR, Section 1769 [a][1][I]).

The Amended CECP will result in positive visual changes through the reduction and elimination of existing large-scale power facilities, as well as substantial environmental benefits due to permanent air emission reductions, elimination of the use of seawater cooling resulting in a decrease in impingement and entrainment of marine organisms, and cessation of discharge of wastewaters to the Pacific Ocean. Therefore, impacts to property owners are expected to be lower for the Amended CECP than those of the Licensed CECP. No effect on property owners beyond what was originally approved by the CEC will occur.

The above-grade removal and demolition of the EPS may have temporary visual and audible impacts on property owners adjacent to the Cabrillo Parcel, beyond those analyzed for the Licensed CECP. However, the EPS is located within an industrial zone, the removal and demolition activities are temporary conditions, and temporary impacts will be mitigated to the extent feasible. Therefore, there will be no permanent adverse effect on adjacent property owner due to the Amended CECP, including the demolition of the EPS.

Appendix 2A
City Agreement

EXHIBIT 1

RESOLUTION NO. 2014-010

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CARLSBAD, CALIFORNIA, APPROVING AN AGREEMENT BETWEEN AND AMONG THE CITY OF CARLSBAD (CITY) AND THE CARLSBAD MUNICIPAL WATER DISTRICT (CMWD), CABRILLO POWER I LLC AND CARLSBAD ENERGY CENTER LLC (COLLECTIVELY, NRG), AND SAN DIEGO GAS & ELECTRIC (SDG&E), ADDRESSING CITY AND CMWD SUPPORT FOR A CHANGE IN THE PROPOSED TECHNOLOGY OF THE APPROVED CARLSBAD ENERGY CENTER PROJECT (CECP) PLANT AND THE SUBMITTAL OF A PETITION TO AMEND (PTA) APPLICATION TO THE CALIFORNIA ENERGY COMMISSION (CEC) FOR APPROVAL OF THIS TECHNOLOGY CHANGE, CONDITIONED UPON THE DECOMMISSIONING, DEMOLITION, REMOVAL AND REMEDIATION OF THE CURRENT ENCINA POWER STATION (EPS) SITE, AS WELL AS OTHER CHANGES IN CECP PLANT DESIGN, ENERGY INFRASTRUCTURE AND PROPERTY CONSIDERATIONS BENEFICIAL TO THE RESIDENTS OF CARLSBAD

WHEREAS, in May of 2012, the California Energy Commission approved NRG's application for certification of the Carlsbad Energy Center Project (CECP). That approval was for a 558 Megawatt combined cycle power plant located east of the existing Encina Power Station (EPS), between the railroad tracks and Interstate 5. As a part of that approval, 3 of the 5 boiler units at the existing EPS would be decommissioned, with the remaining 2 boiler units continuing to operate. Consequently, the decommissioning of the entire plant (all 5 units) and the demolition and removal of the existing EPS structures would not occur until an unspecified and uncertain future date. The CECP is now fully permitted and could proceed to construction and operation; and

WHEREAS, the City participated as an intervenor in the proceedings before the California Energy Commission (CEC) concerning the application for certification of the CECP and vigorously opposed the approval of said application; and

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WHEREAS, during the pendency of said proceedings, the City took certain legislative actions concerning the construction of a new power plant in the Coastal Zone; and

WHEREAS, the CEC acknowledged that the CECP would be inconsistent with said legislative actions, including the City's General Plan and related land use ordinances, regulations and standards, but overrode said inconsistencies and approved the application for certification on the grounds that the CECP was required for public convenience and necessity and there were not more prudent and feasible means of achieving public convenience and necessity; and

WHEREAS, since October of 2012, the energy supply environment in Southern California has dramatically changed. The San Onofre Nuclear Generation Station (SONGS) ceased operation in January 2012. In June 2013, SDG&E and Southern California Edison determined they would not recommence power generation at SONGS. The closure of SONGS has caused an increased and accelerated need for power generation facilities in Southern California. The California Independent System Operator (CAISO) has determined that additional power generation capacity is currently needed in the San Diego Region by 2018; and

WHEREAS given the CAISO determination, SDG&E is interested in entering into a Power Purchase Agreement (PPA) with NRG, but only if NRG is willing to change the proposed technology of the approved CECP from a "combined-cycle configuration" plant to a "peaker configuration" plant and submit a Petition to Amend (PTA) application to the CEC for approval of this technology change. NRG is interested in submitting a PTA application, but only if the City would be supportive of such an application; and

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WHEREAS on December 3, 2013, the City Council adopted Resolution No. 2013-288 directing "staff to negotiate with SDG&E and NRG in an attempt to reach a mutually beneficial agreement acceptable to all three parties, supporting a change in the proposed CECP technology conditioned upon the decommissioning, demolition, and remediation of the current Encina Power Station site, as well as other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad"; and

WHEREAS, staff negotiated based on NRG's intention to submit a PTA application to the CEC for an amendment to the existing approval of the CECP which would provide for a redesigned electrical generating facility that would have a smaller environmental footprint, lower profile and lower stack heights utilizing a "peaker configuration" and would facilitate retirement and removal of the existing Encina Power Station; and

WHEREAS, the three parties reached an agreement on certain non-binding terms and entered into a Memorandum of Understanding (MOU), dated December 20, 2013. The MOU clarified the intentions and obligations of the three parties with respect to the negotiation of a formal, binding Agreement and set forth the terms that would be included in an Agreement; and

WHEREAS, City staff, CMWD staff, NRG and SDG&E have drafted an Agreement incorporating the terms from the MOU; and

WHEREAS, the Agreement will provide significant benefits to the City of Carlsbad as well as increasing energy supplies to the region. Some of those benefits include:

- NRG will amend its CECP project, proposing a plant that is more environmentally friendly, lower profile, utilizing "peaker configuration" technology, with the amount of power generation and hours of operation capped.

- NRG will immediately begin the process to completely shut down and demolish the Encina Power Station structures at no cost to taxpayers and begin the process to remediate and redevelop the site.
- SDG&E will pursue the relocation its operations yard ("North Coast Service Center") at NRG's expense and transfer ownership of the service center property (along with the Cannon Park site) from SDG&E to the City, freeing up the service center land for more appropriate uses. If it is not possible to relocate the service center, NRG will pay the city $10 million.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Carlsbad, California, as follows that:

1. The above recitations are true and correct.

2. That it is in the best interests of the City of Carlsbad to enter into the attached agreement (Exhibit A) with the Carlsbad Municipal Water District, Cabrillo Power I LLC, Carlsbad Energy Center LLC, and San Diego Gas & Electric.

3. That the Mayor is authorized to execute the attached agreement with the Carlsbad Municipal Water District, Cabrillo Power I LLC, Carlsbad Energy Center LLC, and San Diego Gas & Electric.

4. That City staff shall review the City's prior legislative actions concerning the CECP and shall recommend such changes, if any, as may be necessary to reflect the changed circumstances, reduced environmental profile and significant community benefits associated with the amendment.

5. That the Administrative Services Director is authorized to appropriate $200,000 from the General Fund to be utilized in the city's efforts in regards to the CECP and the implementation of the Agreement.

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PASSED, APPROVED AND ADOPTED at a Joint Special Meeting of the Carlsbad City Council and Carlsbad Municipal Water District Board of Directors, held on the 14th day of January 2014, by the following vote:

AYES: Council Members Packard, Wood, Blackburn.

NOES: None.

ABSENT: Council Members Hall, Douglas.

Mark Packard

MARK PACKARD, Mayor Pro Tem

ATTEST:

Barbara Engleson

BARBARA ENGLESON, City Clerk

(SEAL)

SETTLEMENT AGREEMENT

DATED AS OF JANUARY 14, 2014

BETWEEN AND AMONG

THE CITY OF CARLSBAD,

CARLSBAD MUNICIPAL WATER DISTRICT,

CABRILLO POWER I LLC,

CARLSBAD ENERGY CENTER LLC

AND

SAN DIEGO GAS & ELECTRIC COMPANY

LIST OF EXHIBITS

SETTLEMENT AGREEMENT

THIS SETTLEMENT AGREEMENT (this "Agreement") is entered into as of January 14, 2014, by and among the City of Carlsbad, a charter city, located in San Diego County (the "City"), and Carlsbad Municipal Water District ("CMWD"), Cabrillo Power I LLC and Carlsbad Energy Center LLC (collectively, "NRG"), and San Diego Gas & Electric Company ("SDG&E"). The City, NRG and SDG&E are sometimes referred to in this Agreement collectively as the "Parties" and individually as a "Party", except that SDG&E is a Party solely for purposes of Article 5 and Article 12. Unless otherwise defined in this Agreement, initially capitalized terms used in this Agreement shall have the meaning given them in Article 1 below.

The Parties are entering into this Agreement to resolve long-standing disputes between the City and NRG regarding the Carlsbad Energy Center Project ("CECP" or the "Project"), and to provide for the redevelopment of the site of the Encina Power Station. This Agreement, if and when it becomes effective according to its terms, provides for, among other things: (i) the retirement, decommissioning, demolition and removal of the Encina Power Station, (ii) the remediation and redevelopment of the Encina Redevelopment Site (as defined below), (iii) the permitting, construction and development of the CECP, (iv) the relocation and construction of the New Service Center (as defined below), and (v) other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.

RECITALS

THIS AGREEMENT is made with reference to the following facts and circumstances:

A. **WHEREAS**, NRG owns real property located in the City, in the County of San Diego, California, bounded generally by Cannon Road to the south, Interstate 5 to the east, the Agua Hedionda Lagoon to the north, and Carlsbad Boulevard to the west (the "Encina Site"). A legal description of the Encina Site is attached to this Agreement as Exhibit A, and a map of the Encina Site is attached as Exhibit B, provided that in the event of any inconsistency between the map and the legal description, the legal description shall control. Also attached, as Exhibit C, is a map of the area in which the Encina Site is located;

B. **WHEREAS**, at the Encina Site, NRG operates facilities known as Units 1-5 (individually a "Unit" and collectively the "Units," the "Encina Power Station" or the "Station") for the purpose of generating and selling electric power. The Encina Power Station is currently subject to a Resource Adequacy Agreement ("RA Agreement") and a Participating Generator Agreement ("Participating Generator Agreement") with the California Independent System Operator ("ISO");

C. **WHEREAS,** NRG filed an application for the construction and development of the CECP with the California Energy Commission (the "Commission") on or about September 2007 (Docket No. 07-AFC-06) (the "Application");

D. **WHEREAS**, the City conditionally opposed this Application;

E. **WHEREAS**, from 2007 through 2012 the Commission processed this Application and, in May of 2012, issued its Order (Order No. 12-0531-06) and Decision approving the construction and development of the Project subject to the conditions stated therein;

F. **WHEREAS**, the San Onofre Nuclear Generation Station ("SONGS") ceased operation January 2012 and in June 2013 Southern California Edison determined that they would not recommence power generation at SONGS;

G. **WHEREAS**, the early closure of SONGS has caused an increased and accelerated need for power generation facilities in Southern California, and the ISO has determined that additional generating capacity is currently needed in the San Diego region;

H. **WHEREAS**, NRG and SDG&E have represented to the City that they are interested in entering into a tolling or power purchase agreement ("Proposed PPA") for the Project but only if (i) SDG&E and NRG are able to come to mutually acceptable terms on the Proposed PPA and (ii) NRG amends its permits for the Project to allow a change in proposed technology ("Amendment"), and NRG has represented that it would amend its permits only if the City would be supportive of such an Amendment;

I. **WHEREAS**, the Amendment would request approval of a redesigned electrical generating facility that would have a smaller environmental footprint, lower profile, and lower stack heights, and would facilitate the retirement and removal of the Encina Power Station;

J. **WHEREAS**, on December 3, 2013, the City adopted a resolution that provides:

> "That the City Council does hereby direct staff to negotiate with SDG&E and NRG in an attempt to reach a mutually beneficial agreement acceptable to all three parties, supporting a change in the proposed CECP technology conditioned upon the decommissioning, demolition, and remediation of the current Encina Power Station site, as well as other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.";

K. **WHEREAS**, the City, NRG and SDG&E contemplate that SDG&E will relocate its North Coast Service Center provided that the cost of the proposed relocation and construction of the New Service Center be done in a manner which is cost-neutral to SDG&E and its ratepayers; and

L. **WHEREAS**, the Parties now wish to fully and finally resolve disputes involving the CECP and the Encina Power Station, by providing for, among other things: (i) the retirement, decommissioning, demolition, and removal of the Encina Power Station, (ii) the remediation and redevelopment of the Encina Redevelopment Site (as defined below), (iii) the provisions of the Amendment and the construction and development of the CECP, (iv) the relocation and construction of the New Service Center, and (v) other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.

AGREEMENT

ACCORDINGLY, to settle long-standing disputes and in consideration of the mutual covenants and agreements in this Agreement and for other good and valuable consideration, the receipt and adequacy of which are acknowledged, the Parties agree to the following terms and conditions:

ARTICLE 1

DEFINITIONS

1.1 Definitions

(a) "Affiliate" means, with respect to a Person, any Person that directly or indirectly Controls, is Controlled by or is under Common Control with that Person.

(b) "Agreement" shall have the meaning set forth in the opening paragraph of this Agreement.

(c) "Amendment" shall have the meaning set forth in Recital H and set forth in Exhibit G.

(d) "Application" shall have the meaning set forth in Recital C.

(e) "Assumption of Obligations" shall mean the agreement in recordable form attached as Exhibit F.

(f) "Attorneys' Fees and Costs" means any and all reasonable attorneys' fees, costs, expenses and disbursements, including, but not limited to, expert witness fees and costs, travel time and associated costs, transcript preparation fees and costs, document copying, exhibit preparation, courier, postage, facsimile, long-distance and communications expenses, court costs and the costs and fees associated with any other legal, administrative or alternative dispute resolution proceeding, fees and costs associated with execution upon any judgment or order, and costs on appeal.

(g) "CEQA" means the California Environmental Quality Act.

(h) "CECP" shall have the meaning set forth in the second opening paragraph of this Agreement.

(i) "CECP Site" shall mean the approximately 30 acre site on which the newly constructed CECP will be situated and which is identified in the map attached as Exhibit T.

(j) "City" shall have the meaning set forth in the opening paragraph of this Agreement.

(k) "City Support Letter" shall have the meaning set forth in Section 3.4(b)(i).

(l) "CMWD" shall have the meaning set forth in the opening paragraph of this Agreement.

(m) "Commission" shall have the meaning set forth Recital C.

(n) "Control" means the power to direct the affairs or management of another Person, whether by contract, operation of law or otherwise. "Controlled by" and "Controlling" have correlative meanings. "Common Control" means that two Persons are both Controlled by the same other Person.

(o) "DOE" mean the United States Department of Energy.

(p) "Effective Date" shall have the meaning set forth in Section 2.3(b).

(q) "Electric Reliability Removal Conditions" means, for one or more Units of the Station, that:

(i) NRG has not received an order or determination from a federal, state or local governmental agency or authority, including, but not limited to, the ISO, with jurisdiction requiring NRG to continue operating a Unit or Units at the Station or finding that a Unit or Units are necessary for reliability, thereby preventing the shutdown of one or more Units; and

(ii) NRG has obtained any necessary approvals for the Shutdown, including from the ISO, the California State Water Resources Control Board, and the San Diego County Air Pollution Control District.

(r) "Encina Power Station" shall have the meaning set forth in Recital B.

(s) "Encina Redevelopment Site" shall mean the area comprising the Encina Site, excluding, however, the CECP Site. The Encina Redevelopment Site will be subject to future redevelopment and a map of the area is identified on Exhibit S.

(t) "Encina Site" shall mean the entire approximately 95 acre site currently occupied by the Encina Power Station, exclusive of the SDG&E switchyard, and which is identified on Exhibits A, B, and C.

(u) "EPC Contract Notice to Proceed" shall have the meaning set forth in Section 5.4(b).

(v) "Event of Default" shall have the meaning set forth in Article 7.

(w) "Excluded Transfer" shall mean:

(i) any Transfer to an Affiliate of NRG, provided that NRG Energy, Inc. continues to guarantee performance of NRG's obligations under the Guaranty;

(ii) any Transfer of an easement or license over a portion of the Site, that would not allow the Transferee to use that portion of the Site to generate electricity with equipment or machinery that is powered by the combustion of fossil fuels and which would not otherwise interfere with NRG's ability to perform its obligations under this Agreement;

(iii) After demolition and removal of above-ground structures in satisfaction of Section 6.1, any Transfer of an interest, in addition to an easement or license, over a portion of the Site, provided that such Transfer would not allow the Transferee to use that portion of the Site to generate electricity with equipment or machinery that is powered by the combustion of fossil fuels and which would not otherwise interfere with NRG's ability to perform its obligations under this Agreement; and

(iv) any condemnation or exercise of eminent domain authority, whether whole or partial, by a governmental authority or other entity with statutory authority under state law to exercise eminent domain authority.

(x) "Existing Deed of Trust" means any deed of trust securing the Existing Secured Loan and encumbering the site.

(y) "Existing Secured Loan" means the term loan and revolving credit facility under the credit agreement, dated as of July 1, 2011 as amended or modified from time to time, among NRG Energy, Inc., as borrower, the several banks and other financial institutions or entities from time to time parties to the credit agreement, Morgan Stanley Senior Funding, Inc. as syndication agents, and CitiCorp North America, as administrative agent and collateral agent, which loan is secured by the Existing Deed of Trust.

(z) "Existing Secured Loan Parties" means the several banks and other financial institutions or entities that are from time to time parties to the existing secured loan, Morgan Stanley Senior Funding, Inc., as syndication agents, and Morgan Stanley Senior Funding, Inc., as administrative agent and collateral agent, and any of their successors and assigns, including any person receiving an interest in the site or the member interests of NRG from any of the foregoing as a result of their exercise of any of their rights or remedies under the Existing Secured Loan.

(aa) "Feasibility Studies" shall have the meaning set forth in Section 5.3(a).

(bb) "FERC" means the Federal Energy Regulatory Commission or any successor.

(cc) "Final Shutdown Date" means the earlier of (a) midnight of December 31, 2017 or (b) the commercial operation date of CECP (as such term is defined under the facility's PPA).

(dd) "Fossil Fuel Restriction" shall have the meaning set forth in Section 3.5.

(ee) "Guaranty" shall have the meaning set forth in Section 2.5.

(ff) "Indemnified Parties" means the City (including, but not limited to, all of its respective boards, commissions, departments, agencies and other subdivisions), all Agents of the City, and their respective heirs, legal representatives, successors and assigns, and each of them.

(gg) "Indemnify" means indemnify, protect, defend and hold harmless.

(hh) "Independent Guaranty Amount" shall have the meaning set forth in Section 2.5(a).

(ii) "IODs" shall have the meaning set forth in Section 2.4(b).

(jj) "ISO" shall have the meaning set forth in Recital B.

(kk) "ISO Tariff" shall mean the tariff of the ISO, as it may be amended, supplemented, or replaced (in whole or in part) from time to time.

(ll) "Laws" shall mean all present and future applicable laws, ordinances, rules, regulations, permits, authorizations, orders and requirements, whether or not in the contemplation of the Parties, that may affect or be applicable to the Encina Site or any part of the Encina Site (including, without limitation, any subsurface area), or the use of the Encina Site and the buildings and improvements on or affixed to the Encina Site, including, without limitation, all consents or approvals required to be obtained from, and all rules and regulations of, and all building and zoning laws of, all federal, state, county and municipal governments, and their departments, bureaus, agencies or commissions, authorities, board of officers, or any other body or bodies exercising similar functions, having or acquiring jurisdiction of the Encina Site, and similarly the term "Law" shall be construed to mean the same as the above in the singular as well as the plural.

(mm) "Loss" or "Losses" when used with reference to any indemnity means any and all claims, demands, losses, liabilities, damages (including foreseeable and unforeseeable consequential damages to the extent arising from third party claims), liens, obligations, interest, injuries, penalties, fines, lawsuits and other proceedings, judgments and awards and costs and expenses (including, without limitation, reasonable Attorneys' Fees and Costs, and consultants' fees and costs) of whatever kind or nature, known or unknown, contingent or otherwise.

(nn) "Memorandum of Agreement" shall have the meaning set forth in Section 2.2(a) of this Agreement.

(oo) "New Service Center" shall refer to the new service center to be constructed in connection with the North Coast Service Center as set forth in Section 5.1(b).

(pp) "New Service Center Location" shall have the meaning as set forth in Section 5.2(a).

(qq) "North Coast Service Center" shall refer to the existing facility that is owned by SDG&E and that is located at the current North Coast Service Center Site.

(rr) "North Coast Service Center Site" shall refer to the current location of the North Coast Service Center located at the corner of Cannon Road and Carlsbad Boulevard. A legal description of the current property is attached hereto as Exhibit J, a map of the current property is attached hereto as Exhibit K.

(ss) "North Coast Service Center Redevelopment Site" shall mean the area comprised of the North Coast Service Center Site, Cannon Park, and the Agua Hedionda North Shore Bluff Parcel.

(tt) "NRG" shall have the meaning set forth in the opening paragraph of Agreement.

(uu) "NRG Support Letter" shall have the meaning set forth in Section 3.4(a)(ii).

(vv) "NSC Cost Cap" shall have the meaning set forth in Section 5.4(a).

(ww) "NSC Costs" shall have the meaning set forth in Section 5.4(a).

(xx) "Official Records" means the official records of the City and of the County of San Diego, California.

(yy) "Party" or "Parties" shall have the meanings set forth in the opening paragraph of this Agreement.

(zz) "Person" means any individual, partnership, corporation (including, but not limited to, any business trust), limited liability company, joint stock company, trust, unincorporated association, joint venture or any other entity or association, the United States, or other federal, state or local governmental entity.

(aaa) "Petition to Amend" shall have the meaning set forth in Section 6.1.

(bbb) "Project" shall have the meaning set forth in the opening paragraph of this Agreement.

(ccc) "Proposed PPA" shall have the meaning set forth in Recital H.

(ddd) "Prudent Utility Practices" means the practices, methods, standards and acts engaged in or approved by a significant portion of the applicable segment of the electric power generation industry pertaining to facilities of the type, similar size and location to Encina Power Station that, in light of the facts that are known, or reasonably should have been known, at the time a decision was made, would have been expected to accomplish the desired result in a manner consistent with Laws, permits, codes, standards, equipment manufacturer's recommendations, reliability, safety, environmental protection, economy, and expedition. Prudent Utility Practices are not limited to the optimum practice, method, standard or act to the exclusion of all others, but rather to those practices, methods, standards and acts generally acceptable or approved by a significant portion of the applicable segment of the electric power generation industry in the United States.

(eee) "RA Agreement" shall have the meaning set forth in Recital B.

(fff) "Relocation Guaranty Amount" shall have the meaning set forth in Section 2.5(c).

(ggg) "SDG&E" shall have the meaning set forth in the opening paragraph of this Agreement.

(hhh) "Shut Down" or "Shutdown" means the permanent and irrevocable cessation of electricity generation operations at the Encina Power Station in accordance with all applicable laws and regulations, such that the Encina Power Station may no longer be used to generate electricity or reactive power on any basis (including, but not limited to, any reliability-must-run or other intermittent or emergency basis) or emit any hazardous materials in conjunction with the operation of any electrical generation facilities comprising the Encina Power Station. For purposes of this Agreement, "Shutdown" does not include any significant hazardous materials remediation activities on the Site.

(iii) "Shut Down Guaranty Amount" shall have the meaning set forth in Section 2.5(b).

(jjj) "Shutdown Obligation" means the obligation of NRG to Shut Down the Encina Power Station set forth in Section 3.1(a)(ii).

(kkk) "SONGS" shall have the meaning set forth in Recital F.

(lll) "Station" shall have the meaning set forth in Recital B.

(mmm) "Term" shall have the meaning set forth in Section 2.1.

(nnn) "Termination Notice" shall have the meaning set forth in Section 5.6(a).

(ooo) "Transfer" means sell, convey, assign, transfer, alienate or otherwise dispose of (directly or indirectly, by one or more transactions, and by operation of law or otherwise) (i) all or any material part of the ownership interest or rights in any portion of the Encina Site and/or this Agreement, or (ii) all or a Controlling portion of the member interests in NRG.

Notwithstanding the generality of the foregoing, however, "Transfer" shall exclude (i) an Excluded Transfer and (ii) any encumbrance executed in connection with a financing undertaken by NRG for CECP.

(ppp) "Transferee" means a Person to whom a Transfer is made.

(qqq) "Unit" or "Units" shall have the meaning set forth in Recital B.

ARTICLE 2

GENERAL TERMS

2.1 Term of Agreement

The term of this Agreement (the "Term") shall commence on the Effective Date (as defined in Section 2.3(b)) and shall remain in effect until the Parties have fulfilled all of their obligations under this Agreement, unless terminated earlier in writing in accordance with the terms and conditions of this Agreement.

2.2 Covenants Running with the Land

(a) Recordation of Memorandum of Agreement. The City and NRG agree to execute, acknowledge, and cause a memorandum of this Agreement substantially in the form attached to this Agreement as Exhibit H (the "Memorandum of Agreement") to be recorded in the Official Records as soon as possible following the Effective Date in accordance with California Civil Code Section 1468.

(b) Binding on Successors. Upon recordation of the Memorandum of Agreement as provided in Section 2.2(a) above, this Agreement shall constitute covenants running with the Encina Site binding on all successors and assigns of NRG; provided, however, this Agreement, including the covenants on the part of NRG, shall not be binding on the Existing Secured Loan Parties or any of their successors or assigns.

(c) Termination of Agreement. Upon any termination of this Agreement, the City shall, at NRG's written request, execute a notice of termination of the Agreement to be recorded in the Official Records, and this obligation of the City shall survive any such termination of this Agreement.

2.3 Agreement Approvals and Effective Date

(a) NRG Approval. NRG has obtained all required approvals for it to enter into this Agreement.

(b) City Approval. Once NRG has signed and delivered this Agreement to the City, the City shall timely submit this Agreement to the City Council for approval. Notwithstanding anything in this Agreement to the contrary, NRG understands and agrees that no officer or employee of the City has authority to bind the City to this Agreement unless and until the City Council shall have duly adopted a resolution in its sole and absolute discretion approving this Agreement. Therefore, any obligations of the Parties under this Agreement are contingent upon such approval, and this Agreement shall not be effective unless and until such approvals are obtained in accordance with the City's applicable ordinances and codes. If a City Council resolution approving this Agreement becomes effective, then the effective date of this Agreement (the "Effective Date") shall be the same date that such resolution becomes effective. Notwithstanding the foregoing, if a resolution approving this Agreement does not become effective by January 31, 2014, then this Agreement shall terminate and shall be of no force and effect unless the City acting through the City Attorney, and NRG, in their respective sole discretion, agree in writing to extend such date and such a resolution is duly enacted and becomes effective on or before such extended date.

(c) SDG&E Approval. SDG&E may be required to obtain certain regulatory approvals in connection with its obligations under Article 5 of this Agreement, including from the California Public Utilities Commission. To the extent such approvals are required, SDG&E will use reasonable efforts to obtain all such required approvals as soon as commercially practicable. The Parties agree that SDG&E's obligations under this Agreement are contingent on such approvals, if any.

2.4 Improvements

(a) Easements. The City will provide a project description to NRG regarding easements for the Agua Hedionda Lift Station and the Vista-Carlsbad Interceptor Sewer Pipeline that coordinates with the Poseidon easement. NRG shall submit an application to the Commission within 60 days after receipt of project description and NRG will execute easements within 10 days of Commission approval.

(b) PDP Land Transfers. Within 90 days of the Effective Date, NRG agrees to grant Irrevocable Offers of Dedications ("IODs") for the Hubbs Site Parcel, Bluff Area Parcel, South Power Plant Parcel, and Fishing Beach Parcel, as described in Planning Commission Resolution 6632, subject to reasonable restrictions and reservations necessary to ensure public safety and the continuity of power plant operations.

2.5 Guaranty

(a) Independent Guaranty. NRG agrees to deliver to the City a Guaranty from NRG Energy, Inc. in the form of Exhibit R and in the amount of five million dollars ($5,000,000) (the "Independent Guaranty Amount") within ten (10) business days from the Effective Date. The City shall release this amount once all obligations under this Agreement have been satisfied to the City's satisfaction; provided, however, that if the Commission does not issue a final decision approving the Amendment and NRG notifies the City in writing that it is ending further development of the CECP, and provided further that NRG does not have any outstanding liabilities or obligations to the City under this Agreement, the City's consent to such request to reduce this amount will not be unreasonably withheld.

(b) Shut Down Obligation. Within ten (10) business days after the Final Shut Down Date, NRG will increase the amount of the Guaranty by twenty million dollars ($20,000,000) (the "Shut Down Guaranty Amount"), bringing the total amount of the Guaranty to twenty five million dollars ($25,000,000). Upon NRG's request, the City shall release the Shut Down Guaranty Amount following NRG's satisfaction of all obligations under Section 6.1. Following NRG's commencement of demolition and removal of above ground structures, and provided that NRG does not have any outstanding liabilities or obligations to the City under this Agreement at such time, NRG may request, and the City will reasonably consider, a proportionate reduction in the Shut Down Guaranty Amount upon the completion of certain key milestones, with such milestones and reductions to be established by NRG and the City at such time.

(c) Relocation of North Coast Service Center. Within ten (10) business days after the EPC Contract Notice to Proceed is issued, NRG will increase the amount of the Guaranty by an additional amount of twenty two million five hundred thousand ($22,500,000) (the "Relocation Guaranty Amount") for a total Guaranty amount of forty seven million and five hundred thousand dollars ($47,500,000). If the credit rating for Carlsbad Energy Center is equal to or exceeds NRG Energy, Inc.'s credit rating as of the Effective Date, with the consent of the City, which shall not be unreasonably withheld, NRG may elect to substitute a Guaranty from Carlsbad Energy Center LLC for the Relocation Guaranty Amount. Upon NRG's request, the City shall release the Relocation Guaranty Amount following NRG's satisfaction of all obligations under Article 5. At NRG's request, the City will reduce the Relocation Guaranty

Amount in proportion to NRG's payments made in accordance with Article 5; provided, that if NRG makes the ten million dollar ($10,000,000) payment under Section 5.6(b) following issuance of the Termination Notice, the City shall release the entire Relocation Guaranty Amount.

ARTICLE 3

POWER STATION SHUTDOWN PROCESS

3.1 Agreement to Permanently Shut Down the Encina Power Station

(a) Shutdown Obligation.

(i) Within thirty (30) days of the Effective Date, NRG shall initiate measures to Shut Down Units 1-5 of the Encina Power Station. Such measures shall include, but not be limited to, amending the compliance plan for the Encina Power Station in connection with the State Water Resource Control Board's regulation addressing the use of once-through cooling by coastal power plants.

(ii) Subject to the Electric Reliability Removal Conditions and provided that (x) the California Public Utilities Commission has issued a final decision approving a power purchase agreement for CECP and (y) the Commission has issued a final decision approving the Amendment, NRG agrees to Shut Down the Encina Power Station no later than the Final Shutdown Date (the "Shutdown Obligation"). Notwithstanding the foregoing, if NRG issues a final notice to proceed with construction of CECP without having received California Public Utilities Commission approval, such condition shall be deemed satisfied.

(iii) Subject to the provisions of Section 3.3, NRG will diligently apply for and exercise its best efforts to obtain any regulatory approvals and permits needed to Shut Down Units 1-5 and to ensure that the Electric Reliability Removal Conditions are satisfied as soon as reasonably possible. NRG will not, directly or indirectly, request that any regulatory agency with jurisdiction over the Shut Down of the Encina Power Station deny or delay the approvals needed for the Shut Down. Further, NRG will take no action which is cause for the regulatory agency to deny or delay any approvals or other matters needed to satisfy the Electric Reliability Removal Conditions.

(iv) The Electric Reliability Removal Conditions are solely for the benefit of NRG. If some, but not all, of the Electric Reliability Removal Conditions are not satisfied for reasons other than an Event of Default by NRG or NRG's failure to timely obtain a needed approval for the Shut Down, then NRG, in its sole and absolute discretion, may upon not less than ten (10) days' written notice to the City describing in reasonable detail the unsatisfied condition(s) either: (x) suspend performance of its obligation to Shut Down the applicable Unit or the Encina Power Station only until such condition is satisfied, or (y) waive the satisfaction of such conditions as NRG may set forth in its sole and absolute discretion in a written notice to the City.

(v) Notwithstanding anything in this Agreement to the contrary, if the United States Department of Energy ("DOE"), ISO or other entity having jurisdiction over NRG or the Encina Power Station orders or decrees it necessary for any Unit or Units to continue to operate past the Final Shutdown Date, then NRG shall be permitted to operate the applicable Unit or Units in accordance with such order or decree. Nothing in this subsection (v) shall relieve either Party from its support obligations under Section 3.4 or prevent either Party from challenging the effectiveness or legality of such order, provided, however, each Party shall provide the other Party copies of any such order and any legal challenges to such order. In the event NRG receives an order under this Section 3.1(a)(v), NRG and City shall comply with Section 3.4 until such time as the Unit or Units is/are released from such order.

(vi) Notwithstanding any provision in this Agreement to the contrary, in the event that CECP becomes commercially operable and the Encina Power Station continues to operate, NRG will pay the City (on a monthly basis), a liquidated damages payment equal to $1/kW-mo. multiplied by the greater of (a) the generating capacity of the Unit or Units (in MW) remaining online past the Final Shutdown Date or (b) 300 MW. If the Shutdown occurs during a portion of a calendar month, then the monthly payment shall be pro-rated based on the number of days during which the Unit or Units were operational and the number of days in that calendar month. Such liquidated damages shall continue until the Shutdown of the Encina Power Station.

(b) Accelerated Shutdown. Nothing in this Agreement shall prohibit NRG from an accelerated Shutdown of a Unit or Units, whereby the Shutdown would occur in advance of the Final Shutdown Date.

(c) Post-Shutdown Activities. Within ninety (90) days of the Shutdown of the Encina Power Station, NRG (i) shall ensure that the Encina Power Station facilities and improvements are in a secure, inoperable condition and do not pose a physical or environmental safety hazard to members of the public or visitors of the Encina Site, consistent with Prudent Utility Practices and all applicable regulatory requirements and approvals; (ii) shall seek to terminate applicable permits and registrations that are no longer needed after the Shutdown of the Encina Power Station, (iii) shall request termination of the ISO Participating Generator Agreement and FERC market-based rate tariff as applicable to the Encina Power Station, and (iv) shall take appropriate actions in support of those requests, consistent with all applicable legal requirements.

3.2 Notices Regarding Electric Reliability Removal Conditions

NRG shall promptly provide the City with copies of any and all notices, correspondence or other documents to or from the ISO, FERC or other agency relating to the Electric Reliability Removal Conditions; provided, however, that failure to provide copies of such notices shall not constitute an event of default under Section 7.1.

3.3 Limitation on Future Contracts; No Actions to Prolong Need for Encina Power Station

With the exception of any contractual arrangements required to be entered into in connection with Electric Reliability Removal Conditions, NRG represents, warrants and covenants that its obligation to Shut Down the Encina Power Station under this Agreement shall not be limited by any existing contracts it has or may in the future have to operate any or all of the Units on the Encina Site. NRG further agrees not to take any actions that may prolong the need for the Encina Power Station to continue operating for electric reliability or any other purposes inconsistent with the terms and conditions of this Agreement; the City nonetheless acknowledges that NRG has the right, in its sole and absolute discretion so long as consistent with the terms and conditions of this Agreement, to continue to operate, maintain, repair, replace and improve the Encina Power Station, in accordance with all applicable laws, regulations, and permits, until the Final Shutdown Date; provided, however, that NRG may be required to operate, maintain and repair the Encina Power Station beyond the Final Shutdown Date if the Electric Reliability Removal Conditions have not been met.

3.4 Mutual Support for Shutdown Efforts and NRG's Regulatory Compliance Pending Shutdown

(a) NRG's Support for Shutdown Efforts.

(i) No later than fifteen (15) business days after approval of the Amendment by the Commission, NRG shall submit to the ISO a written notice of intent to retire the Encina Power Station as of Final Shutdown Date.

(ii) Within five (5) business days of the City's request, NRG shall deliver a letter (the "NRG Support Letter"), in the form attached as Exhibit D, to other governmental agencies or third parties.

(b) City's Support of NRG's Regulatory Compliance Pending Shutdown. As long as there is not an Event of Default by NRG under this Agreement, for period beginning with the Effective Date and ending on the Final Shutdown Date, the City agrees to support any and all regulatory approvals required for the continued operation of any of the Units before Shutdown, such support to consist of:

(i) within five (5) business days of NRG's request the City shall submit a letter from the City Attorney ("City Support Letter"), to the relevant governmental agency, in the form attached to this Agreement as Exhibit E, and

(ii) upon reasonable prior notice provided by NRG, the City shall participate in a reasonable number of meetings with the relevant governmental agencies, provided that the City's participation under this subsection 3.4(b)(ii) shall consist of verbally affirming City's support for the renewal or issuance of the relevant regulatory approval for the Encina Power Station, as stated in the City Support Letter.

In the event of a dispute between the Parties regarding the City's compliance with its obligations under subsections 3.4(b)(i)-(ii), and before NRG delivers any Notice of Default under Article 7 for noncompliance with these obligations, both Parties shall, upon request of either Party, meet and confer in good faith to attempt to resolve such dispute over a period of ten (10) business days. Further, NRG shall not deliver a Notice of Default under Article 7 for City's alleged non-compliance with its obligations under Sections 3.4(b)(i)-(ii) before the expiration of the ten (10) business day period following delivery to the City of written notice of such dispute.

Any other actions by the City in support of NRG's regulatory compliance pending Shutdown in addition to the actions specified under this Section 3.4(b) shall be at the sole discretion of the City. If the City decides to rescind its support on or after the Final Shutdown Date, then the City may, in its sole discretion, take such action as it deems appropriate to oppose or condition the continued operation of the Encina Power Station or any portion of the Encina Power Station, including, but not limited to, opposing the extension or renewal of any operating permits and/or the imposition by governmental regulatory authorities of air and water quality mitigation measures or other operating requirements or limitations.

3.5 Fossil Fuel Deed Restriction

NRG agrees to limit fossil fuel generation on the Encina Site to the generating capacity proposed in the current project description (e.g., six LMS100s) to be proposed in the Petition to Amend and any black start equipment potentially required by the ISO. NRG agrees that no future modifications to the CECP shall be undertaken that exceed the environmental envelope, profile or footprint of CECP as presented in the Amendment. Within ten (10) business days after the Shut Down, NRG shall record a restrictive covenant for the benefit of the City in the Official Records, in the form attached to this Agreement as Exhibit I, which provides that no portion of the Encina Site, with the exception of the CECP Site, may be used to generate electricity with equipment or machinery that is powered by the combustion of fossil fuels (except the following used on the Encina Site: ancillary equipment or machinery; back-up generators; or distributed energy sources approved by the City in a redevelopment plan), all as more particularly set forth in such exhibit (the "Fossil Fuel Restriction"). Except with respect to the Existing Secured Loan Parties as provided in Section 2.2 of this Agreement, the Fossil Fuel Restriction shall constitute covenants running with the land, binding on successors and assigns of NRG. In the event that an Existing Secured Loan Party, or its successor or assignee, takes ownership or possession of the Site and fails to assume NRG's obligations and rights under this Agreement under Section 2.2 of this Agreement, and the Agreement terminates after the Fossil Fuel Restriction has been recorded, then following any such termination the City shall, at the written request of NRG or the Existing Secured Loan Party (or its successor or assignee), execute and cause a quitclaim deed to be recorded in the Official Records evidencing the termination of the Fossil Fuel Restriction; this obligation of the City shall survive any such termination of this Agreement. Notwithstanding the foregoing, and also as provided in Section 2.2 of this Agreement, the Parties understand and agree that, in the event of a refinancing of the Existing Secured Loan that provides for full repayment, NRG shall ensure – supported by written evidence reasonably satisfactory to the City – that this Agreement, including the Fossil Fuel Restriction, has priority over the deed of trust securing the refinanced loan and, accordingly, that the Fossil Fuel Restriction shall thereafter be binding on all successors and assigns of NRG without exception.

ARTICLE 4

AMENDMENTS TO THE CECP PERMITS

4.1 City Support of CECP Permits Amendment Applications

(a) Provided that NRG is not in default under any obligations to the City under the Agreement and in substantial compliance with the provisions of the Amendment agreed to by the

City, the City agrees not to oppose permits or authorities accommodating the continued operation of the Encina Power Station through the Final Shutdown Date.

(b) The City shall support the Amendment; provided that the City has a reasonable and meaningful opportunity to review and comment on the Amendment prior to filing with the Commission to confirm that the Amendment is consistent with Exhibit G and the Amendment is filed with the Commission consistent with the provisions of Exhibit G. The City will issue the City Support letter, a form of which is set forth in Exhibit E, in connection with the Amendment and to government agencies as requested by NRG. Upon reasonable prior notice provided by NRG, the City shall also participate in a reasonable number of meetings with the relevant governmental agencies, provided that the City's participation under this subsection shall consist of verbally affirming City's support for the Amendment.

(c) As per the request of the City, NRG will incorporate a provision in the Petition to Amend to be filed with the Commission in connection with the Amendment and in any power purchase agreement for CECP that CECP will not operate between the hours of midnight and 6 am, except to the extent reasonably required for reliability-related purposes or as otherwise required by the ISO Tariff. A decision by the Commission declining to apply this limitation to the CECP shall not absolve the City of its support obligation set forth in Section 4.1(b).

4.2 Services for CECP

(a) NRG agrees to work with the Carlsbad Fire Department in good faith to address those fire safety concerns that were previously raised in connection with the Application in the Amendment and any other reasonable fire safety concerns during the Amendment process.

(b) NRG agrees to reimburse the City for costs incurred in accordance with actual services performed by the City as contemplated by currently adopted fee and permit schedules, including applicable and appropriate impact fees, which are not expected to exceed $1 MM.

(c) The City, CMWD and NRG will work together to establish related services to CECP, including recycled water supply, potable water supply, sanitary sewer service and fire response.

(d) The City will work with NRG to accommodate gas line service to CECP on the east side of the railroad tracks.

ARTICLE 5

SDG&E PROVISIONS

5.1 Relocation of the North Coast Service Center

(a) SDG&E has advised the City that with the early retirement of SONGS and future closures of plants that use once-through cooling technology, the SDG&E area will be deficient of electricity generating capacity by 2018. SDG&E has requested that the City support the Amendment for the development of CECP as set forth in this Agreement

(b) In addition and subject to regulatory approvals and other conditions and agreements specified here, SDG&E has agreed to the relocation of SDG&E's North Coast Service Center, currently located at the corner of Cannon Road and Carlsbad Boulevard ("North Coast Service Center Site"), with the North Coast Service Center Site and certain other properties to be transferred to the City upon completion and occupancy of the newly relocated North Coast Service Center ("New Service Center").

(c) The New Service Center is to be built at NRG's sole cost, subject to the NSC Cost Cap (defined below), and to SDG&E's specifications and conditions. NRG will build the New Service Center, or will cause it to be built, in accordance with such specifications; provided, however, that the City, in its sole discretion, may elect to build the New Service Center, or to cause it to be built. The Parties acknowledge and agree that the cost of the relocation and the construction of the New Service Center, and the structure of the transaction, will be at no cost to the City or to SDG&E, and in a manner that is cost-neutral to SDG&E and its ratepayers.

(d) If the City and SDG&E do not proceed with the proposed relocation of the New Service Center, then NRG shall make the payment to the City in accordance with Section 5.6(b) below.

5.2 Identification of Property for the New Service Center Location

(a) The City and SDG&E will work together to identify a mutually acceptable alternative location for the New Service Center to be located ("New Service Center Location"). Currently SDG&E and the City may review: (i) the land currently owned by SDG&E north of Cannon Road known as Parcel 11 (a legal description of Parcel 11 is attached hereto as Exhibit L, a map of Parcel 11 is attached hereto as Exhibit M) or (ii) another site mutually acceptable to both the City and SDG&E, as determined by each in its respective and sole discretion, provided that such site shall be made available at no cost to SDG&E. The City shall cooperate on community outreach and education on the New Service Center Location.

(b) In the event that SDG&E and the City cannot agree on a mutually acceptable New Service Center Location by March 1, 2016, then either the City or SDG&E may provide the Termination Notice as set forth in Section 5.6 below.

5.3 Feasibility Studies and Ongoing Coordination Regarding SDG&E Specifications and Conditions for the New Service Center

(a) Within sixty (60) days after the Effective Date, SDG&E will meet with the City to identify and cause the environmental, land use, traffic and nodal analysis studies associated with studying the feasibility of the New Service Center ("Feasibility Studies") to be prepared. SDG&E shall pay for the Feasibility Studies subject to reimbursement for such studies as provided for below.

(b) As soon as reasonably possible, but by no later than March 31st, 2015, SDG&E will provide all required specifications and conditions for the New Service Center to NRG and the City. In connection with this SDG&E will provide a budget and cost statement representing its budget for the NSC Costs (defined below), including, to the extent available, (i) any available budget or cost estimates for the construction of the New Service Center; and (ii) a statement or budget of all other costs for the relocation (including the Feasibility Studies) of the North Coast Service Center. Such budget will not exceed the NSC Cost Cap as provided in Section 5.4 and will be prepared such that the New Service Center can be reasonably and prudently constructed for an amount that will not exceed the NSC Cost Cap.

5.4 New Service Center Relocation and Construction Cost Cap: NRG Funding and Conditions

(a) NRG agrees to fund up to $22.5 million ($22,500,000) (the "NSC Cost Cap") toward the "all-in" cost of the relocation of the North Coast Service Center according to SDG&E's specifications and conditions, including the cost of construction, furniture, fixtures, equipment, IT infrastructure, architectural, engineering and consulting costs, all relocation costs, reasonable contingencies and the reimbursements for the Feasibility Studies under Section 5.3(a) (collectively, the "NSC Costs").

(b) NRG's obligation to fund the NSC Costs is conditioned upon NRG's issuance of a final notice to proceed under its engineering, procurement and construction contract for CECP (the "EPC Contract Notice to Proceed").

(c) Upon NRG's issuance of the EPC Contract Notice to Proceed, NRG, SDG&E and the City shall meet within thirty (30) days of such final notice to review the projected NSC Costs in relation to the NSC Cost Cap and construction of the New Service Center.

(i) If the projected NSC Costs are less than or equal to the NSC Cost Cap, and a Termination Notice has not been issued under Section 5.6, NRG will build the New Service Center, or will cause it to be built, in accordance with SDG&E's specifications and conditions; provided, however, that the City, in its sole discretion, may elect to build the New Service Center, or to cause it to be built. Subject to the NSC Cost Cap and the conditions and provisions stated herein, NRG agrees to fund the NSC Costs. Subject to the NSC Cost Cap, SDG&E will be reimbursed by NRG for costs associated with the Feasibility Studies and such reimbursement shall be made as agreed by NRG and SDG&E; provided, however, that any amounts reimbursed for Feasibility Studies will reduce the NSC Cost Cap on a dollar-for-dollar basis.

(ii) If the projected NSC Costs exceed the NSC Cost Cap, SDG&E, NRG and the City shall meet in good faith to consider potential modifications to this Article 5, including, without reservation, changes to the New Service Center specifications and conditions, the NSC Cost Cap, or agreements to fund the costs in excess of the NSC Cost Cap; provided, however, that any subsequent modifications will be strictly subject to execution of future binding definitive agreements and obtaining any required regulatory approvals.

5.5 Conditions to SDG&E's Obligation to Relocate the North Coast Service Center

SDG&E's Relocation of the North Coast Service Center is subject to the following conditions:

(a) Identification of the New Service Center Location in accordance with Section 5.2.

(b) SDG&E obtaining any required regulatory approvals with the understanding that SDG&E will diligently and in good faith seek all regulatory approvals needed for the relocation of the North Coast Service Center as contemplated in this Agreement.

(c) A Private Letter Ruling, if necessary, satisfactory to SDG&E, issued by the Internal Revenue Service confirming the tax treatment of the transactions outlined herein.

(d) Construction of the New Service Center and turnover of the completed and operational New Service Center to SDG&E.

5.6 Termination of Proposed Relocation of the North Coast Service Center; NRG Payment

(a) Either the City or SDG&E may issue a notice terminating the obligations and agreement to relocate the North Coast Service Center (the "Termination Notice") under the following circumstances:

(i) if the City and SDG&E cannot agree upon a mutually acceptable New Service Center Location;

(ii) if construction of the New Service Center does not commence before the third (3rd) anniversary of the commercial operation date for CECP;

(iii) if the projected cost of relocation of the North Coast Service Center cannot be accomplished within the NSC Cost Cap, and SDG&E, NRG and the City are unable to agree upon subsequent modifications pursuant to Section 5.4(c)(ii); or

(iv) if SDG&E and the City jointly elect not to proceed with the relocation of the North Coast Service Center.

(b) Within 30 days of receipt of the Termination Notice, NRG shall pay the City of Carlsbad the sum of $10 million ($10,000,000); provided, however, that NRG will owe this amount only if CECP achieves commercial operation, in which case NRG shall make the payment within 30 days of commercial operation or the Termination Notice, whichever is later. Thus, if the New Service Center does not proceed and NRG does not fund the costs of the New Service Center, NRG shall be responsible for the payment as provided in this Section 5.6(b).

(c) Notwithstanding any other provision in this Agreement, the City's issuance of a Termination Notice will not affect NRG's remaining obligations under this Agreement, except to the extent expressly set forth in this Article 5.

5.7 Transfer of SDG&E Property upon the Relocation of the North Coast Service Center

Upon the completion and occupancy of the New Service Center, SDG&E shall transfer (i) the existing North Coast Services Center Site and buildings, (ii) Cannon Park (a legal description of Cannon Park is attached hereto as Exhibit N, a map of Cannon Park is attached hereto as Exhibit O), and (iii) the Agua Hedionda North Shore Bluff Parcel (APN 206-070-16) (a legal description of the Agua Hedionda North Shore Bluff Parcel is attached hereto as Exhibit P, a map of the Agua Hedionda North Shore Bluff Parcel is attached hereto as Exhibit Q), to the City in fee simple, free and clear of all financial liabilities and financial liens, simultaneously with SDG&E receiving title to the New Service Center. SDG&E will be responsible for remediating preexisting environmental conditions to applicable industrial standards pursuant to applicable law. The City and SDG&E will determine if such remediation shall be conducted before or after the transfer of title. If the site is to be remediated prior to the transfer, SDG&E shall commence the remediation within sixty (60) days after occupancy of the New Service Center, shall proceed in a diligent and timely manner to remediate the site and shall then transfer the properties under this Section 5.7 upon completion of the remediation. If the remediation is to occur following the transfer, the City will provide at least one-hundred twenty (120) days notice that SDG&E is to commence remediation of the site and the remediation shall proceed in a diligent and timely manner to completion.

5.8 Long-Term Plan for Substation Improvements and Expansions

The Parties acknowledge that SDG&E has recently undertaken certain improvements and upgrades of the Encina Power Station substation. The City has asked SDG&E to consider relocating the Encina Power Station substation away from the Encina Site. SDG&E has agreed that as part of a long-term plan, and contingent upon execution and regulatory approval of the Proposed PPA, and subject to any other required regulatory approvals, it will work in good faith with the City to identify and ultimately permit a site, such that any future material improvements or expansions to the transmission system, beyond those needed for the CECP, be made at the alternate site in lieu of the existing Encina Power Station. SDG&E will update the City at least annually on the status of the long-term plan as it relates to the identification and permitting of such a site. The City acknowledges and agrees that the substation design at the alternate site and any associated transmission design will be based on SDG&E design standards and specifications. The alternate site will be subject to a feasibility review by SDG&E to ensure a constructible site. Any design enhancements requested by the City that are not part of SDG&E's customary design standard and specifications will be paid for by the City unless SDG&E and City otherwise agree.

ARTICLE 6

REDEVELOPMENT PROCESS

6.1 Demolition and Removal of Above-Ground Structures

(a) Provided that (i) the California Public Utilities Commission has issued a final decision approving a power purchase agreement for CECP and (ii) the Commission has issued a final decision approving the Amendment, NRG agrees to fund at its sole cost the physical demolition and removal of the above-ground structures of the Encina Power Station in accordance with Laws and the milestones set forth below. Notwithstanding the foregoing, if NRG issues a final notice to proceed with construction of CECP without having received

California Public Utilities Commission approval, such condition shall be deemed satisfied. Details regarding the demolition and removal of the Encina Power Station will be incorporated into the petition to amend ("Petition to Amend") the Commission-issued license for CECP in which NRG seeks authority to construct CECP as reflected in Exhibit G, and following the issuance of a decision by the Commission approving such Petition to Amend, NRG will obtain all additional permits, if any, consistent with the schedule outlined below.

(b) Provided that (i) the California Public Utilities Commission has issued a final decision approving a power purchase agreement for CECP and (ii) the Commission has issued a final decision approving the Amendment, NRG shall commence physical demolition and removal of the above-ground structures of the Encina Power Station within one (1) year after Shut Down. NRG will also use good faith efforts to identify opportunities to begin and implement decommissioning prior to such date, including the removal of unused tanks. Notwithstanding the foregoing, if NRG issues a final notice to proceed with construction of CECP without having received California Public Utilities Commission approval, such condition shall be deemed satisfied.

(c) Provided that (i) the California Public Utilities Commission has issued a final decision approving a power purchase agreement for CECP and (ii) the Commission has issued a final decision approving the Amendment, NRG agrees to complete physical demolition and removal of the above-ground structures of the Encina Power Station within two (2) years of the commencement of demolition activities. Notwithstanding the foregoing, if NRG issues a final notice to proceed with construction of CECP without having received California Public Utilities Commission approval, such condition shall be deemed satisfied.

6.2 Redevelopment and Remediation

(a) The City and NRG acknowledge that they have a mutual interest in the productive reuse of the Encina Redevelopment Site. The City staff and NRG will work in good faith to address the redevelopment of the Encina Redevelopment Site in the pending General Plan update.

(b) If the City takes fee title to the North Coast Service Center Site, as contemplated by Article 5 of this Agreement, the City and NRG work in good faith to consider a joint development strategy for the Encina Redevelopment Site and the North Coast Service Center Redevelopment Site, comprising basic principles to be identified in a subsequent binding agreement.

(c) NRG shall present an initial proposed strategy for redevelopment of the Encina Redevelopment Site to City of Carlsbad staff within one-hundred eighty (180) days of the Effective Date of this Agreement.

(d) With the exception of any remediation required under a Commission decision approving the Amendment or applicable law, remediation of the Encina Redevelopment Site shall be undertaken in conjunction with redevelopment of the Encina Redevelopment Site.

(e) The City and NRG shall work in good faith to determine a mutually acceptable and appropriate alignment for the Coastal Rail Trail; provided, however, that failure to reach agreement on the alignment for the Coastal Rail Trail shall not impact performance of the obligations established in this Agreement.

ARTICLE 7

EVENTS OF DEFAULT

7.1 Defaults by NRG

Each of the following shall constitute an "Event of Default" by NRG under this Agreement:

(a) NRG fails to perform any of its obligations set forth in this Agreement, which failure is not a separate Event of Default, and which continues without cure for a period of thirty (30) days following the date the City provides written notice specifying the nature of such failure; provided, however, if a longer period of time than thirty (30) days is reasonably necessary to effect such cure, then no Event of Default shall exist as long as NRG commences such cure within such thirty (30) day period and then proceeds diligently in the prosecution of such cure to completion.

(b) NRG fails to perform its obligation to permanently Shut Down the Encina Power Station by the Final Shutdown Date (except solely as expressly provided in Section 3.1(a)).

(c) NRG fails to (i) timely perform its obligations under Section 6.1, or (ii) fails to make payment under Section 5.6(b), provided such failure to pay is not cured within five business days.

(d) Any representation made by NRG to the City contained in this Agreement proves to be false or misleading in any material respect at the time that such representation was made.

(e) NRG files a petition for relief, or an order for relief is entered against NRG in any case under applicable bankruptcy or insolvency law that is now or later in effect, whether for liquidation or reorganization, and this Agreement has been rejected or deemed rejected by the debtor in such case.

(f) NRG attempts to Transfer this Agreement, any portion of the Encina Site, or both, to a Transferee without the prior written consent of the City.

(g) A Transferee, not including an Existing Secured Loan Party, fails to execute an Assumption of Obligations and does not comply with the Shutdown Obligation.

7.2 Defaults by the City

The following shall constitute an Event of Default by the City under this Agreement:

(a) The City fails to perform any of its obligations set forth in this Agreement, which failure continues without cure for a period of thirty (30) days following the date NRG provides written notice specifying the nature of such failure; provided, however, if a longer period of time than thirty (30) days is reasonably necessary to effect such cure, then no Event of Default shall exist as long as the City commences such cure within such thirty (30) day period and then proceeds diligently in the prosecution of such cure to completion.

(b) Any representation made by the City to NRG contained in this Agreement proves to be false or misleading in any material respect at the time that such representation was made.

ARTICLE 8

REMEDIES

8.1 Remedies of the City

(a) Specific Performance.

(i) If an Event of Default by NRG occurs, then the City shall have the right to bring an action for specific performance or other equitable relief, or any other remedy authorized by applicable law.

(ii) In the event that a Transferee, with the exception of an Existing Secured Loan Party, fails to execute an Assumption of Obligations and does not comply with the Shutdown Obligation, the City shall have the right of specific performance against the Transferee to require it to comply with the Shutdown Obligation.

(b) Suspension of Performance. Notwithstanding anything to the contrary in this Agreement, if at any time an Event of Default by NRG occurs before the Shutdown, then the City shall, in addition to its other remedies under this Section 8.1, have the right to suspend performance of its obligations under this Agreement until such Event of Default is cured by NRG.

(c) NRG's Consent to Specific Performance and Waiver of Rights.

(i) In any action by the City for specific performance or injunctive relief under Article 3, Article 4, and Section 6.1 and Section 6.2 of this Agreement, NRG hereby consents to the City's right to seek specific performance of the Agreement. Further, NRG agrees that the City is fully entitled to seek a preliminary or permanent injunction to prevent further breach of the Agreement; to compel performance in aid of a decree of specific performance; or where the further breach may render specific performance meaningless or otherwise impair the City's ability to obtain performance of the Agreement. In connection with such requests for specific performance or injunctive relief, NRG acknowledges and agrees that:

a. Specific performance may be compelled to compel performance of the following provisions of this Agreement: Article 3, Article 4, and Article 6;

b. Monetary damages are not an adequate remedy at law for the breach of these provisions. Further and notwithstanding the liquidated damages provided for under Section 3.1(a)(vi) and the fact that this liquidated damage provision is damages do not constitutes an adequate remedy at law such as to deny entry of a decree of specific performance of the Agreement or either a preliminary or permanent injunction;

c. The Agreement is fair and reasonable to NRG and the failure to specifically enforce the Agreement would effectively deny the City the rights bargained for under this Agreement;

d. NRG's breach of the Agreement, as well as the continued or threatened breach of the Agreement, will cause great and irreparable injury to the City that can only be remedied by specific performance of the Agreement and issuance of a preliminary and/or permanent injunction;

e. Specific performance and issuance of a preliminary and/or permanent injunction cannot be denied based on the argument that there is a need for continuous supervision by the court or lack of mutuality or any other equitable defense or objection;

f. In connection with the request for a preliminary and/or permanent injunction which constitutes a mandatory injunction compelling NRG's performance under the Agreement, NRG acknowledges that this extraordinary form of relief is appropriate and proper under the unique circumstances of this Agreement and that a mandatory injunction should issue if the City demonstrates that it will incur irreparable injury if performance is not compelled. NRG further agrees that in the event of a mandatory injunction compelling performance that such injunction shall not by stayed by any appeal of the injunctive order;

g. NRG waives any other equitable defense to the entry of the injunction;

h. NRG waives any requirement that the city post a bond or any other security in connection with such injunctive relief; and

i. The remedies here shall be in addition to any and all other legal or equitable remedies that maybe available to the City under this agreement.

Initials of NRG J.C.

8.2 Remedies of NRG

(a) Specific Performance. If an Event of Default by the City occurs, then NRG shall have the right to bring an action for specific performance or other equitable relief, or any other remedy authorized by applicable law, subject to the limitation set forth in Section 8.3.

(b) Suspension of Performance. Notwithstanding anything to the contrary in this Agreement, if at any time an Event of Default by the City occurs before the Shutdown, then NRG shall, in addition to its other remedies under this Section 8.2, have the right to suspend

(a) Specific Performance. If an Event of Default by the City occurs, then NRG shall have the right to bring an action for specific performance or other equitable relief, or any other remedy authorized by applicable law, subject to the limitation set forth in Section 8.3.

(b) Suspension of Performance. Notwithstanding anything to the contrary in this Agreement, if at any time an Event of Default by the City occurs before the Shutdown, then NRG shall, in addition to its other remedies under this Section 8.2, have the right to suspend performance of its obligations under this Agreement until such Event of Default is cured by the City.

(c) Consent to Specific Performance and Waiver of Rights by the City. In any action by NRG for specific performance or injunctive relief under this Agreement, City hereby consents to NRG's right to seek specific performance of the Agreement. Further, City agrees that NRG is fully entitled to seek a preliminary or permanent injunction to prevent further breach of the Agreement; to compel performance in aid of a decree of specific performance; or where the further breach may render specific performance meaningless or otherwise impair NRG's ability to obtain performance of the Agreement. In connection with such requests for specific performance or injunctive relief, City acknowledges and agrees that:

(i) Specific performance may be compelled to compel performance of the provisions of this Agreement;

(ii) Monetary damages are not an adequate remedy at law for the breach of these provisions;

(iii) The Agreement is fair and reasonable to City and the failure to specifically enforce the Agreement would effectively deny NRG the rights bargained for under this Agreement;

(iv) City's breach of the Agreement, as well as the continued or threatened breach of the Agreement, will cause great and irreparable injury to NRG that can only be remedied by specific performance of the Agreement and issuance of a preliminary and/or permanent injunction;

(v) Specific performance and issuance of a preliminary and/or permanent injunction cannot be denied based on the argument that there is a need for continuous supervision by the court or lack of mutuality or any other equitable defense or objection;

(vi) In connection with the request for a preliminary and/or permanent injunction which constitutes a mandatory injunction compelling City's performance under the Agreement, City acknowledges that this extraordinary form of relief is appropriate and proper under the unique circumstances of this Agreement and that a mandatory injunction should issue if NRG demonstrates that it will incur irreparable injury if performance is not compelled. City further agrees that in the event of a mandatory injunction compelling performance that such injunction shall not by stayed by any appeal of the injunctive order;

(vii) City waives any other equitable defense to the entry of the injunction;

(viii) City waives any requirement that NRG post a bond or any other security in connection with such injunctive relief; and

(ix) The remedies here shall be in addition to any and all other legal or equitable remedies that maybe available to NRG under this agreement.

Initials of City ______

8.3 Limitations of Liability

(a) Direct Monetary Damages: No Consequential or Incidental Damages. The City and NRG agree that they may be held liable for any monetary or liquidated damages arising directly out of a breach of the obligations of this Agreement or any Event of Default. Notwithstanding this, neither the City nor NRG shall be liable for, and the City and NRG each waive any claim for, any incidental or consequential damages, arising out of any Event of Default on the part of NRG or the City.

(b) No Individual Liability. NRG agrees that no member, commissioner, official, advisor, agent or employee of the City will be personally liable to NRG, or any successor in interest, due to an Event of Default by the City. The City agrees that no directors, officers, shareholders, members, employees, advisers or agents of NRG or of its Affiliates will be personally liable to the City, due to an Event of Default by NRG.

8.4 LIQUIDATED DAMAGES

(a) IN THE EVENT THAT CECP BECOMES COMMERCIALLY OPERABLE AND THE ENCINA POWER STATION CONTINUES TO OPERATE, NRG HAS AGREED TO MAKE THE LIQUIDATED DAMAGE PAYMENT AS PROVIDED BY SECTION 3.1(A) (VI).

(b) NRG AND THE CITY HAVE AGREED TO THE DAMAGE PROVISION SET FORTH IN SECTION 3.1(A) (VI). NRG AND THE CITY ACKNOWLEDGE AND AGREE THAT THIS PROVISION APPLIES SOLELY TO CONTINUED OPERATION OF THE ENCINA POWER PLANT AS SET FORTH IN SECTION 3.1(A) (VI) AND FURTHER ACKNOWLEDGE THAT THIS PROVISION IS REASONABLE AT THE TIME OF THE AGREEMENT AS THAT TERM IS USED IN CALIFORNIA CIVIL CODE SECTION 1671. TO THE EXTENT NECESSARY TO SUPPORT THE STATEMENT THAT THIS PROVISION IS REASONABLE AT THE TIME OF THE AGREEMENT: (I) NRG ACKNOWLEDGES, AGREES AND UNDERSTANDS THAT THE CITY WOULD INCUR DAMAGES IN THE EVENT THAT ENCINA POWER STATION CONTINUED TO OPERATE AFTER THE DATE THAT CECP BECAME COMMERCIALLY OPERABLE BUT THAT THOSE DAMAGES AND COMPENSATION TO THE CITY WILL BE EXTREMELY DIFFICULT AND IMPRACTICAL TO ASCERTAIN IN PART DUE TO THE FACT THAT THE CONTINUED OPERATION HAS AN IMPACT ON THE CITY AND ITS RESIDENTS AND THE QUANTIFICATION OF THOSE POTENTIAL DAMAGES CANNOT BE DONE AT THIS TIME; (II) NRG ADMITS THAT THIS IS A REASONABLE PROVISION GIVEN THE DIFFICULTY OF QUANTIFYING THESE DAMAGES AND THE

AMOUNT OF REASONABLE COMPENSATION TO THE CITY IN THE EVENT THAT THE ENCINA POWER PLANT CONTINUES IN OPERATION.

(c) THE LIQUIDATED DAMAGES SO IMPOSED ARE NOT INTENDED AS A FORFEITURE OR PENALTY WITHIN THE MEANING OF CALIFORNIA CIVIL CODE SECTIONS 3275 OR 3369, BUT ARE INTENDED TO CONSTITUTE LIQUIDATED DAMAGES TO THE CITY AS PROVIDED BY CALIFORNIA CIVIL CODE SECTIONS 1671(b). NRG AGREES, ACKNOWLEDGES AND REPRESENTS THAT THE LIQUIDATED DAMAGES SET FORTH HEREIN ARE REASONABLE AT THE TIME OF THIS AGREEMENT AND ARE NOT A PENALTY OR FORFEITURE AND NRG IS ESTOPPED FROM ARGUING THAT THE LIQUIDATED DAMAGE PROVISION IS UNENFORCEABLE OR CONSTITUTES A PENALTY.

(d) NOTWITHSTANDING THE IMPOSITION AND PAYMENT OF SUCH LIQUIDATED DAMAGES, NRG ACKNOWLEDGES AND AGREES THAT THE CITY MAINTAINS ITS RIGHTS TO SEEK SPECIFIC PERFORMANCE OF THE AGREEMENT AS PROVIDED FOR IN SECTION 8.1(C), ACKNOWLEDGES THAT THE LIQUIDATED DAMAGES DO NOT CONSTITUTE AN ADEQUATE REMEDY AT LAW AND AGREES THAT SUCH LIQUIDATED DAMAGES DO NOT IMPAIR OR PREVENT THE CITY FROM SEEKING SPECIFIC PERFORMANCE OF ARTICLE 3 (OR ANY OTHER PROVISION OF THIS AGREEMENT) OR INJUNCTIVE RELIEF IN CONNECTION WITH THE ENFORCEMENT OF THIS AGREEMENT.

Initials of NRG ______

Initials of City ______

ARTICLE 9

INDEMNITY

9.1 Indemnification of the City

Subject to the terms, conditions and limitations set forth below and to the extent permitted by law, NRG agrees to and shall Indemnify the Indemnified Parties from and against any and all Losses (including, without limitation, any judgments, settlements, consent decrees, stipulated judgments or other partial or complete terminations of any actions or proceedings that require any of the Indemnified Parties to take any action) imposed upon, incurred by or asserted against any of the Indemnified Parties in connection with the occurrence or existence of any of the following arising as a result of this Agreement: (i) any accident, injury to or death of any Person or loss or damage to property occurring on the Encina Site; (ii) any accident, injury to or death of any person or loss or damage to property occurring near or around the Encina Site and that shall be directly or indirectly caused by the negligent act or omission or willful misconduct of NRG or its agents, tenants or invitees; (iii) any development, construction, operation, use, occupation, management, marketing, leasing, condition, financing or refinancing, sale or Transfer of the Encina Site; (iv) non-compliance with applicable Laws, including, but not limited to, Laws relating to hazardous materials, disabled access (including, without limitation, the

American with Disabilities Act) and unreinforced masonry buildings; (v) any third-party contracts entered into by or on behalf of NRG with respect to the Encina Site; (vi) any civil rights actions or other legal actions or suits initiated by any occupant or invitee of the Encina Site; and (vii) any claim that NRG and the City are joint venturers. Notwithstanding the foregoing, NRG shall not be required to Indemnify the Indemnified Parties against Losses if such Losses are caused by the negligence or willful misconduct of the City or the Agency or their respective directors, officers, employees, agents, successors and assigns, including the negligence or willful misconduct of the Indemnified Parties (or failing to act) or in the City's regulatory capacity in the exercise of its police powers.

9.2 Terms and Conditions

The foregoing indemnity is subject to the following terms and conditions.

(a) Immediate Obligation to Defend. NRG specifically acknowledges that it has an immediate and independent obligation to defend the Indemnified Parties from any claim that is actually or potentially within the scope of the indemnity provisions of Section 9.1, even if such claim is or may be groundless, fraudulent or false. Such obligation arises at the time such claim is tendered to NRG by an Indemnified Party and continues at all times after such tender.

(b) Notice. The Indemnified Parties agree to give notice to NRG with respect to any suit or claim initiated against the Indemnified Parties. Such notice shall be given at the address for notices of NRG set forth in this Agreement, and in no event later than the earlier of (i) ten (10) days after valid service of process as to any suit or (ii) fifteen (15) days after receiving written notification of the filing of such suit or the assertion of such claim, which the City has reason to believe is likely to give rise to a claim for indemnity under this Article. If notice is not given to NRG in a timely manner as provided in this Article, then, except as provided below, NRG's liability shall terminate as to the matter for which such notice is not given, provided that failure to notify NRG shall not affect the rights of the Indemnified Parties or the obligations of NRG under this Article unless NRG is materially prejudiced by such failure, and then only to the extent of such prejudice.

(c) Defense. NRG shall, at its option but subject to the reasonable consent and approval of the Indemnified Parties, be entitled to control the defense, compromise or settlement of any such matter through counsel of NRG's own choice; provided, however, in all cases the Indemnified Parties shall be entitled to participate in such defense, compromise, or settlement at their respective expense. If NRG shall fail, however, in the Indemnified Party's reasonable judgment, within a reasonable time following notice from the Indemnified Parties alleging such failure, to take reasonable and appropriate action to defend, compromise or settle such suit or claim, the Indemnified Parties shall have the right promptly to hire counsel at NRG's sole expense to carry out such defense, compromise or settlement, which expense shall be immediately due and payable to the Indemnified Parties upon receipt by NRG of a properly detailed invoice; provided that NRG must consent in writing to any proposed compromise or settlement, which consent shall not be unreasonably withheld.

(d) Insurance. The indemnity contained in Section 9.1 shall not be limited by any insurance carried by NRG.

(e) Survival. The indemnity contained in this Section shall survive any termination of this Agreement as to matters or Losses that arise during the term of this Agreement.

(f) No Limitation on Other Obligations. The agreement to Indemnify set forth above is in addition to, and in no way shall be construed to limit or replace, any other obligations or liabilities that NRG may have to the City under any other permits, approvals or agreements with the City, at common law or otherwise.

(g) Limitation. NRG has no duty under Section 9.1 regarding any claim against any Indemnified Parties directly related to the existence, interpretation and/or enforcement of this Agreement.

ARTICLE 10

SETTLEMENT

10.1 Negotiated Settlement

The discussions that have produced this Agreement have been conducted with the explicit understanding that they are privileged under California Evidence Code section 1152 and Federal Rule of Evidence 408, and that such discussions shall be without prejudice to the position of any party and may not be used in any manner in any proceeding or otherwise, except as may be necessary to enforce this Agreement or as otherwise required by law.

ARTICLE 11

RESERVED

11.1 Reserved

ARTICLE 12

GENERAL

12.1 Notices

Except as otherwise expressly provided in this Agreement, all notices, demands, approvals, consents and other formal communications between the Parties required or permitted under this Agreement shall be in writing and shall be deemed given and effective upon the date of receipt (i) if given by personal delivery on a business day (or the next business day if delivered personally on a day that is not a business day), (ii) if sent for next-business-day delivery (with all expenses prepaid) by a reliable overnight delivery service, with receipt of delivery, or (iii) if mailed by United States registered or certified mail, first class postage prepaid, to the Party at their respective addresses for notice designated below. For convenience of the Parties, copies of notices may also be given by facsimile to the facsimile number set forth below or such other number as may be provided from time to time by notice given in the manner required under this Agreement; however, neither Party may give official or binding notice by facsimile. The effective time of a notice shall not be affected by the receipt, before receipt of the original, of a facsimile copy of the notice.

(a) In the case of a notice or communication to the City:

Celia A. Brewer, Esq.
City Attorney for City of Carlsbad
General Counsel for Carlsbad Municipal Water District
1200 Carlsbad Village Drive
Carlsbad, CA 92008
Celia.Brewer@carlsbadca.gov

Stephen C. Hall, Esq.
Troutman Sanders LLP
805 SW Broadway, Suite 1560
Portland, OR 97205
stephen.hall@troutmansanders.com

Fletcher W. Paddison, Esq.
Troutman Sanders LLP
11682 El Camino Real
Suite 400
San Diego, CA 92130-2092
fletcher.paddison@troutmansanders.com

(b) And in the case of a notice or communication sent to NRG or NRG:

Sean Beatty
West Region General Counsel
NRG Energy, Inc.
P.O. Box 192
Pittsburg, CA 94565
sean.beatty@nrgenergy.com

(c) And in the case of a notice or communication sent to SDG&E:

Diana Day
Assistant General Counsel
SDG&E
101 Ash Street,
HQ11
San Diego, CA 92101
dday@semprautilities.com

Every notice given to a Party to this Agreement, under the terms of this Agreement, must state (or must be accompanied by a cover letter that states) substantially the following:

(i) the Section of this Agreement under which the notice is given and the action or response required, if any;

(ii) if applicable, the period of time within which the recipient of the notice must respond;

(iii) if approval is being requested, shall be clearly marked "Request for Approval under the Settlement Agreement";

(iv) if a notice of a disapproval or an objection that is subject to a reasonableness standard, shall specify with particularity the reasons for the disapproval or objection; and

(v) if applicable, that the failure to object to the notice within the stated time period will be deemed to be the equivalent of the recipient's approval of or consent to the request for approval that is the subject matter of the notice.

If a request for approval states a period of time for approval that is less than the time period provided for in this Agreement for such approval, the time period stated in this Agreement shall be the controlling time period.

In no event shall a recipient's approval of or consent to the subject matter of a notice be deemed to have been given by its failure to object to such notice if such notice (or the accompanying cover letter) does not comply with the requirements of this Section.

Any mailing address or facsimile number may be changed at any time by giving written notice of such change in the manner provided above at least ten (10) days before the effective date of the change.

12.2 Relationship of Parties: No Joint Venture or Partnership

The subject of this Agreement is an agreement for the Shutdown of the Encina Power Station and for a private development, with neither Party acting as the agent of the other Party in any respect. None of the provisions in this Agreement is intended to or shall be construed or deemed to render the City or SDG&E a partner in NRG's business, or joint venturer or member in any development or joint enterprise with NRG, including, but not limited to, the development or reuse of the Encina Site. NRG shall Indemnify the City against any Losses relating to any claim of any such joint venture as provided in Section 9.1. Nothing in this Agreement is intended to or shall be construed to create any principal-agent relationship between SDG&E, NRG and the City. Nothing in this Agreement is intended or shall be construed as to create any obligation between SDG&E and NRG to enter into the Proposed PPA.

12.3 Conflict of Interest

No member, official or employee of the City may have any personal interest, direct or indirect, in this Agreement, nor shall any such member, official or employee participate in any decision relating to this Agreement that affects her or his personal interest or the interests of any corporation, partnership or association in which she or he is interested directly or indirectly.

12.4 Time of Performance

(a) **Expiration.** All performance dates (including cure dates) expire at 5:00 p.m., Carlsbad, California time, on the performance or cure date, unless otherwise provided in this Agreement.

(b) **Weekends and Holidays.** A performance date that falls on a Saturday, Sunday or City holiday (or official City furlough day) is deemed extended to the next City working day.

(c) **Days for Performance.** All periods for performance specified in this Agreement in terms of days shall be calendar days, and not business days, unless otherwise expressly provided in this Agreement.

(d) **Time of the Essence.** Time is of the essence for each and every provision of this Agreement.

12.5 Interpretation of Agreement

(a) **Words of Inclusion.** The use of the terms "including," "such as" or words of similar import when following any general term, statement or matter shall not be construed to limit such term, statement or matter to the specific items or matters set forth, whether or not language of non-limitation is used with reference to such items or matters. Rather, such terms shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such statement, term or matter.

(b) **No Presumption Against Drafter.** This Agreement has been negotiated at arm's length and between Persons sophisticated and knowledgeable in the matters dealt with in this Agreement. In addition, experienced and knowledgeable legal counsel has represented each Party. Accordingly, this Agreement shall be interpreted to achieve the intents and purposes of the Parties, without any presumption against the Party responsible for drafting any part of this Agreement.

(c) **Costs and Expenses.** The Party on which any obligation is imposed in this Agreement shall be solely responsible for paying all costs and expenses incurred in the performance of such obligation, unless the provision imposing such obligation specifically provides to the contrary.

(d) **Agreement References.** A reference to any provision, term or matter "in this Agreement," "herein" or "hereof," or words of similar import shall be deemed to refer to any and all provisions of this Agreement reasonably related in the context of such reference, unless such reference refers solely to a specific numbered or lettered Article, Section or paragraph of this Agreement or any specific subdivision of this Agreement.

(e) **Approvals and Consents.** Unless this Agreement otherwise expressly provides, all approvals, consents or determinations to be made by or on behalf of the City under this Agreement shall be made by the City Attorney, or his or her designee. Unless otherwise provided in this Agreement, whenever approval, consent or satisfaction is required of a Party under this Agreement, it shall not be unreasonably withheld or delayed. Except with respect to matters that a Party is expressly entitled to determine in its sole and absolute discretion, the reasons for disapproval shall be stated in reasonable detail in writing. Approval by NRG or the City to or of any act or request by the other shall not be deemed to waive or render unnecessary approval to or of any similar or subsequent acts or requests.

(f) Recitals. The Recitals in this Agreement are included for convenience of reference only and are not intended to create or imply covenants under this Agreement. In the event of any conflict or inconsistency between the Recitals and the terms and conditions of this Agreement, the terms and conditions of this Agreement shall control.

(g) Captions. The captions preceding the articles and Sections of this Agreement have been inserted for convenience of reference only. Such captions shall not define or limit the scope or intent of any provision of this Agreement.

(h) Exhibits. Whenever an "Exhibit" is referenced, it means an attachment to this Agreement unless otherwise specifically identified. All such Exhibits are incorporated in this Agreement by reference.

12.6 Successors and Assigns

This Agreement is binding upon and will inure to the benefit of the successors and assigns of the City and NRG, except as expressly provided in this Agreement.

12.7 No Third Party Beneficiaries

This Agreement is made and entered into for the sole protection and benefit of the Parties and their successors and assigns, except as expressly provided in this Agreement.

12.8 Counterparts

This Agreement may be executed in counterparts and by facsimile or e-mailed signatures, each of which is deemed to be an original, and all such counterparts shall constitute one and the same instrument.

12.9 Entire Agreement

This Agreement, including the attached Exhibits, constitutes the entire agreement between the Parties with respect to the subject matter of this Agreement and supersedes all negotiations or previous conditions mentioned in or incidental to this Agreement (including, but not limited to, any term sheets relating to any of the subject matters of this Agreement). No parol evidence of any prior draft of this Agreement or any other agreement shall be permitted to contradict or vary the terms of this Agreement.

12.10 Governing Law

The laws of the State of California shall govern the interpretation and enforcement of this Agreement. As part of the consideration for the City's entering into this Agreement, all Parties agree that all actions or proceedings arising directly or indirectly under this Agreement may, at the sole option of the City, be litigated in courts located within the State of California, in the City of Carlsbad, County of San Diego, and the Parties expressly consent to the jurisdiction of any such local, state or federal court, and consents that any service of process in such action or proceeding may be made by personal service upon the Parties wherever the Parties may then be located, or by certified or registered mail directed to the Parties at the address set forth in this Agreement for the delivery of notices.

12.11 Extensions by the City

Upon the request of NRG or SDG&E, the City Attorney or his or her designee may, by written instrument and in the City Attorney's sole and absolute discretion, extend the time for NRG's or SDG&E's performance of any term, covenant or condition of this Agreement or permit the curing of any default upon such terms and conditions as he or she determines appropriate, including but not limited to, the time within which NRG or SDG&E shall agree to such terms or conditions, provided, however, any such extension for more than thirty (30) days or the permissive curing of any particular material default will be subject to approval of the City Council by resolution and in no event will operate to release any of NRG's or SDG&E's obligations nor constitute a waiver of the City's rights regarding any other term, covenant or condition of this Agreement or any other default in, or breach by NRG or SDG&E of, this Agreement or otherwise affect compliance with the other dates for performance under this Agreement.

12.12 Further Assurances

The Parties agree to execute and acknowledge such other and further documents as may be necessary or reasonably required to effectuate the terms of this Agreement. The City Attorney is authorized to execute on behalf of the City any closing or similar documents and any contracts, agreements, memoranda or similar documents with State, regional or local entities or other Persons that are necessary or proper to achieve the purposes and objectives of this Agreement and do not materially increase the obligations of the City under this Agreement, if the City Attorney determines that the document is necessary or proper, consistent with the purposes of this Agreement and in the City's best interests. The City Attorney's signature of any such document shall conclusively evidence such a determination by him or her.

12.13 Severability

If any provision of this Agreement, or its application to any Person or circumstance, is held invalid by any court, the invalidity or inapplicability of such provision shall not affect any other provision of this Agreement or the application of such provision to any other Person or circumstance, and the remaining portions of this Agreement shall continue in full force and effect, unless enforcement of this Agreement as so modified by and in response to such invalidation would be grossly inequitable under all of the circumstances, or would frustrate the fundamental purposes of this Agreement.

12.14 Amendments; Corrections of Technical Errors

Neither this Agreement nor any of its terms may be terminated, amended or modified except by a written instrument executed by the Parties. Any material amendment of this Agreement shall be subject to approval of the City Council by resolution. If by reason of inadvertence, and contrary to the intention of the Parties, errors are made in this Agreement in the legal description or the reference to or within any Exhibit with respect to a legal description, in the boundaries of any parcel in any map or drawing that is an Exhibit, or in the typing of this Agreement or any of its Exhibits, the Parties by mutual agreement may correct such error by written memorandum executed by them without the necessity of amendment of this Agreement. The City Attorney may execute any such written memorandum on behalf of the City.

12.15 Representations, Warranties and Covenants

(a) NRG Representation, Warranties and Covenants. NRG represents, warrants, and covenants to the City that as of the Effective Date, each of the following statements is accurate and complete:

(i) **Valid Existence; Good Standing.** NRG represents that both Cabrillo Power I LLC and Carlsbad Energy Center LLC are Delaware limited liability companies duly organized, validly existing and in good standing under the laws of the State of California. NRG represents that each entity has all requisite power and authority to own its property and conduct its business as presently conducted.

(ii) **Authority.** NRG represents that each of Cabrillo Power I LLC and Carlsbad Energy Center LLC has all requisite power and authority to execute and deliver this Agreement and to carry out and perform all of its duties and obligations under this Agreement. Without limiting the foregoing, NRG has obtained any and all required approvals. NRG will provide as a condition of the City's obligations under this Agreement (x) written resolutions from Cabrillo Power I LLC and Carlsbad Energy Center LLC authorizing the execution of and performance their obligations under this Agreement and (y) a written resolution from NRG Energy, Inc., in its role at Guarantor, authorizing NRG Energy, Inc. to guarantee the prompt and complete performance of NRG's obligations under this Agreement.

(iii) **No Limitation on Ability to Perform.** Neither limited liability company agreements, nor any other agreement or Law prohibits or materially limits or otherwise affects the right or power of NRG to enter into and perform all of the terms and covenants of this Agreement. Neither NRG nor any of its members are party to or bound by any contract, agreement, indenture, trust agreement, note, obligation or other instrument that prohibits or materially limits or otherwise affects the same. Except as expressly stated in this Agreement, no consent, authorization or approval of, or other action by, and no notice to or filing with, any governmental authority, regulatory body or any other Person is required for the due execution, delivery and performance by NRG of this Agreement or any of the terms and covenants contained in this Agreement (or if required, any such consent, authorization or approval has been obtained, any such action has occurred, and any such notice has been given). There are no pending or threatened suits or proceedings or undischarged judgments affecting NRG before any court, governmental agency, or arbitrator that, if determined adversely to NRG, might materially adversely affect the enforceability of this Agreement or the ability of NRG to perform its obligations under this Agreement.

(iv) **Valid Execution.** The execution and delivery of this Agreement (and the agreements contemplated in this Agreement) by NRG have been duly and validly authorized by all necessary action on the part of NRG. Upon its execution and delivery by all Parties and City Council approval under Section 2.3(b), this Agreement will be a legal, valid, binding and enforceable obligation of NRG.

(v) **Business Licenses.** To NRG's knowledge, NRG has obtained all licenses required to conduct business in City and it is not in default of any fees or taxes due to the City.

(vi) **Financial Matters.** (1) NRG is not in default under, and has not received notice asserting that it is in default under, any agreement for borrowed money, (2) NRG has not filed a petition for relief under any chapter of the U.S. Bankruptcy Code and has no present intention to petition for relief under any chapter of the U.S. Bankruptcy Code, (3) to NRG's knowledge, no involuntary petition naming NRG as debtor has been filed under any chapter of the U.S. Bankruptcy Code, and (4) NRG has the financial wherewithal to perform all of its financial and other obligations under this Agreement.

For purposes of the foregoing representations and warranties, whenever a statement is qualified by reference to NRG's knowledge or lack of knowledge, such reference is intended to refer to, and be limited to, matters within the actual knowledge of, or which should be discovered upon a reasonably diligent inquiry by, those officers of NRG who are most knowledgeable with NRG's business dealings with the Encina Site.

(b) City Representations, Warranties, and Covenants. The City represents, warrants, and covenants to NRG that as of the Effective Date, each of the following statements is accurate and complete:

(i) **Authority.** The City has all requisite power and authority to execute and deliver this Agreement and to carry out and perform all of its duties and obligations under this Agreement.

(ii) **Valid Execution.** The execution and delivery of this Agreement (and the agreements contemplated in this Agreement) by the City have been duly and validly authorized by all necessary action on the part of the City. Upon its execution and delivery by all Parties and City Council approval under Section 2.3(b), this Agreement will be a legal, valid, binding and enforceable obligation of the City. The City has provided (or upon written request will provide) to NRG a written resolution of the City authorizing the execution of and performance by the City of its obligations under this Agreement.

(iii) **Defaults.** The execution, delivery and performance of this Agreement do not and will not violate or result in a violation of, contravene or conflict with, or constitute a default under (A) any agreement, document or instrument to which the City is a party or (B) any applicable law, statute, ordinance or regulation.

For purposes of the foregoing representations and warranties, whenever a statement is qualified by reference to the City's knowledge or lack of knowledge, such reference is intended to refer to, and be limited to, matters within the actual knowledge of, or which should be discovered upon a reasonably diligent inquiry by employees of the City Attorney who are most knowledgeable with this Agreement.

12.16 Cooperation and Non-Interference

In connection with this Agreement, the Parties shall reasonably cooperate with one another to achieve the objectives and purposes of this Agreement. In so doing, the Parties shall each refrain from doing anything that would render its performance under this Agreement impossible and each shall do everything that this Agreement contemplates that the Party shall do to accomplish the objectives and purposes of this Agreement. In all situations arising out of this Agreement, the Parties shall each attempt to avoid and minimize the damages resulting from the conduct of the other and shall take all reasonably necessary measures to achieve the provisions of this Agreement.

12.17 Attorneys' Fees and Costs

NRG shall pay to City on demand any and all Attorneys' Fees and Costs incurred or paid by City in enforcing NRG's obligations under this Agreement. City shall pay to NRG on demand any and all Attorneys' Fees and Costs incurred or paid by NRG in enforcing City's obligations under this Agreement.

12.18 Transfer

NRG acknowledges and agrees that during the term of the Agreement any Transfer of the Agreement, any portion of the Encina Site, or both, requires the prior written consent of the City, which will not be unreasonably withheld, conditioned, or delayed, provided that the Transferee (i) has the financial capability of performing NRG's obligations under this Agreement, as reasonably determined by the City in its sole discretion; provided, however, that a Transferee with a credit rating equal to or higher than NRG Energy, Inc. from a nationally-recognized credit rating agency shall be deemed to meet this condition, and (ii) enters into an Assumption of Obligations Agreement set forth in Exhibit F.

12.19 Survival

Notwithstanding anything to the contrary in this Agreement, the following provisions shall survive the expiration of the Term or any other termination of this Agreement: (i) any obligation that arises and was not satisfied before termination shall survive any termination of this Agreement except to the extent otherwise provided in this Agreement; (ii) the releases and indemnities set forth in Article 9 and Article 10 of this Agreement shall continue as set forth in those articles, and (iii) and any provision expressly stated in this Agreement to survive in whole or in part following a termination of this Agreement.

12.20 Exhibits

The attached Exhibits A-T are made a part of this Agreement.

IN WITNESS WHEREOF, the City of Carlsbad, Carlsbad Municipal Water District, Cabrillo Power I LLC, Carlsbad Energy Center LLC, and San Diego Gas & Electric Company have caused this Agreement to be executed on the date first written above.

CABRILLO POWER I LLC

By: ______________________

Title: PRESIDENT

CARLSBAD ENERGY CENTER LLC

By: ______________________

Title: PRESIDENT

CITY OF CARLSBAD
AND
CARLSBAD MUNICIPAL WATER DISTRICT

By: ______________________

Title: Mayor pro tem -City of Carlsbad
Vice President - Carlsbad Municipal Water District

Solely with respect to Article 5 and Article 12

SAN DIEGO GAS & ELECTRIC

By: ______________________

Title: ______________________

IN WITNESS WHEREOF, the City of Carlsbad, Carlsbad Municipal Water District, Cabrillo Power I LLC, Carlsbad Energy Center LLC, and San Diego Gas & Electric Company have caused this Agreement to be executed on the date first written above.

CABRILLO POWER I LLC

By: ______________________________

Title: ____________________________

CARLSBAD ENERGY CENTER LLC

By: ______________________________

Title: ____________________________

CITY OF CARLSBAD
AND
CARLSBAD MUNICIPAL WATER DISTRICT

By: ______________________________

Title: ____________________________

Solely with respect to Article 5 and Article 12

SAN DIEGO GAS & ELECTRIC

By: ______________________________

Title: SVP Power Supply

EXHIBIT A

Legal Description of the Encina Site

[INSERTED ON THE FOLLOWING PAGE]

LEGAL DESCRIPTION

(Exceptions Not Noted)

The land referred to herein is situated in the State of California, County of San Diego, City of Carlsbad, and described as follows:

That portion of Lot "H" of Rancho Agua Hedionda, in the City of Carlsbad, County of San Diego, State of California, according to Partition Map thereof No. 823, filed in the Office of the County Recorder of San Diego County, November 16, 1896; being Parcel No. 4 of that certain Certificate of Compliance recorded October 30, 2001 as file no. 2001-0789068 of Official Records, and more particularly described as:

Commencing at the intersection of the easterly line of the 100.00 foot wide right-of-way of the Atchison Topeka and Santa Fe Railroad with the northerly line of Canon Road (60.00 feet wide); thence long said easterly line north 22°30'13" west, 1564.78 feet to the TRUE POINT OF BEGINNING; thence continuing along said easterly line north 22°30'13" west, 1990.35 feet to the beginning of a non-tangent curve concave to the northwest having a radius of 1005.37 feet, a radial to said beginning bears south 85°54'14" east; thence northeasterly 36.76 feet along said curve through a central angle of 02°05'42"; thence non-tangent to said curve north 22°30'13" west, 302.87 feet; thence leaving said easterly line north 61°25'37" east, 14.19 feet; thence north 30°30'37" east, 34.90 feet; thence south 40°47'43" east, 63.50 feet; thence south 69°10'23" east, 38.00 feet; thence north 79°19'37" east, 285.00 feet; thence north 88°07'37" east, 333.14 feet; thence north 81°53'37" east, 13.68 feet to the westerly right-of-way lkine of California State Highway XI-SD-2B (I-5); thence along said right-of-way line south 17°57'05" east, 204.93 feet; thence south 12°34'11" east, 424.72 feet; thence south 22°07'51" east, 239.68 feet; thence south 22°30'37" east, 1210.91 feet; thence leaving said right-of-way line south 67°37'25" west, 492.66 feet; thence south 62°25'13" west, 126.26 feet to the TRUE POINT OF BEGINNING,

Together with that portion of said Lot H described as follows:

Commencing at the northeasterly corner of Record of Survey No. 14621, in the City of Carlsbad, County of San Diego, State of California, recorded in the Office of the County Recorder of Sand Diego County, August 14, 1994 as file no. 1994-500086, said corner being on the westerly line of the right-of-way of the Atchison Topeka and Santa Fe Railroad; thence along said westerly line and easterly line of Record of Survey 14621 south 28°40'19" east, 656.70 feet to the most southerly corner of said Record of Survey No. 14621; thence continuing south 28°40'19" east, 275.00 feet to the TRUE POINT OF BEGINNING; thence leaving said westerly line south 56°25'30" west, 61.30 feet; thence south 04°59'18" west, 27.61 feet; thence south 39°37'42" east, 61.38 feet; thence south 77°21'22" east, 49.55 feet; thence south 26°45'53" east, 232.92 feet; thence south 17°52'19" east, 115.92 feet; thence south 02°16'37" east, 55.06 feet; thence south 24°00'58" west, 44.47 feet; thence south 40°45'14" west, 126.60 feet; thence south 29°41'50" west, 83.42 feet; thence south 27°27'35" west, 90.04 feet; thence south 35°18'30" west, 212.59 feet; thence south 19°22'01" east, 108.34 feet; thence south 30°56'56" east, 304.06 feet; thence south 14°30'21" west, 175.27 feet; thence south 00°09'57' east, 123.11 feet; thence south 26°53'37" east, 119.99 feet; thence south 34°46'51" west, 23.60 feet; thence north 61°27'21" west, 142.77 feet; thence north 22°47'32" west, 47.01 feet; thence south 67°12'28" west, 16.03 feet; thence south 22°47'32" east, 22.23 feet; thence south 58°37'31" west, 97.99 feet; thence south 41°35'28" west, 110.44 feet; thence north 74°44'52" west, 164.81 feet; thence north 05°57'51" west, 202.95 feet; thence north 30°14'20" west, 64.23 feet; thence north 64°31'22" west, 293.59 feet to the easterly line of the 100.00 foot wide Carlsbad Boulevard; thence along said easterly line of Carlsbad

Boulevard south 24°07'36" east, 913.18 feet to the beginning of a curve concave southwesterly having a radius of 4050.00 feet; thence southeasterly 348.89 feet along said curve through a central angle of 04°56'09"; thence south 19°11'27" east, 15.63 feet to the beginning of a curve concave northeasterly having a radius of 5216.55 feet; thence southeasterly 900.29 feet along said curve through a central angle of 09°53'18"; thence leaving said easterly line of Carlsbad Boulevard north 60°43'42" east, 103.71 feet; thence north 71°53'50" east, 49.05 feet; thence north 88°29'46" east, 149.63 feet; thence north 77°06'32" east, 80.00 feet; thence north 68°28'15" east, 121.97 feet; thence north 63°21'54" east, 220.51 feet; thence north 67°56'35" east, 167.57 feet; thence north 76°27'03" east, 60.33 feet; thence south 77°37'36" east, 172.85 feet; thence south 60°55'41' east, 66.30 feet; thence south 45°30'57" east, 47.42 feet; thence south 82°40'44" east, 84.31 feet; thence south 44°29'52" east, 52.55 feet to said westerly right-of-way line of said Atchison Topeka and Santa Fe Railroad; thence along said westerly line north 22°30'13" west, 2664.53 feet; thence north 28°40'19" west, 835.14 feet to the TRUE POINT OF BEGINNING.

The above described parcel of land contains 95.08 acres more or less.

Assessor's Parcel Numbers: 210-010-43, and 210-010-43 (with other property).

(End of Legal Description)

EXHIBIT B

Map of the Encina Site

EXHIBIT C

Area Map of the Encina Site

EXHIBIT D

Form of NRG Support Letter

Re: **Cabrillo Power I LLC's Support of the Shutdown of the Encina Power Station**

Dear ___________________:

In response to longstanding concerns and disputes related to the operation of the Encina Power Station, Cabrillo Power I LLC (NRG) and the City of Carlsbad (City) have entered into a Settlement Agreement dated as of January 14, 2014, to permanently shut down the Encina Power Station on the earlier of the commercial operation of the Carlsbad Energy Center or December 31, 2017, provided that the Encina Power Station is no longer needed for electric reliability as set forth in the Settlement Agreement.

NRG fully supports the shutdown of the Encina Power Station as soon as it is not needed for reliability. More particularly, NRG does not intend to operate the Encina Power Station after commercial operation of the Carlsbad Energy Center or December 31, 2017, whichever is earlier, and accordingly is committed to working with the California Independent System Operator and the City to achieve the permanent shutdown of the Encina Power Station by the earlier of those milestones.

Very truly yours,
CABRILLO POWER I LLC

[signed by authorized officer or officers]

EXHIBIT E

<u>Form of City Support Letter</u>

Re: **City's Support of the Approvals Needed for Licensing and Operation of the Carlsbad Energy Center and Interim Operation of the Encina Power Station**

Dear ___________________:

Consistent with the terms of the Settlement Agreement dated as of January 14, 2014, among multiple parties, including Carlsbad Energy Center LLC, Cabrillo Power I LLC and the City of Carlsbad (City), I write this letter to indicate the support of the City for the issuance of the permit or license for the operation of the Carlsbad Energy Center.

City further supports renewal of any permits or licenses necessary for the interim operation of the Encina Power Station. Under the Settlement Agreement, Cabrillo Power I LLC has agreed to shut down the Encina Power Station on the earlier of commercial operation of the Carlsbad Energy Center or December 31, 2017, provided it is released from reliability requirements by the California Independent System Operator (ISO). Accordingly, the City supports the renewal of the permits for the Encina Power Station until the earlier of commercial operation of the Carlsbad Energy Center or December 31, 2017.

A representative of the City is authorized to meet in person with your agency to communicate the support referenced in this letter.

Very truly yours,

City Attorney
City of Carlsbad

EXHIBIT F

Form of Assumption of Obligations Agreement

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

(Space above this line for Recorder's use only)

ASSUMPTION OF OBLIGATIONS AGREEMENT

This Assumption of Obligations (this "Assumption") dated as of ___________, 2014, is by **Cabrillo Power I LLC** and **Carlsbad Energy Center LLC** (collectively the "Assignor"), ____, a ____________________________________ (the "Assignee"), and the **City of Carlsbad**, a charter city located in San Diego County (the "City").

Factual Background

A. The Assignor owns real property located in the City, in the County of San Diego, California, bounded generally by Cannon Road to the south, Interstate 5 to the east, the Agua Hedionda Lagoon to the north, and Carlsbad Boulevard to the west (the "Site").

B. The Assignor and the City entered into that certain Settlement Agreement dated for reference purposes as of January 14, 2014 (the "Agreement"). Capitalized terms not defined in this Assumption have the meanings given them in the Agreement.

C. The Assignor wishes to convey to the Assignee its entire right, title and interest in and to that portion of the Site, as more particularly described in Exhibit A attached to the Agreement (the "Transferred Property") and its rights under the Agreement to the extent pertaining to the Transferred Property. In connection therewith, Assignee has agreed to assume [certain/all] of Assignor's unfulfilled and/or continuing obligations under the Agreement, all as set forth in this Assignment.

Agreement

Therefore, the City, the Assignor and the Assignee agree as follows:

(1) Reaffirmation of Obligations. The Assignor reaffirms all of its obligations under the Agreement (to the extent such obligations remain unfulfilled as of the date this instrument is executed), and the Assignor acknowledges that to its knowledge, [except for ________] the City is presently not in default of any of its obligations under the Agreement. The City reaffirms all of its obligations under the Agreement (to the extent such obligations remain unfulfilled as of the date this instrument is executed), and the City acknowledges that to its knowledge, [except for ________] the Assignor is presently not in default of any of its obligations under the Agreement.

(2) Effective Date. Effective as of ___________ (the "Effective Date") Assignor assigns to Assignee all of its right, title and interest in and to the Agreement [to the extent pertaining to the Transferred Property].

(3) Assumption. The Assignee assumes and agrees to faithfully perform for the benefit of the City all obligations of the Assignor under, and to be bound by all of the provisions of, the Agreement that remain unfulfilled as of the Effective Date; provided, however, the Assignee shall not assume the following obligations:____________________________________. Upon this Assumption becoming effective, the Assignor shall have no further obligations to the City, and the City shall have no further obligations to the Assignor, with respect to the obligations of the Assignor under the Agreement assumed by and the rights of the Owner under the Agreement assigned to the Assignee.

(4) Representations and Warranties of Assignor. The Assignor represents and warrants to the City as follows:

(A) No Event of Default on the part of Assignor, or to Assignor's knowledge, no event or condition that, with notice or lapse of time or both, would constitute an Event of Default on the part of Assignor, exists under the Agreement.

(B) The execution, delivery, and performance by the Assignor of this Assignment (x) will not contravene any legal requirements applicable to the Assignor or the Transferred Property, and (y) will not conflict with, breach or contravene any other agreement binding upon the Assignor or the Transferred Property.

(5) Representations and Warranties of Assignee: The Assignee represents and warrants to the Agency and the City as follows:

(A) The Assignee has reviewed the Agreement and is familiar with its terms and provisions.

(B) The Assignee makes for itself all representations, agreements and warranties of the Assignor set forth in Section 12.15(a) of the Agreement, effective as of the date hereof [to the extent applicable to the Transferred Property], subject to the following modifications: ____.

(C) The Assignee has obtained all consents in connection with its assumption of the obligations provided in this Assumption and for its acquisition of the Transferred Property that may be required by any agreement to which it is a party. Other than the consents so obtained, no consent to the acquisition of the Transferred Property is required under any agreement to which Assignee is a party.

(D) The execution, delivery, and performance by the Assignee of this Assumption and any other documents required under this Assumption (x) will not contravene any legal requirements applicable to the Assignee, and (y) will not conflict with, breach or contravene any other agreement binding upon the Assignee.

(E) To the knowledge of Assignee, there are no actions, suits or proceedings at law or in equity or by or before any governmental authority now pending against the Assignee, or threatened against or affecting the Assignee, in which there is a reasonable possibility of an adverse determination and that are reasonably likely individually or in the aggregate, if adversely determined, have a material adverse effect on the ability of the Assignee to perform such obligations under the Agreement as are being assumed by the Assignee.

(6) Address for Notices. All notices to the Assignee shall be sent to the following addresses:

Attention: ______________________________
Facsimile: ______________________________
Telephone: ______________________________

(7) No Prejudice. This Agreement shall not prejudice any rights or remedies of the City under the Agreement.

(8) Integration. This Assumption contains the entire agreement of the parties with respect to the matters contemplated in this Assumption and supersedes all prior negotiations.

(9) Modification. This Assumption may be amended or modified only in a writing signed by the parties.

(10) Counterparts. This Assumption may be executed in any number of counterparts which together shall be deemed the same instrument.

(11) Unenforceability. If any provision of this Assumption shall be determined by a court of competent jurisdiction to be invalid, illegal or unenforceable, then that portion shall be deemed severed and the remaining parts shall remain in full force as though the invalid, illegal, or unenforceable portion had not been a part of this Assumption.

(12) Governing Law. The parties agree that this Assumption shall be construed and interpreted in accordance with the laws of the State of California.

IN WITNESS WHEREOF, the Assignor, the Assignee and the City have caused this Agreement to be duly executed.

ASSIGNOR: CABRILLO POWER I LLC AND CARLSBAD ENERGY CENTER LLC

By: _______________________________

CITY: CITY OF CARLSBAD

By: _______________________________

ASSIGNEE:

By: _______________________________

EXHIBIT G

Form of Amendment

Carlsbad Energy Center Project Amendment

In accordance with Section 4.1(b) of the Agreement, this Exhibit G sets forth certain provisions of NRG's proposed Petition to Amend (defined below) and Amendment (defined below), which provisions are a material part of the City's consideration for entering into the Agreement; provided, however, that the Commission's failure to adopt the midnight to 6:00 a.m. operating limitation shall not absolve the City of its support obligation set forth in the Agreement. Unless otherwise defined in this Exhibit G, initially capitalized terms used in this Exhibit G shall have the meaning given them in Article I of the Agreement. In the event of any conflict or inconsistency between Exhibit G and the terms and conditions of the Agreement, the terms and conditions of the Agreement shall prevail.

Carlsbad Energy Center LLC ("NRG") intends to modify the Carlsbad Energy Center Project ("CECP") to replace the currently licensed combined-cycle configuration with a peaker configuration. To accomplish this modification, NRG will submit a Petition to Amend ("PTA") to the California Energy Commission ("Commission") requesting that the Commission amend its May 2012 Final Decision in Docket 07-AFC-06 in which it granted the Application for Certification of the CECP (the "Final Decision" and such Commission amendment, the "Amendment"). The CECP PTA will demonstrate the extraordinary circumstances that have arisen, including those associated with the premature closure of the San Onofre Nuclear Generating Station, and that necessitate changes to the Final Decision. The PTA will also include certain NRG obligations from the Agreement relating to the Final Shutdown, decommissioning, demolition, and removal of the Encina Power Station, which are set forth below.

The Project Description for the CECP PTA will address the following:

1. Site Preparation and Tank Farm Demolition. NRG will demolish the following existing facilities to enable construction of the amended CECP as well as creation of associated laydown areas:
    a. Aboveground Fuel Oil Storage Tanks 4-7 located east of the railroad tracks and west of Interstate 5. The footprint of the amended CECP will occupy the current location of Tanks 4-7.
    b. Aboveground Fuel Oil Storage Tanks 1 and 2 located west of the railroad tracks. The footprint of those tanks will be used for construction laydown.
    c. Site grading including removal of internal berms within the tank farm basin and preparation of ingress/egress routes.

2. Construction of Supporting Facilities.
    a. Industrial water supply interconnection from City supplied reclaim water source at Cannon Road, if available (preferred) or from Ocean Water Purification System (small desalination plant if needed).

b. Ocean Water Purification System (if needed).
c. Natural gas line interconnection from Cannon Road (preferred, if feasible; interconnect with existing infrastructure, if not) and gas metering and compression systems.
d. Fire Prevention Systems and hydrants east of the railroad tracks; commission/test associated back up diesel power pump to support Fire Prevention Systems.
e. Water and Aqueous Ammonia Storage Tanks.
f. Administration Building/Control Room.
g. Operations and Maintenance Building.
h. Stormwater management systems.
i. Industrial waste discharge interconnections.

3. Construction of no more than six General Electric LMS100s.
    a. Construction of no more than six General Electric LMS100s and supporting equipment (transformers, air cooled condensers, lubricating systems, selective catalytic reduction ("SCR") for emissions control, etc).
    b. Construction of the LMS100s will be below grade to minimize the visual profile of the units, stacks, and associated equipment.
    c. Construction of black start, diesel powered generation equipment (anticipated to be 1-2 MWs) to be located on east side of railroad tracks (if needed by the ISO).
    d. Interconnect into the 138 and 230 kV switchyards located on west side of the railroad tracks and appurtenant to SDG&E utilities and structures supporting the transmission of electricity to and from the switchyards.
    e. Interconnect with constructed reclaimed or CECP desalination water supplies and natural gas supply, including associated gas metering and gas compression equipment.
    f. Conduct commissioning of units, including installation and testing of SCR and continuous emissions monitoring systems ("CEMS") for the respective units.
    g. Conduct commissioning of black start unit (if needed by the ISO).

4. Environmental Characteristics. Environmental characteristics will include the following:
    a. Reduced criteria air pollutants compared to the permitted CECP.
    b. Reduced greenhouse gas emissions compared to the permitted CECP.
    c. Elimination of the use of ocean water for plant use (unless the City is not able to provide reclaimed water).
    d. Reduced noise levels compared to the permitted CECP.
    e. No operation between midnight and 6:00 am, except to the extent reasonably required for reliability-related purposes or as otherwise required by the ISO Tariff.
    f. Lower plant profile and visibility.

g. Removal of all aboveground oil storage tanks (see 1 a and b).
h. Demolition and removal of the Encina Power Station in a time certain unless required by the ISO or other agency for system reliability (see 5 below).
i. Revised vegetation and screening plan developed in cooperation with the City
j. Resolution of City fire safety concerns.
k. Development of the Coastal Rail Trail in a manner agreed to with the City.

5. <u>Final Shutdown Date, Shut Down, decommissioning, demolition and removal</u>. The PTA and the Amendment will incorporate the following requirements from the Agreement relating to the Final Shutdown Date, Shut Down, decommissioning, demolition and removal of the Encina Power Station, all of which requirements are expressly subject to the terms and conditions of the Agreement:
    a. NRG will permanently Shut Down the Encina Power Station on the earlier of the commercial operation date of CECP or December 31, 2017 (i.e., the Final Shutdown Date).
    b. Within ninety (90) days of the Shutdown of the Encina Power Station, NRG shall ensure that the Encina Power Station facilities and improvements are in a secure, inoperable condition and do not pose a physical or environmental safety hazard to members of the public or visitors of the Encina Site, consistent with Prudent Utility Practices and all applicable regulatory requirements and approvals.
    c. NRG shall commence physical demolition and removal of the above-ground structures of the Encina Power Station within one (1) year after Shut Down.
    d. NRG and its contractor(s) will use commercially reasonable efforts to sequence the work to complete demolition and removal in the most timely and efficient manner, taking into consideration any hourly fieldwork restrictions/constraints at the site. The demolition scope of work will include the following:
        i. Demolition to existing grade of Encina Power Station power block building and stack, including removal of steam boilers and associated equipment and removal of the combustion turbine (e.g., the black start unit). Removal of buildings, structures, equipment, and remaining storage tanks at the Encina Power Station (i.e., administrative building, operations/maintenance/warehouse buildings, industrial wastewater management system, intake/discharge structures not otherwise assumed by Poseidon).
        ii. The overall project objective is to decontaminate and demolish the Site in a safe, cost-effective and environmentally safe manner, and in compliance with all applicable laws.
        iii. NRG's contractor will prepare an updated hazardous materials survey. NRG's contractor shall properly handle, manage or remove and dispose of

all hazardous materials and wastes in accordance with all local, state and federal regulations.

iv. NRG and its contractors will develop, implement and maintain a storm water pollution prevention and sediment and soil erosion control plan in accordance with all local, state and federal regulations.

v. Site restoration activities after demolition: grading/backfilling to match existing surrounding grade. Surrounding grade may include existing concrete/asphalt surfaces. Clean, suitable fill material reused from the site or from offsite will be utilized to support back filling operation.

vi. Site grading and drainage will match the current site contours. Existing stormwater management systems would be utilized west of the railroad tracks. Erosion controls shall be installed and maintained during demolition site activities.

e. NRG agrees to complete physical demolition and removal of the above-ground structures of the Encina Power Station within two (2) years of the commencement of demolition activities.

f. NRG agrees to limit fossil fuel generation on the Encina Site to the generating capacity proposed in the current project description (e.g., six LMS100s) proposed in the Amendment and any black start equipment potentially required by the ISO.

g. NRG agrees that no future modifications to the CECP shall be undertaken that exceed the environmental envelope, profile or footprint of CECP as presented in the PTA and Amendment.

Anticipated Amendment Approval Schedule

Subject to processing and approval by applicable regulatory agencies (e.g., CEC, California Public Utilities Commission, San Diego County Air Pollution Control District, U.S. Environmental Protect Agency, San Diego Regional Water Quality Control Board), the following is the anticipated permitting/approval schedule for the Amendment:

1. March 2014 - File CECP PTA with the Commission.
2. March 2014 – File Air Permit Applications with San Diego County Air Pollution Control District ("SDAPCD").
3. June 2014 – Commission Site Informational Work Shop and Initial Data Requests.
4. October 2014 – SDAPCD Preliminary Determination of Compliance.
5. December 2014 – Commission Preliminary Staff Assessment and Workshop.
6. April 2015 – Commission Final Staff Assessment Report.
7. June 2015 – Commission Evidentiary Hearings
8. August 2015 – Commission Presiding Member's Proposed Decision on CECP PTA.
9. September 2015 – Commission Decision on CECP PTA.

EXHIBIT H

Form of Memorandum of Agreement

RECORDING REQUESTED BY AND)
WHEN RECORDED MAIL TO:)
)
City Clerk)
CITY OF CARLSBAD)
1200 Carlsbad Village Drive)
Carlsbad, California 92008-1989)

Space above this line for Recorder's use

Assessor's Parcel Number	CLICK HERE
Project Number and Name	CLICK HERE

NOTICE OF RESTRICTION ON SALE OR CONVEYANCE OF REAL PROPERTY

The real property located in the City of Carlsbad, County of San Diego, State of California which is described on Exhibit "A" attached hereto (the "Property").

Pursuant to Government Code Section 27281.5(a), Notice is hereby given that the owner of the Property as set forth below is hereby restricted from conveying, transferring or granting the Property to any other party, except as provided under the Settlement Agreement (described below) and this restriction is imposed by the City of Carlsbad on the Property.

This Notice shall be recorded in the County Recorder's Office for the County of San Diego which recordation is permitted pursuant to the provisions of Government Code Section 27281.5(a). Upon recordation, this Notice provides constructive notice of the restriction on the conveyance or transfer of the Property.

This Notice is provided pursuant to that certain Settlement Agreement, Dated as of January 14, 2014, Between and Among the City of Carlsbad, Carlsbad Municipal Water District, Cabrillo Power I LLC, Carlsbad Energy Center LLC and San Diego Gas & Electric Company, approved by the City of Carlsbad pursuant to City Of Carlsbad Resolution No. 2014-010, A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CARLSBAD, CALIFORNIA, APPROVING AN AGREEMENT BETWEEN AND AMONG THE CITY OF CARLSBAD (CITY)

AND THE CARLSBAD MUNICIPAL WATER DISTRICT (CMWD), NRG ENERGY, INC. (NRG), AND SAN DIEGO GAS & ELECTRIC (SDG&E), ADDRESSING CITY AND CMWD SUPPORT FOR A CHANGE IN THE PROPOSED TECHNOLOGY OF THE APPROVED CARLSBAD ENERGY CENTER PROJECT (CECP) PLANT AND THE SUBMITTAL OF A PETITION TO AMEND (PTA) APPLICATION TO THE CALIFORNIA ENERGY COMMISSION (CEC) FOR APPROVAL OF THIS TECHNOLOGY CHANGE, CONDITIONED UPON THE DECOMMISSIONING, DEMOLITION, REMOVAL AND REMEDIATION OF THE CURRENT ENCINA POWER STATION (EPS) SITE, AS WELL AS OTHER CHANGES IN CECP PLANT DESIGN, ENERGY INFRASTRUCTURE AND PROPERTY CONSIDERATIONS BENEFICIAL TO THE RESIDENTS OF CARLSBAD, approved by the City of Carlsbad on January 14, 2014. A copy is on file at the City of Carlsbad Planning Division.

OWNER:	APPROVED AS TO FORM:
______________________ Owner's Name	CITY OF CARLSBAD
______________________ Signature	______________________ DON NEU, City Planner
______________________ Print name and title	______________________ Date
______________________ Signature	______________________ CELIA A. BREWER, City Attorney City Attorney
______________________ Print name and title	By: ______________________ Assistant City Attorney
______________________ Date	______________________ Date

(Proper notarial acknowledgment of execution by Contractor must be attached.)

(Chairman, president or vice-president and secretary, assistant secretary, CFO or assistant treasurer must sign for corporations. Otherwise, the corporation must attach a resolution certified by the secretary or assistant secretary under corporate seal empowering the officer(s) signing to bind the corporation.)

(If signed by an individual partner, the partnership must attach a statement of partnership authorizing the partner to execute this instrument).

EXHIBIT I

<u>Form of Fossil Fuel Deed Restriction</u>

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

(Space above this line for Recorder's use only)

DECLARATION OF ENVIRONMENTAL RESTRICTION REGARDING USE

This Declaration Of Environmental Restriction Regarding Use (this "<u>Declaration</u>") is made as of ___________________, _____, by **NRG Cabrillo Power I LLC** and **Carlsbad Energy Center LLC** (collectively "<u>NRG</u>"), in favor of the **City of Carlsbad**, a charter city, located in San Diego County (the "<u>City</u>"). NRG and the City are sometimes collectively referred to below as the "<u>Parties</u>."

<u>Recitals</u>

THIS DECLARATION is made with reference to the following facts and circumstances:

A. NRG owns real property located in the City, in the County of San Diego, California, bounded generally by Cannon Road to the south, Interstate 5 to the east, the Agua Hedionda Lagoon to the north, and Carlsbad Boulevard to the west (the "<u>Site</u>"). A legal description of the Site is attached to this Declaration as <u>Exhibit A</u>. If there is any conflict or inconsistency between the general description of the Site and the attached legal description, the attached legal description shall control.

B. At the Site, NRG previously operated facilities known as Units 1-5 (individually a "<u>Unit</u>" and collectively the "<u>Units</u>," the "<u>Encina Power Station</u>") for the purpose of generating and selling electric power.

C. On or about January 14, 2014, NRG and the City entered into a Settlement Agreement (the "<u>Settlement Agreement</u>"), under which the Parties agreed to resolve certain outstanding disputes. All capitalized terms in this Declaration not defined in this Declaration shall have the meaning given to them in the Settlement Agreement.

D. Before the date of this Declaration, NRG permanently shut down the operation of the Encina Power Station in accordance with requirements and procedures described in the Settlement Agreement. The final shutdown date of the Encina Power Station was __________, 20__.

E. In accordance with NRG's obligations under into the Settlement Agreement, NRG now wishes to record this Declaration describing certain permanent restrictions on the use of the Site following the shutdown of the Plant. The Parties intend that this Declaration have priority over any mortgage, deed of trust or similar instrument now or later encumbering any or all of the Site.

Agreement

ACCORDINGLY, NRG, on behalf of itself and its successors and assigns, its and their licensees and invitees, and all persons claiming by and through them, covenants to and agrees with the City, for the benefit of the City and the City's Property, as follows:

1. Restriction Regarding Use of Fossil Fuels. From and after the date this Declaration is recorded in the Official Records of San Diego County, California, and except solely for the limited purposes provided in section 2 below, the Site shall not be used for the generation of electricity by any plant, facility, machinery or other equipment that is powered by the combustion of Fossil Fuels. "Fossil Fuels" means petroleum or any petroleum product, coal or any coal-based product, natural gas, or other hydrocarbon-based fuel. The Parties intend that this restriction run with the Site in perpetuity. The purpose of this restriction is to protect human health and safety and the environment.

2. Exceptions. The restriction set forth in section 1 above shall not apply to: (i) the operation of the Carlsbad Energy Center Project ("CECP") in the configuration described in Exhibit G to the Settlement Agreement which is located on the Site; provided that changes to the configuration of the CECP that do not exceed the environmental envelope, profile or footprint of CECP as reflected in Exhibit G are permitted; (ii) ancillary equipment or machinery; (iii) back-up generators; (iv) distributed energy sources approved by the City in a redevelopment plan; or (v) any Existing Secured Loan Party, as set forth in Section 2.2 of the Settlement Agreement.

3. Enforcement. The City may, in its sole discretion, rely on this Declaration to enforce any of its covenants or restrictions. The City, but not the general public, shall have all rights and remedies available at law or in equity to enforce the covenants and restrictions set forth in this Declaration. All rights and remedies available to the City under this Declaration or at law or in equity shall be cumulative and not alternative, and invocation of any such right or remedy shall not constitute a waiver or election of remedies with respect to any other available right or remedy. In the event of any breach of the covenants or restrictions by NRG under this Declaration, the City shall be entitled to recover all attorneys' fees and costs in connection with City's enforcement activities and actions.

4. Notice and Cure Rights. Before taking enforcement actions under section 3 above, the City shall provide written notice to NRG of any actual or alleged violation of the covenants or restrictions set forth in this Declaration. Such notices shall be given to NRG at the address last furnished by NRG in writing to the City. NRG shall have a period of ten (10) days after receipt of such notice to cure such violation; provided, however, if the violation is not capable of cure within such ten (10) day period, NRG shall have such additional time as shall be reasonably required to complete a cure so long as NRG promptly undertakes action to commence the cure within the ten (10) day period and then diligently prosecutes the same to completion. The time in which NRG may cure is referred to in this Declaration as the "Cure Period," and the City shall not exercise any legal or equitable remedies during the Cure Period so long as NRG is diligently pursuing such cure. Notwithstanding anything to the contrary in this section, in no event shall the Cure Period exceed six (6) months.

5. Covenants Running with the Land; Binding on Successors. This Declaration, including the covenants set forth above, constitute covenants running with the land in perpetuity and shall bind and burden NRG and any successor owner or occupier.

6. Constructive Notice and Acceptance. Every person or entity who now or later owns or acquires any right, title or interest in or to all or any portion of the Site is, and shall be, conclusively deemed to have consented to and agreed to every covenant, condition, restriction contained in this Declaration, whether or not any reference to this Declaration is contained in the instrument by which such person or entity acquired such interest.

7. Injunctive Relief. Notwithstanding anything to the contrary contained in this Declaration, and without limiting section 3 above, the City may seek and obtain injunctive relief in any court of competent jurisdiction to restrain NRG from any conduct in breach of this Declaration that causes or threatens to cause immediate and irreparable harm to the extent such equitable relief is otherwise available.

8. No Waiver. No waiver by the City (including, without limitation, any of its boards, commissions, officers, employees or agents) of any violation under this Declaration shall be effective or binding unless and to the extent expressly made in writing by the City, and no such waiver may be implied from any failure by the City to take action with respect to such violation. No express written waiver of any violation shall constitute a waiver of any subsequent violation in the performance of the same or any other provision of this Declaration.

9. Severability. Should any provision or portion of this Declaration be declared invalid or in conflict with any law, the validity of all remaining provisions shall remain unaffected and in full force and effect.

10. Governing Law; Venue. The laws of the State of California shall govern the interpretation and enforcement of this Declaration. As part of the consideration for the City's entering into Settlement Agreement and this Declaration, NRG agrees that all actions or proceedings arising directly or indirectly under this Declaration may, at the sole option of the City, be litigated in courts located within the State of California, in the County of San Diego, and

NRG expressly consents to the jurisdiction of any such local, state or federal court, and consents that any service of process in such action or proceeding may be made by personal service upon NRG wherever NRG may then be located, or by certified or registered mail directed to NRG at the address set forth in this Declaration for the delivery of notices.

11. Notices. Except as otherwise expressly provided in this Declaration, all notices, demands, approvals, consents and other formal communications between the Parties required or permitted under this Declaration shall be in writing and shall be deemed given and effective upon the date of receipt (i) if given by personal delivery on a business day (or the next business day if delivered personally on a day that is not a business day), (ii) if sent for next-business-day delivery (with all expenses prepaid) by a reliable overnight delivery service, with receipt of delivery, or (iii) if mailed by United States registered or certified mail, first class postage prepaid, to the Party at their respective addresses for notice designated below. For convenience of the Parties, copies of notices may also be given by facsimile to the facsimile number set forth below or such other number as may be provided from time to time by notice given in the manner required under this Declaration; however, neither Party may give official or binding notice by facsimile. The effective time of a notice shall not be affected by the receipt, before receipt of the original, of a telefacsimile copy of the notice.

(a) In the case of a notice or communication by NRG to the City:

Celia A. Brewer, Esq.
City Attorney for City of Carlsbad
General Counsel for Carlsbad Municipal Water District
1200 Carlsbad Village Drive
Carlsbad, CA 92008
Celia.Brewer@carlsbadca.gov

(b) And in the case of a notice or communication sent by the City to NRG:

Sean Beatty
West Region General Counsel
NRG Energy, Inc.
P.O. Box 192
Pittsburg, CA 94565
sean.beatty@nrgenergy.com

Every notice given to a Party to this Declaration, under the terms of this Declaration, must state (or must be accompanied by a cover letter that states) substantially the following: the section of this Declaration under which the notice is given and the action or response required, if any; and if applicable, the period of time within which the recipient of the notice must respond.

In no event shall a recipient's approval of or consent to the subject matter of a notice be deemed to have been given by its failure to object to such notice if such notice (or the accompanying cover letter) does not comply with the requirements of this Section.

Any mailing address or number may be changed at any time by giving written notice of such change in the manner provided above at least ten (10) days before the effective date of the change.

IN WITNESS WHEREOF, NRG has duly executed this Declaration as of the date first written above.

NRG ENERGY, INC. ON BEHALF OF ITSELF AND ITS SUBSIDIARIES, INCLUDING CABRILLO POWER I LLC

By: ___________________________
Name: _________________________
Title: __________________________

EXHIBIT A
TO
DECLARATION OF ENVIRONMENTAL RESTRICTION REGARDING USE

Legal Description of the Site

[INSERTED ON THE FOLLOWING PAGE]

LEGAL DESCRIPTION

(Exceptions Not Noted)

The land referred to herein is situated in the State of California, County of San Diego, City of Carlsbad, and described as follows:

That portion of Lot "H" of Rancho Agua Hedionda, in the City of Carlsbad, County of San Diego, State of California, according to Partition Map thereof No. 823, filed in the Office of the County Recorder of San Diego County, November 16, 1896; being Parcel No. 4 of that certain Certificate of Compliance recorded October 30, 2001 as file no. 2001-0789068 of Official Records, and more particularly described as:

Commencing at the intersection of the easterly line of the 100.00 foot wide right-of-way of the Atchison Topeka and Santa Fe Railroad with the northerly line of Canon Road (60.00 feet wide); thence long said easterly line north 22°30'13" west, 1564.78 feet to the TRUE POINT OF BEGINNING; thence continuing along said easterly line north 22°30'13" west, 1990.35 feet to the beginning of a non-tangent curve concave to the northwest having a radius of 1005.37 feet, a radial to said beginning bears south 85°54'14" east; thence northeasterly 36.76 feet along said curve through a central angle of 02°05'42"; thence non-tangent to said curve north 22°30'13" west, 302.87 feet; thence leaving said easterly line north 61°25'37" east, 14.19 feet; thence north 30°30'37" east, 34.90 feet; thence south 40°47'43" east, 63.50 feet; thence south 69°10'23" east, 38.00 feet; thence north 79°19'37" east, 285.00 feet; thence north 88°07'37" east, 333.14 feet; thence north 81°53'37" east, 13.68 feet to the westerly right-of-way lkine of California State Highway XI-SD-2B (I-5); thence along said right-of-way line south 17°57'05" east, 204.93 feet; thence south 12°34'11" east, 424.72 feet; thence south 22°07'51" east, 239.68 feet; thence south 22°30'37" east, 1210.91 feet; thence leaving said right-of-way line south 67°37'25" west, 492.66 feet; thence south 62°25'13" west, 126.26 feet to the TRUE POINT OF BEGINNING,

Together with that portion of said Lot H described as follows:

Commencing at the northeasterly corner of Record of Survey No. 14621, in the City of Carlsbad, County of San Diego, State of California, recorded in the Office of the County Recorder of Sand Diego County, August 14, 1994 as file no. 1994-500086, said corner being on the westerly line of the right-of-way of the Atchison Topeka and Santa Fe Railroad; thence along said westerly line and easterly line of Record of Survey 14621 south 28°40'19" east, 656.70 feet to the most southerly corner of said Record of Survey No. 14621; thence continuing south 28°40'19" east, 275.00 feet to the TRUE POINT OF BEGINNING; thence leaving said westerly line south 56°25'30" west, 61.30 feet; thence south 04°59'18" west, 27.61 feet; thence south 39°37'42" east, 61.38 feet; thence south 77°21'22" east, 49.55 feet; thence south 26°45'53" east, 232.92 feet; thence south 17°52'19" east, 115.92 feet; thence south 02°16'37" east, 55.06 feet; thence south 24°00'58" west, 44.47 feet; thence south 40°45'14" west, 126.60 feet; thence south 29°41'50" west, 83.42 feet; thence south 27°27'35" west, 90.04 feet; thence south 35°18'30" west, 212.59 feet; thence south 19°22'01" east, 108.34 feet; thence south 30°56'56" east, 304.06 feet; thence south 14°30'21" west, 175.27 feet; thence south 00°09'57' east, 123.11 feet; thence south 26°53'37" east, 119.99 feet; thence south 34°46'51" west, 23.60 feet; thence north 61°27'21" west, 142.77 feet; thence north 22°47'32" west, 47.01 feet; thence south 67°12'28" west, 16.03 feet; thence south 22°47'32" east, 22.23 feet; thence south 58°37'31" west, 97.99 feet; thence south 41°35'28" west, 110.44 feet; thence north 74°44'52" west, 164.81 feet; thence north 05°57'51" west, 202.95 feet; thence north 30°14'20" west, 64.23 feet; thence north 64°31'22" west, 293.59 feet to the easterly line of the 100.00 foot wide Carlsbad Boulevard; thence along said easterly line of Carlsbad

Boulevard south 24°07'36" east, 913.18 feet to the beginning of a curve concave southwesterly having a radius of 4050.00 feet; thence southeasterly 348.89 feet along said curve through a central angle of 04°56'09"; thence south 19°11'27" east, 15.63 feet to the beginning of a curve concave northeasterly having a radius of 5216.55 feet; thence southeasterly 900.29 feet along said curve through a central angle of 09°53'18"; thence leaving said easterly line of Carlsbad Boulevard north 60°43'42" east, 103.71 feet; thence north 71°53'50" east, 49.05 feet; thence north 88°29'46" east, 149.63 feet; thence north 77°06'32" east, 80.00 feet; thence north 68°28'15" east, 121.97 feet; thence north 63°21'54" east, 220.51 feet; thence north 67°56'35" east, 167.57 feet; thence north 76°27'03" east, 60.33 feet; thence south 77°37'36" east, 172.85 feet; thence south 60°55'41' east, 66.30 feet; thence south 45°30'57" east, 47.42 feet; thence south 82°40'44" east, 84.31 feet; thence south 44°29'52" east, 52.55 feet to said westerly right-of-way line of said Atchison Topeka and Santa Fe Railroad; thence along said westerly line north 22°30'13" west, 2664.53 feet; thence north 28°40'19" west, 835.14 feet to the TRUE POINT OF BEGINNING.

The above described parcel of land contains 95.08 acres more or less.

Assessor's Parcel Numbers: 210-010-43, and 210-010-43 (with other property).

(End of Legal Description)

EXHIBIT J

Legal Description of North Coast Services Center Site

[INSERTED ON NEXT PAGE**]**

LEGAL DESCRIPTION

EXHIBIT J

That certain parcel of land situated in the City of Carlsbad, County of San Diego, State of California, being more particularly described as follows:

Parcel 5 as described in the Certificate of Compliance recorded on October 30, 2001 as Document No. 2001-0789069 of Official Records of said San Diego County also as shown as Parcel 5 on Record of Survey No. 17350 filed in the Office of the County Recorder of said San Diego County on April 12, 2002 as File No. 2002-0308512.

Containing 16.37 acres more or less.

Prepared By:

1/13/14

Jeffrey J. Safford, L6703 Date

LICENSED LAND SURVEYOR
JEFFREY J SAFFORD
No. L6703
EXP. 06-30-14
STATE OF CALIFORNIA

EXHIBIT K

Map of North Coast Services Center Site

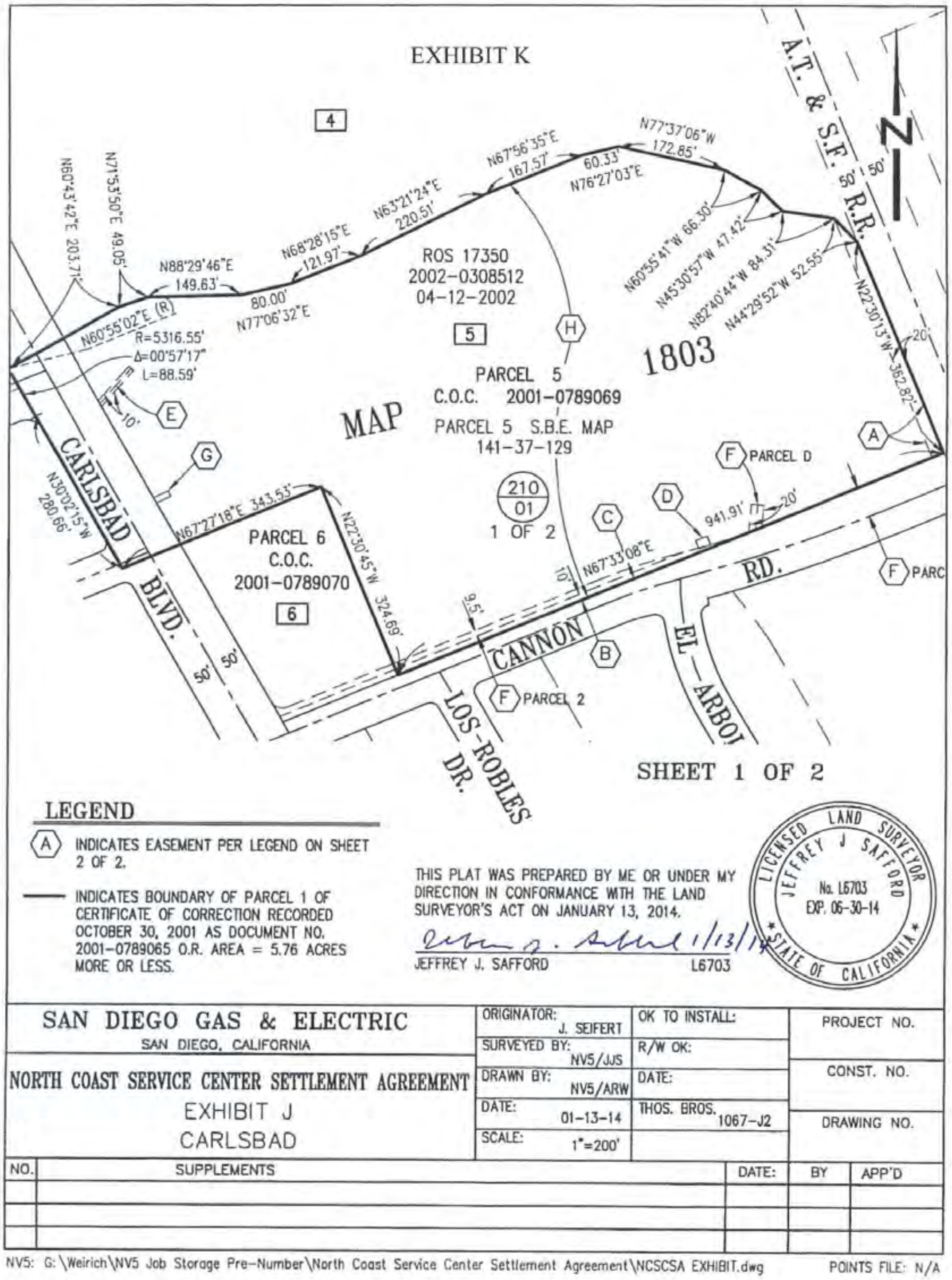


EXHIBIT K

EASEMENT LEGEND

(A) EASEMENT FOR ROAD PURPOSES GRANTED TO W.D. CANNON RECORDED ON JANUARY 21, 1953 IN BOOK 4722, PAGE 361, O.R.

ALSO, AN EASEMENT AND RIGHT OF WAY FOR WATER PIPELINE PURPOSES.

ALSO, AN EASEMENT AND RIGHT OF WAY FOR ROAD AND FOR WATER PIPELINE PURPOSES OVER THE EASTERLY 20 FEET OF THE SOUTHERLY 576.45 FEET OF THE PARCEL OF LAND CONVEYED TO SAN DIEGO GAS AND ELECTRIC COMPANY BY DEED RECORDED IN BOOK 2974, PAGE 493, O.R.

ALSO, THE RIGHT, TITLE AND INTEREST OF GRANTOR IN ANY PIPE IN THE GROUND WITHIN SAID WATER PIPELINE RIGHTS OF WAY GRANTED HEREIN, GRANTEE, HOWEVER, TO REMOVE THE SAME OR SUCH PORTION THEREOF AS MAY CEASE TO BE USED WITHIN TWELVE MONTHS FROM DATE OF CESSATION OF USE, OTHERWISE TITLE TO SUCH PIPE TO REVERT TO THE GRANTOR, ITS SUCCESSORS OR ASSIGNS.

(B) EASEMENT FOR A PUBLIC STREET GRANTED TO THE CITY OF CARLSBAD RECORDED ON APRIL 7, 1964 AS FILE NO. 62682, O.R.

(C) EASEMENT FOR A PUBLIC STREET GRANTED TO THE CITY OF CARLSBAD RECORDED ON JUNE 24, 1964 AS FILE NO. 111718, O.R.

(D) EASEMENT FOR A SEWER PUMPING STATION GRANTED TO THE CITY OF CARLSBAD RECORDED ON APRIL 14, 1965 AS FILE NO. 66049, O.R.

(E) EASEMENT FOR A SEWER PIPELINE GRANTED TO THE CITY OF CARLSBAD RECORDED ON APRIL 14, 1965 AS FILE NO. 66050, O.R.

(F) EASEMENT FOR ROAD AND PUBLIC UTILITY GRANTED TO THE CITY OF CARLSBAD RECORDED ON NOVEMBER 13, 1972 AS FILE NO. 303347, O.R.

(G) EASEMENT FOR WATER PIPELINES, METERS, AND METER VAULT GRANTED TO THE CITY OF CARLSBAD RECORDED ON FEBRUARY 27, 1974 AS FILE NO. 74-049416, O.R.

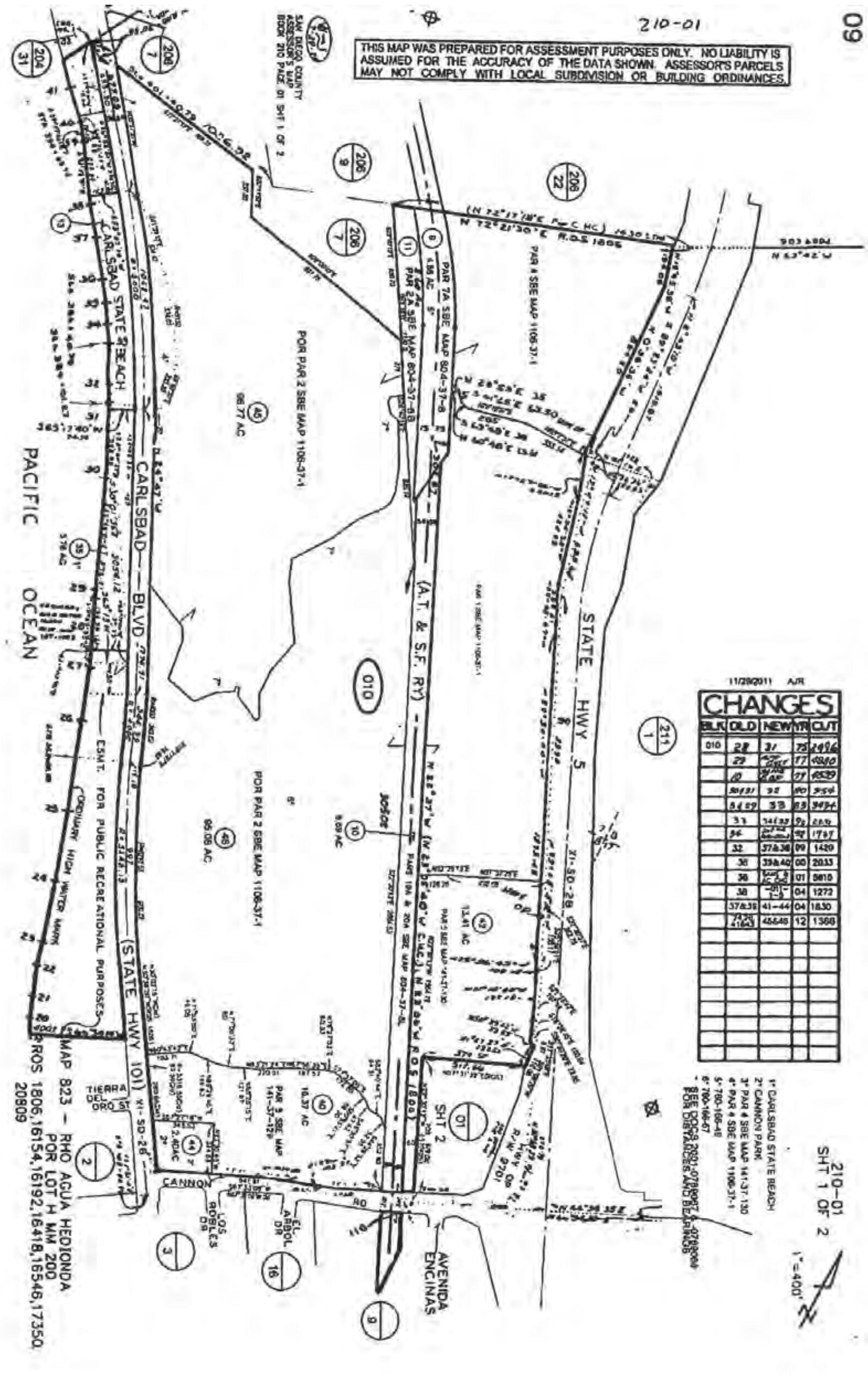
(H) INDICATES COVENANTS AND CONDITIONS CONTAINED IN AN AGREEMENT BY AND BETWEEN SAN DIEGO GAS AND ELECTRIC COMPANY AND CABRILLO POWER I LLC, A DELAWARE LIMITED LIABILITY COMPANY DATED MAY 20 1999 AND RECORDED MAY 21, 1999 AS FILE NO. 1999-0347270, O.R. REGARDING STAGING, MAINTENANCE AND OPERATION FACILITIES RELATED TO LICENSEE'S ELECTRICAL TRANSMISSION AND DISTRIBUTION SERVICES.

SHEET 2 OF 2

SAN DIEGO GAS & ELECTRIC SAN DIEGO, CALIFORNIA	ORIGINATOR: J. SEIFERT	OK TO INSTALL:	PROJECT NO.
	SURVEYED BY: NV5/JJS	R/W OK:	
NORTH COAST SERVICE CENTER SETTLEMENT AGREEMENT	DRAWN BY: NV5/ARW	DATE:	CONST. NO.
EXHIBIT J	DATE: 01-13-14	THOS. BROS. 1067-J2	DRAWING NO.
CARLSBAD	SCALE: 1"=200'		

NO.	SUPPLEMENTS	DATE:	BY	APP'D

NV5: G:\Weirich\NV5 Job Storage Pre-Number\North Coast Service Center Settlement Agreement\NCSCSA EXHIBIT.dwg POINTS FILE: N/A



THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.
SAN DIEGO COUNTY ASSESSOR'S MAP BOOK 210 PAGE 01 SHT 1 OF 2
210-01 SHT 1 OF 2
1"=400'
CHANGES
PACIFIC OCEAN
CARLSBAD STATE BEACH
CARLSBAD BLVD
(STATE HWY 101)
STATE HWY 5
(A.T. & S.F. RY)
ESMT. FOR PUBLIC RECREATIONAL PURPOSES
POR PAR 2 SBE MAP 1106-37-1
CANNON RD
AVENIDA ENCINAS
TIERRA DEL ORO ST
LOS ROBLES DR
EL ARBOL DR
MAP 823 - RHO AGUA HEDIONDA POR LOT H MM 200
ROS 1806,16154,16192,16418,16546,17350, 20909

Parcel 5

DOC # 2001-0789069

OCT 30, 2001 4:59 PM

OFFICIAL RECORDS
SAN DIEGO COUNTY RECORDER'S OFFICE
GREGORY J. SMITH, COUNTY RECORDER
FEES: 20.00

025097

2001-0789069

RECORDING
REQUESTED BY
STEWART TITLE OF CALIFORNIA

AND WHEN
RECORDED MAIL TO:

City Clerk
CITY OF CARLSBAD
1200 Carlsbad Village Dr.
Carlsbad, CA 92008

SPACE ABOVE THIS LINE FOR RECORDER'S USE

ASSESSOR'S PARCEL NO. 210-010-39-00 (portion)
PROJECT NO. & NAME: ADJ 00-10, Parcel 5
Encina Adjustment
Case No. CE 01-40

CERTIFICATE OF COMPLIANCE
FOR ADJUSTMENT PLAT
(Section 66499.35 of the Government Code)

The City Engineer has determined that the real property described below, has been divided or has resulted from a division or combining of lots in compliance with the Subdivision Map Act and with the provisions of the Carlsbad Municipal Code pursuant thereto.

OWNER(S): Cabrillo Power I LLC, a Delaware Limited Liability Company

DESCRIPTION: (See Exhibit "A" attached. Exhibit "B" is attached for clarity only.)

NOTE: The description in Exhibit "A" attached has been provided by the owner of the property and neither the City of Carlsbad nor any of its officers or employees assume responsibility for the accuracy of said description.

This Certificate of Compliance shall have no force and effect if the above owners or any subsequent transferee or assignee acquires any contiguous property other than a lot or lots shown on a recorded subdivision map, parcel map or record of survey map filed pursuant to and prior to repeal (Stats. 1955, Ch. 1593) of Section 11575 of the Business and Professions Code;

This Certificate of Compliance shall in no way affect the requirements of any other County, State or Federal agency that regulates development of real property.

DATE: 10/29/01

BY: Robert J. Wojcik
Deputy City Engineer
RCE ~~33081~~ 33698 EXP. 6/30/02

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

EXHIBIT "A" 025098
LEGAL DESCRIPTION
ADJ 00-10 - ENCINA

PARCEL 5

That portion of Rancho Agua Hedionda, in the City of Carlsbad, County of San Diego, State of California, according to Partition Map thereof No. 823, filed in the Office of the County Recorder of said County, November 16, 1896, described as follows:

Commencing at the Northeasterly corner of Record of Survey No. 14621, in the City of Carlsbad, County of San Diego, State of California, recorded in the Office of the County Recorder of San Diego County, August 14, 1994 as File No. 1994-500086, said corner being on the Westerly line of the Right-of-Way of the Atchison Topeka and Santa Fe Railroad; thence along said Westerly line and Easterly line of said Record of Survey 14621 South 28°40'19" East, 656.70 feet to the most Southerly corner of said Record of Survey No. 14621; thence continuing South 28°40'19" East, 1110.14 feet; thence South 22°30'13" East, 2664.53 feet TO THE TRUE POINT OF BEGINNING; thence continuing South 22°30'13" East, 362.82 feet to the Southeast corner of Parcel 1 described in Document No. 78-430841, recorded October 10, 1978, Official Records; thence leaving said Westerly line of Railroad and along the Southerly line of said Parcel 1, North 67°33'08" West, 941.91 feet; thence leaving said Southerly line North 22°30'45" West, 324.69 feet; thence South 67°27'18" West, 343.53 feet to the Westerly line of the 100 foot wide Carlsbad Boulevard; thence along said Westerly line of Carlsbad Boulevard North 30°02'15" West, 280.66 Feet to the beginning of a curve concave Easterly having a radius of 5316.55 feet; thence Northerly 88.59 feet along said curve through a central angle of 00°57'17"; thence leaving said Westerly line North 60°43'42" East, 203.71 feet; thence North 71°53'50" East, 49.05 feet; thence North 88°29'46" East, 149.63 feet; thence North 77°06'32" East, 80.00 feet; thence North 68°28'15" East, 121.97 feet; thence North 63°21'24" East, 220.51 feet; thence North 67°56'35" East, 167.57 feet; thence North 76°27'03" East, 60.33 feet; thence South 77°37'06" East, 172.85 feet; thence South 60°55'41" East, 66.30 feet; thence South 45°30'57" East, 47.42 feet; thence South 82°40'44" East, 84.31 feet; thence South 44°29'52" East, 52.55 feet to the TRUE POINT OF BEGINNING.

The hereinabove described parcel of land contains 16.37 acres more or less.

Prepared By:

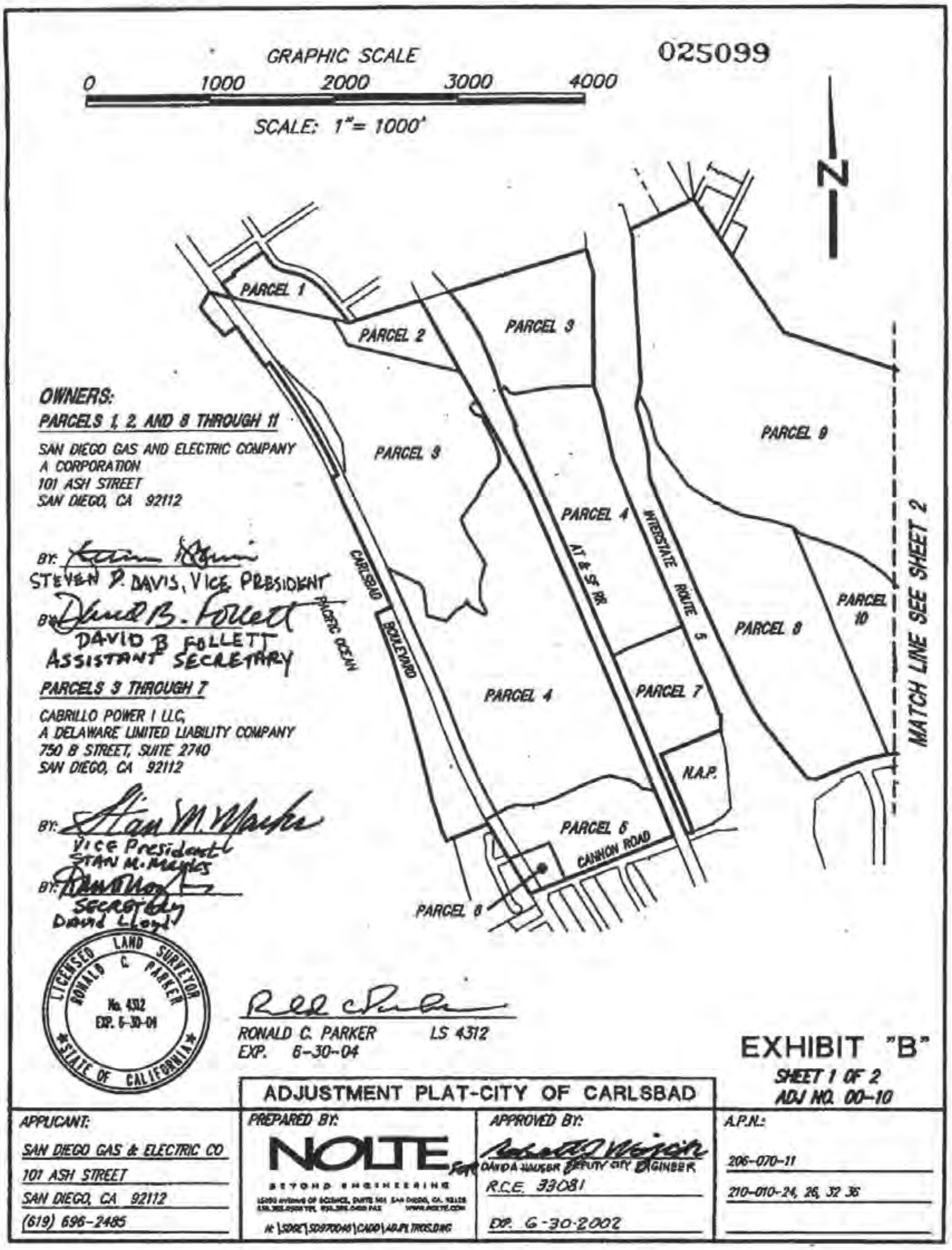
Nolte Associates, Inc.

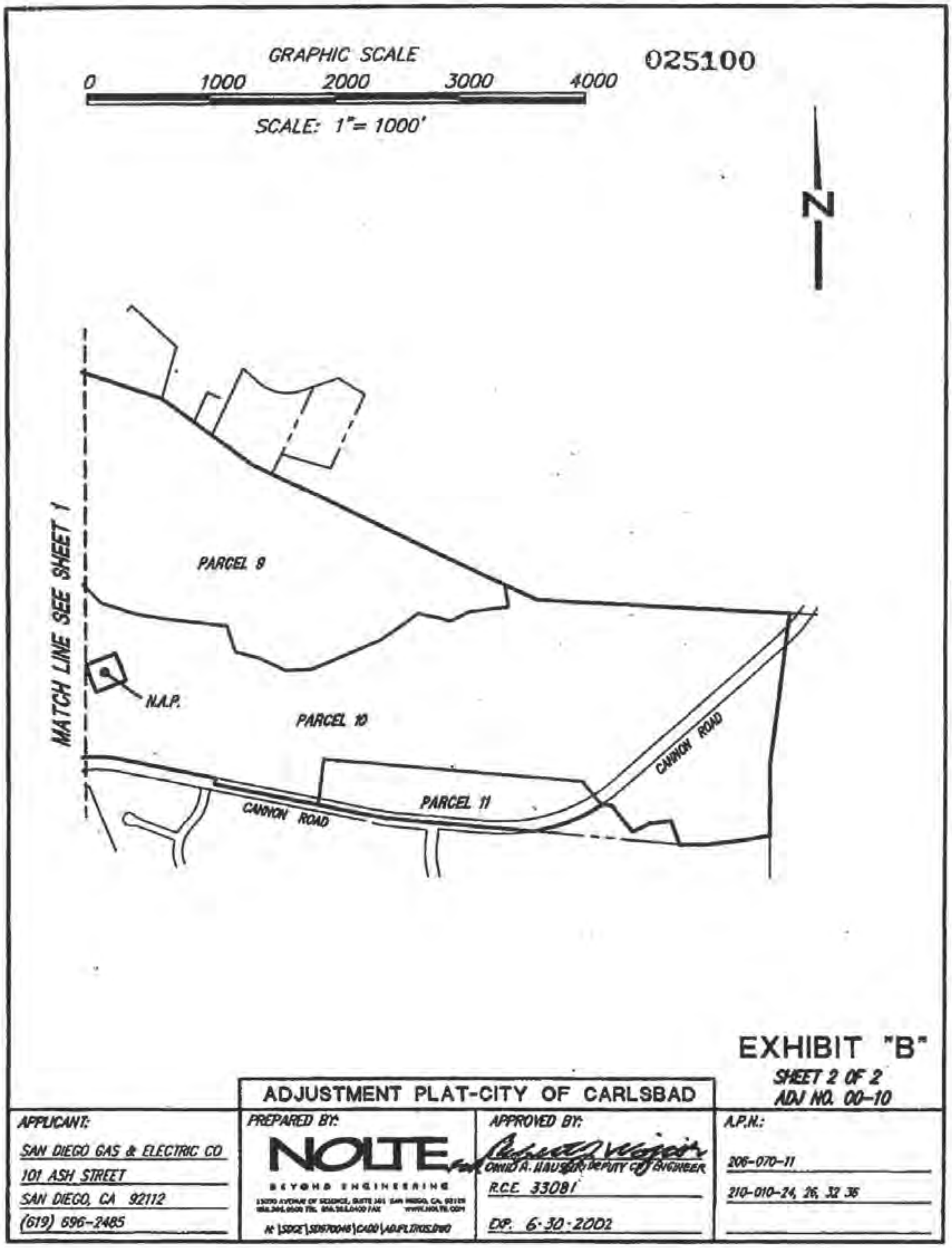
RCParker 10-22-01

Ronald C. Parker Date
Director of Survey

LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
Exp. 6/30/04
STATE OF CALIFORNIA

n:\sd1947\legal description parcel 5.doc


025099
GRAPHIC SCALE
0
1000
2000
3000
4000
SCALE: 1"= 1000'
N
PARCEL 1
PARCEL 2
PARCEL 3
PARCEL 3
PARCEL 4
PARCEL 4
PARCEL 5
PARCEL 6
PARCEL 7
PARCEL 8
PARCEL 9
PARCEL 10
N.A.P.
CARLSBAD BOULEVARD
PACIFIC OCEAN
AT & SF RR
INTERSTATE ROUTE 5
CANNON ROAD
MATCH LINE SEE SHEET 2
OWNERS:
PARCELS 1, 2, AND 8 THROUGH 11
SAN DIEGO GAS AND ELECTRIC COMPANY
A CORPORATION
101 ASH STREET
SAN DIEGO, CA 92112
BY:
STEVEN D. DAVIS, VICE PRESIDENT
BY
DAVID B. FOLLETT
ASSISTANT SECRETARY
PARCELS 3 THROUGH 7
CABRILLO POWER I LLC,
A DELAWARE LIMITED LIABILITY COMPANY
750 B STREET, SUITE 2740
SAN DIEGO, CA 92112
BY:
Vice President
STAN M. MARKS
BY:
SECRETARY
David Lloyd
LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
EXP. 6-30-04
STATE OF CALIFORNIA
RONALD C. PARKER LS 4312
EXP. 6-30-04
EXHIBIT "B"
SHEET 1 OF 2
ADJ NO. 00-10
ADJUSTMENT PLAT-CITY OF CARLSBAD
APPLICANT:
SAN DIEGO GAS & ELECTRIC CO
101 ASH STREET
SAN DIEGO, CA 92112
(619) 696-2485
PREPARED BY:
NOLTE
BEYOND ENGINEERING
APPROVED BY:
DAVID HAUSER DEPUTY CITY ENGINEER
R.C.E. 33081
EXP. 6-30-2002
A.P.N.:
206-070-11
210-010-24, 26, 32 36


GRAPHIC SCALE
0
1000
2000
3000
4000
SCALE: 1"= 1000'
025100
N
MATCH LINE SEE SHEET 1
PARCEL 9
PARCEL 10
PARCEL 11
N.A.P.
CANNON ROAD
CANNON ROAD
EXHIBIT "B"
SHEET 2 OF 2
ADJ NO. 00-10
ADJUSTMENT PLAT-CITY OF CARLSBAD
APPLICANT:
SAN DIEGO GAS & ELECTRIC CO
101 ASH STREET
SAN DIEGO, CA 92112
(619) 696-2485
PREPARED BY:
NOLTE
BEYOND ENGINEERING
APPROVED BY:
DAVID A. HAUSER DEPUTY CITY ENGINEER
R.C.E. 33081
EXP. 6-30-2002
A.P.N.:
206-070-11
210-010-24, 26, 32 36

025101

State of California)
County of San Diego)

On October 29, 2001 before me, Kelly Murphy
(Date) (Name, Title of Officer)

personally appeared Robert J. Wojcik
(Name[s] of Signer[s])

, [X] personally known to me

- OR - [ ] (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal

KELLY MURPHY
COMM. #1172628
NOTARY PUBLIC • CALIFORNIA
ORANGE COUNTY
Commission Expires Feb. 6, 2002

Kelly Murphy
Signature of Notary

(This area for official notary seal)

Title or Type of Document Certificate of Compliance for Adjustment Plat ADJ 00-10, Parcel 5

Date of Document 10/29/01 No. of Pages 4

Signer(s) other than named above

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

EXHIBIT L

Legal Description of Parcel 11

[INSERTED ON NEXT PAGE]

LEGAL DESCRIPTION

EXHIBIT L

That certain parcel of land situated in the City of Carlsbad, County of San Diego, State of California, being more particularly described as follows:

Parcel 11 as described in the Certificate of Compliance recorded on October 30, 2001 as Document No. 2001-0789075 of Official Records of said San Diego County also as shown as Parcel 11 on Record of Survey No. 17350 filed in the Office of the County Recorder of said San Diego County on April 12, 2002 as File No. 2002-0308512.

Containing 20.55 acres more or less.

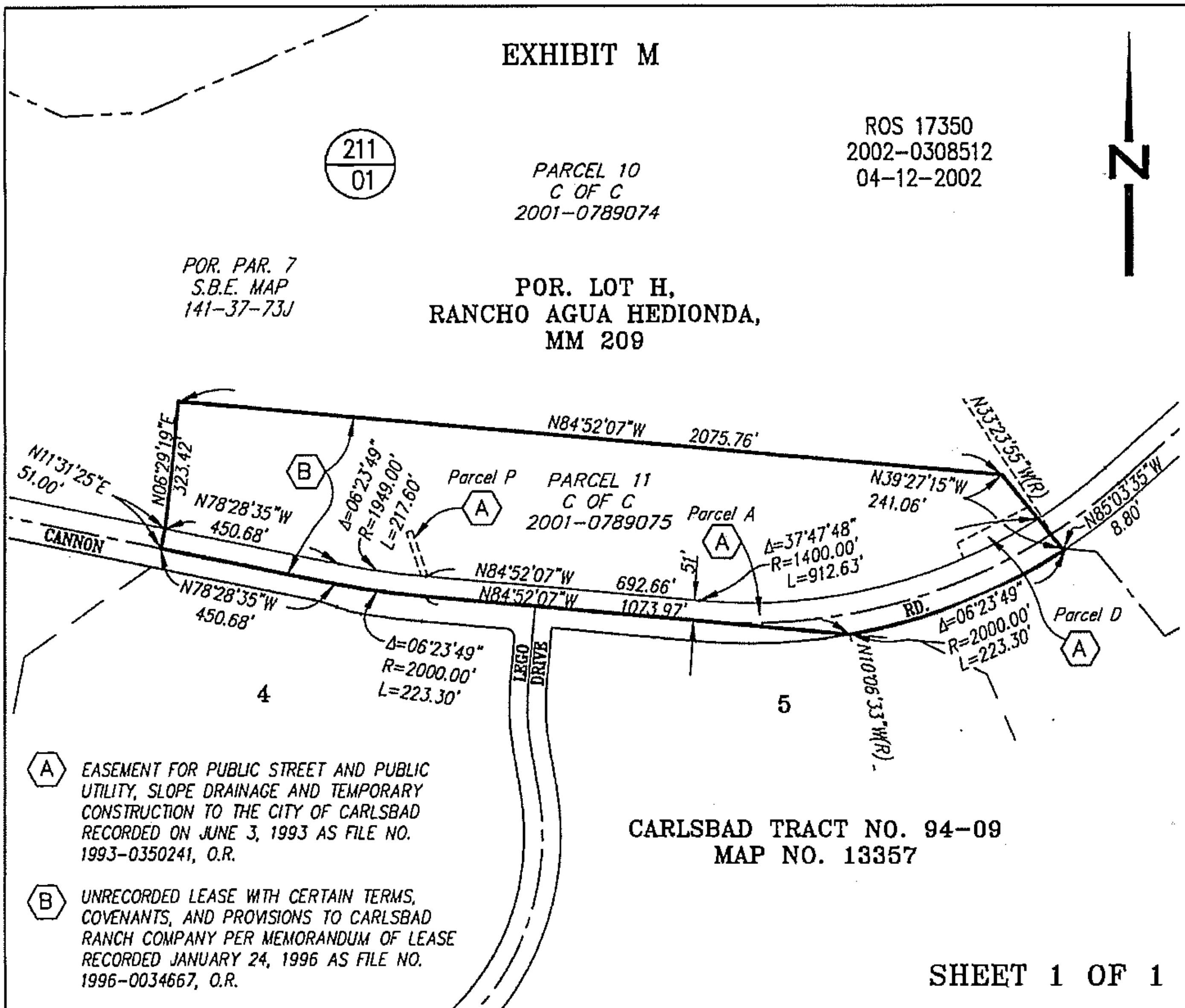
Prepared By:

1/14/14

Jeffrey J. Safford, L6703 Date

LICENSED LAND SURVEYOR
JEFFREY J SAFFORD
No. L6703
EXP. 06-30-14
* STATE OF CALIFORNIA *

EXHIBIT M



(A) EASEMENT FOR PUBLIC STREET AND PUBLIC UTILITY, SLOPE DRAINAGE AND TEMPORARY CONSTRUCTION TO THE CITY OF CARLSBAD RECORDED ON JUNE 3, 1993 AS FILE NO. 1993-0350241, O.R.

(B) UNRECORDED LEASE WITH CERTAIN TERMS, COVENANTS, AND PROVISIONS TO CARLSBAD RANCH COMPANY PER MEMORANDUM OF LEASE RECORDED JANUARY 24, 1996 AS FILE NO. 1996-0034667, O.R.

SHEET 1 OF 1

LEGEND

(A) INDICATES EASEMENT AS NOTED HEREON.

—— INDICATES BOUNDARY OF PARCEL 11 OF CERTIFICATE OF CORRECTION RECORDED OCTOBER 30, 2001 AS DOCUMENT NO. 2001-0789075 O.R. AREA = 20.55 ACRES (NET), MORE OR LESS.

THIS PLAT WAS PREPARED BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE LAND SURVEYOR'S ACT ON JANUARY 14, 2014.

Jeffrey J. Safford 1/14/14

JEFFREY J. SAFFORD L6703

LICENSED LAND SURVEYOR
JEFFREY J SAFFORD
No. L6703
EXP. 06-30-14
STATE OF CALIFORNIA

SAN DIEGO GAS & ELECTRIC SAN DIEGO, CALIFORNIA	ORIGINATOR: J. SEIFERT	OK TO INSTALL:	PROJECT NO.
	SURVEYED BY: NV5/JJS	R/W OK:	
NORTH COAST SERVICE CENTER SETTLEMENT AGREEMENT	DRAWN BY: NV5/ARW	DATE:	CONST. NO.
EXHIBIT M	DATE: 01-13-14	THOS. BROS. 1067-J2	DRAWING NO.
CARLSBAD	SCALE: 1"=400'		

NO.	SUPPLEMENTS	DATE:	BY	APP'D

NV5: G:\Weirich\NV5 Job Storage Pre-Number\North Coast Service Center Settlement Agreement\NCSCSA EXHIBIT.dwg POINTS FILE: N/A

T

DOC # 2001-0789075

OCT 30, 2001 4:59 PM

RECORDING
REQUESTED BY
STEWART TITLE OF CALIFORNIA
AND WHEN
RECORDED MAIL TO:

OFFICIAL RECORDS
SAN DIEGO COUNTY RECORDER'S OFFICE
GREGORY J. SMITH, COUNTY RECORDER
FEES: 20.00

025128

City Clerk
CITY OF CARLSBAD
1200 Carlsbad Village Dr.
Carlsbad, CA 92008

RD
3
ICM

2001-0789075

SPACE ABOVE THIS LINE FOR RECORDER'S USE

ASSESSOR'S PARCEL NO. 211-010-28-00
PROJECT NO. & NAME: ADJ 00-10, Parcel 11
Encina Adjustment
Case No. CE 01-46

CERTIFICATE OF COMPLIANCE
FOR ADJUSTMENT PLAT
(Section 66499.35 of the Government Code)

The City Engineer has determined that the real property described below, has been divided or has resulted from a division or combining of lots in compliance with the Subdivision Map Act and with the provisions of the Carlsbad Municipal Code pursuant thereto.

OWNER(S): San Diego Gas & Electric Company, a Corporation

DESCRIPTION: (See Exhibit "A" attached. Exhibit "B" is attached for clarity only.)

NOTE: The description in Exhibit "A" attached has been provided by the owner of the property and neither the City of Carlsbad nor any of its officers or employees assume responsibility for the accuracy of said description.

This Certificate of Compliance shall have no force and effect if the above owners or any subsequent transferee or assignee acquires any contiguous property other than a lot or lots shown on a recorded subdivision map, parcel map or record of survey map filed pursuant to and prior to repeal (Stats. 1955, Ch. 1593) of Section 11575 of the Business and Professions Code;

This Certificate of Compliance shall in no way affect the requirements of any other County, State or Federal agency that regulates development of real property.

DATE: 10/29/01

BY: Robert J. Wojcik
Deputy City Engineer
RCE ~~33081~~ 33698 EXP. ~~6~~/30/02

EXHIBIT "A"
LEGAL DESCRIPTION
ADJ 00-10 - ENCINA

025129

PARCEL 11

Parcel B of Certificate of Compliance recorded November 22, 1995 as File No. 1995-0532901 of Official Records, in the City of Carlsbad, County of San Diego, State of California.

The hereinabove described parcel of land contains 20.55 acres more or less.

Prepared By:

Nolte Associates, Inc.

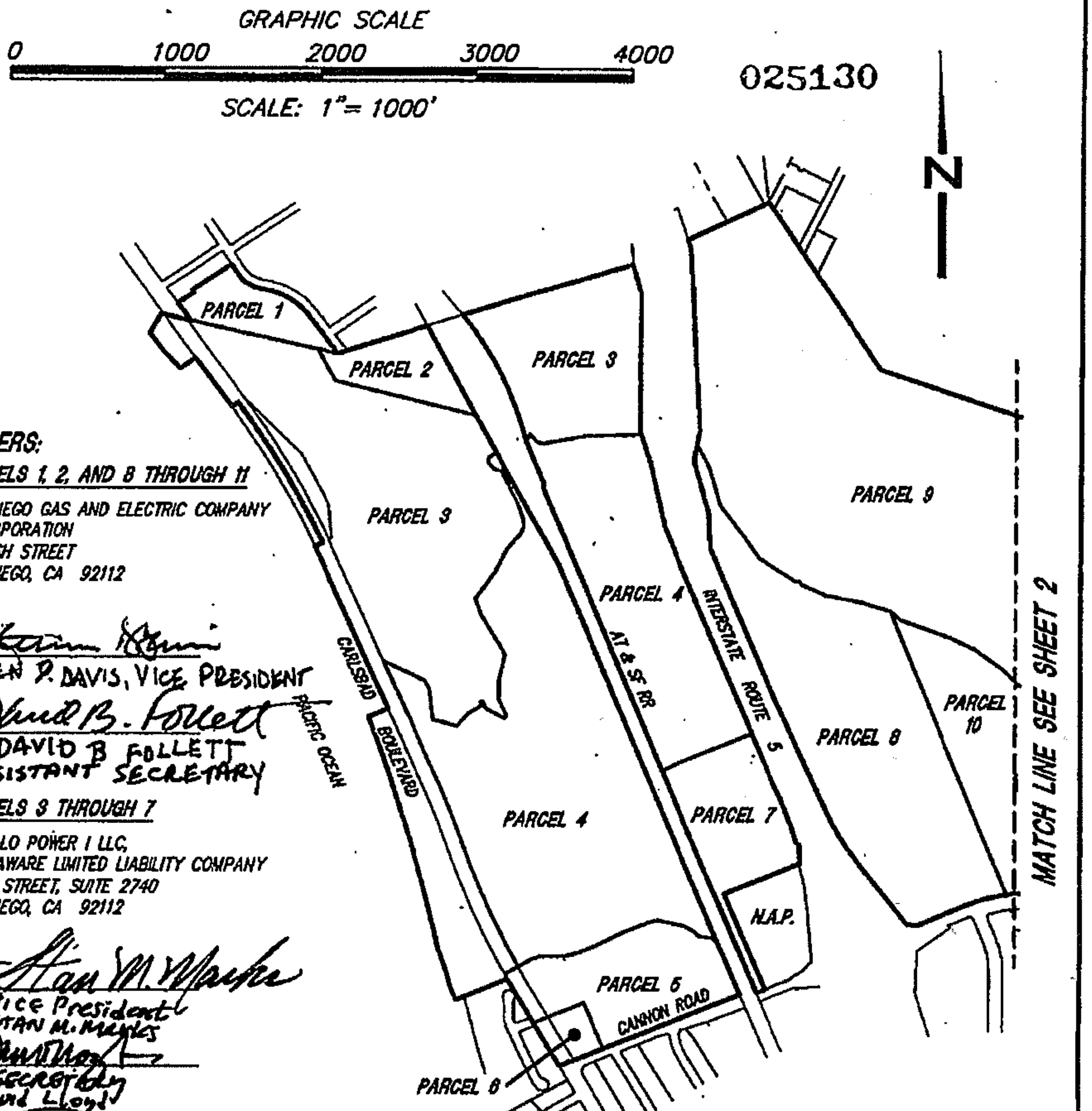
10/22/01

Ronald C. Parker — Date
Director of Survey

LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
Exp. 6/30/04
STATE OF CALIFORNIA

n:\sd1947\parcel 11.doc

025130



OWNERS:

PARCELS 1, 2, AND 8 THROUGH 11

SAN DIEGO GAS AND ELECTRIC COMPANY
A CORPORATION
101 ASH STREET
SAN DIEGO, CA 92112

BY: [signature]
STEVEN D. DAVIS, VICE PRESIDENT

BY: David B. Follett
DAVID B FOLLETT
ASSISTANT SECRETARY

PARCELS 3 THROUGH 7

CABRILLO POWER I LLC,
A DELAWARE LIMITED LIABILITY COMPANY
750 B STREET, SUITE 2740
SAN DIEGO, CA 92112

BY: Stan M. Marks
Vice President
STAN M. MARKS

BY: [signature]
SECRETARY
David Lloyd

LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
EXP. 6-30-04
STATE OF CALIFORNIA

[signature]
RONALD C. PARKER LS 4312
EXP. 6-30-04

EXHIBIT "B"

SHEET 1 OF 2
ADJ NO. 00-10

ADJUSTMENT PLAT-CITY OF CARLSBAD

APPLICANT:	PREPARED BY:	APPROVED BY:	A.P.N.:
SAN DIEGO GAS & ELECTRIC CO 101 ASH STREET SAN DIEGO, CA 92112 (619) 696-2485	NOLTE BEYOND ENGINEERING 15090 AVENUE OF SCIENCE, SUITE 101 SAN DIEGO, CA 92128 858.385.0500 TEL 858.385.0400 FAX WWW.NOLTE.COM N:\SDGE\SD970046\CADD\ADJPLT00.DWG	[signature] FOR DAVID A HAUSER DEPUTY CITY ENGINEER R.C.E. 33081 EXP. 6-30-2002	206-070-11 210-010-24, 26, 32 36

GRAPHIC SCALE

0 1000 2000 3000 4000

SCALE: 1"= 1000'

025131

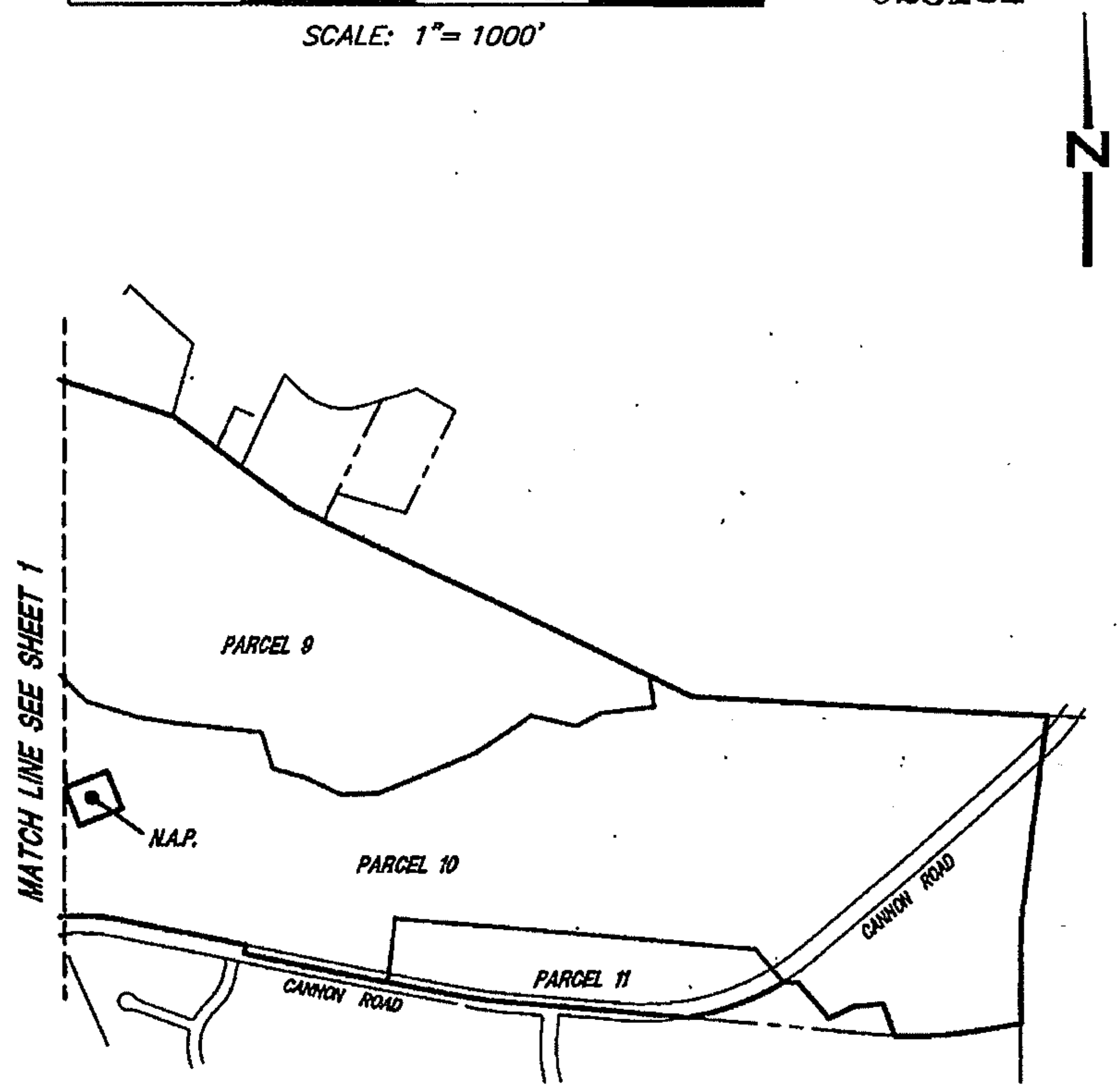


EXHIBIT "B"

SHEET 2 OF 2
ADJ NO. 00-10

ADJUSTMENT PLAT-CITY OF CARLSBAD

APPLICANT:	PREPARED BY:	APPROVED BY:	A.P.N.:
SAN DIEGO GAS & ELECTRIC CO	NOLTE BEYOND ENGINEERING	FOR DAVID A. HAUSER DEPUTY CITY ENGINEER	206-070-11
101 ASH STREET	15090 AVENUE OF SCIENCE, SUITE 101 SAN DIEGO, CA 92128 858.385.0500 TEL 858.385.0400 FAX WWW.NOLTE.COM	R.C.E. 33081	210-010-24, 26, 32 36
SAN DIEGO, CA 92112			
(619) 696-2485	H:\SDGE\SD970048\CADD\ADJPLTR05.DWG	EXP. 6-30-2002	

State of California)
County of San Diego)

025132

On October 29, 2001 before me, Kelly Murphy,
(Date) (Name, Title of Officer)

personally appeared Robert J. Wojcik
(Name[s] of Signer[s])

________________, [X] personally known to me

- OR - [ ] (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

KELLY MURPHY
COMM. #1172528
NOTARY PUBLIC • CALIFORNIA
ORANGE COUNTY
Commission Expires Feb. 6, 2002

WITNESS my hand and official seal

Kelly Murphy
Signature of Notary

(This area for official notary seal)

Title or Type of Document Certificate of Compliance for Adjustment Plat ADJ 00-10, Parcel 11

Date of Document 10/29/01 No. of Pages 4

Signer(s) other than named above ________________

EXHIBIT N

Legal Description of Cannon Park

[INSERTED ON NEXT PAGE**]**

LEGAL DESCRIPTION

EXHIBIT N

That certain parcel of land situated in the City of Carlsbad, County of San Diego, State of California, being more particularly described as follows:

Parcel 6 as described in the Certificate of Compliance recorded on October 30, 2001 as Document No. 2001-0789070 of Official Records of said San Diego County also as shown as Parcel 6 on Record of Survey No. 17350 filed in the Office of the County Recorder of said San Diego County on April 12, 2002 as File No. 2002-0308512.

Containing 2.40 acres more or less.

Prepared By:

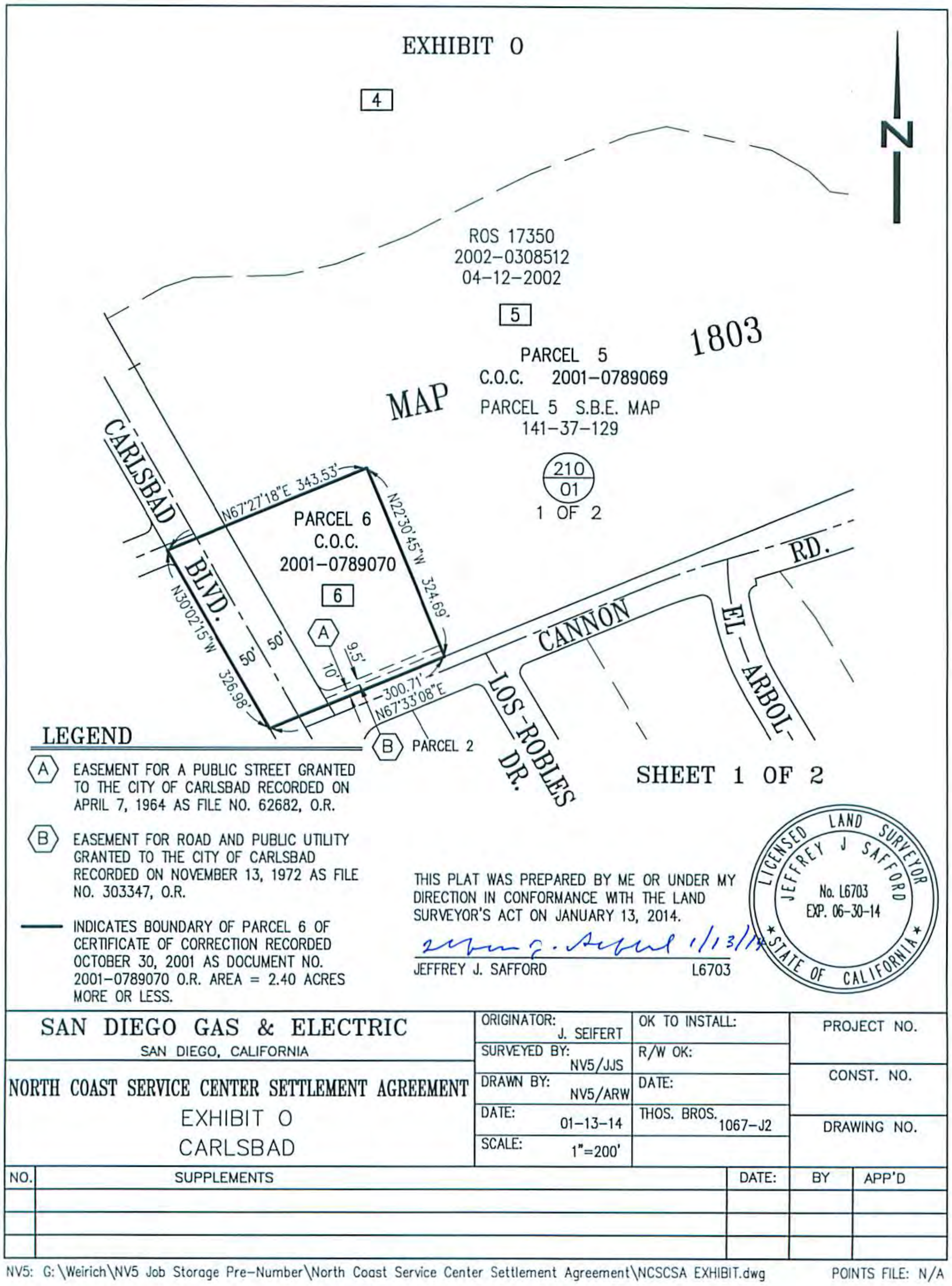
1/13/14

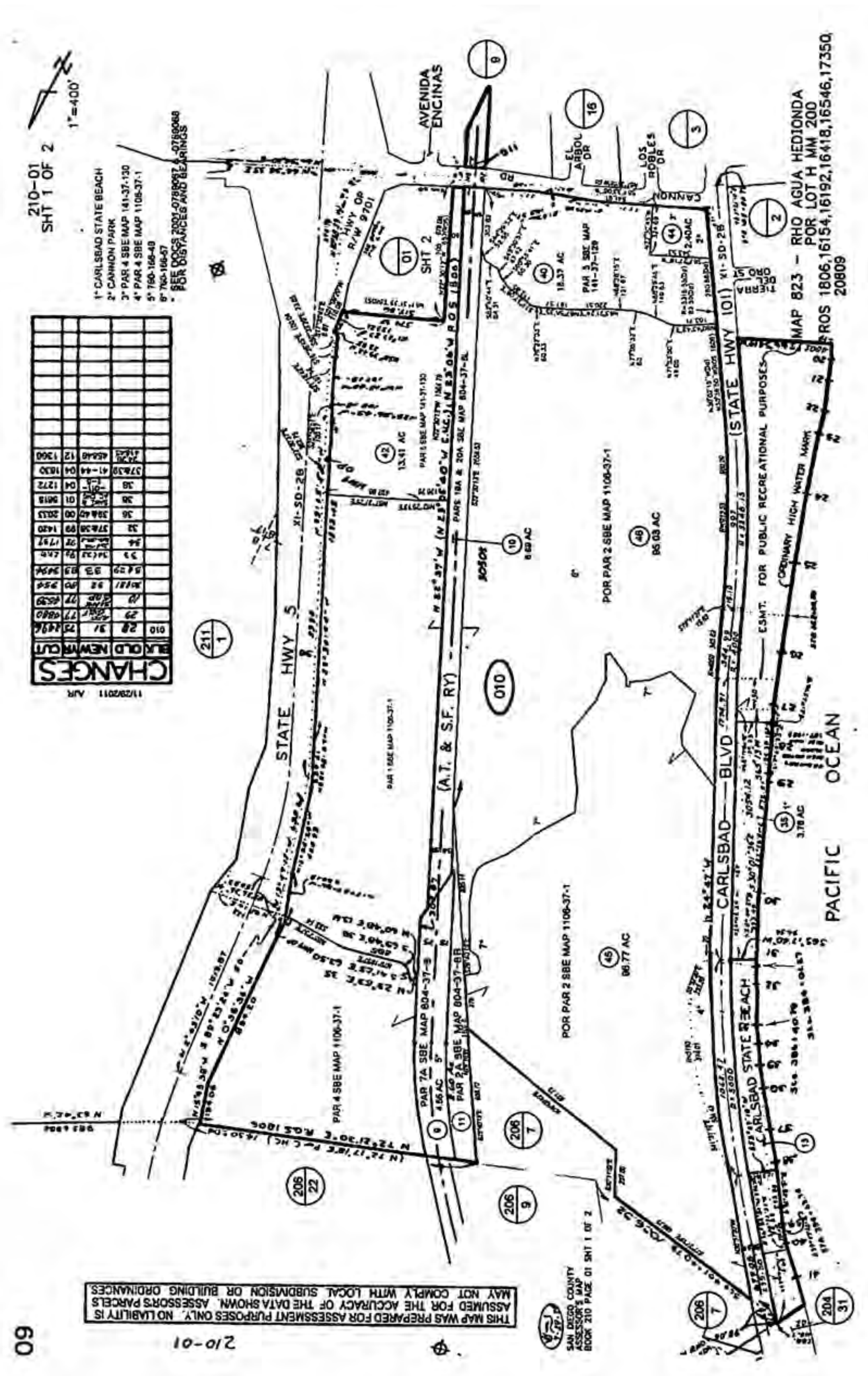
Jeffrey J. Safford, L6703 Date

LICENSED LAND SURVEYOR
JEFFREY J SAFFORD
No. L6703
EXP. 06-30-14
STATE OF CALIFORNIA

EXHIBIT O

Map of Cannon Park





210-01
SHT 1 OF 2
1"=400'
CHANGES
1- CARLSBAD STATE BEACH
2- CANNON PARK
AVENIDA ENCINAS
STATE HWY 5
(A.T. & S.F. RY)
010
CARLSBAD BLVD
(STATE HWY 101)
CARLSBAD STATE BEACH
ESMT. FOR PUBLIC RECREATIONAL PURPOSES
ORDINARY HIGH WATER MARK
PACIFIC OCEAN
MAP 823 - RHO AGUA HEDIONDA POR LOT H MM 200
ROS 1806,16154,16192,16418,16546,17350, 20809
SAN DIEGO COUNTY ASSESSOR'S MAP BOOK 210 PAGE 01 SHT 1 OF 2
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.

Exhibit O – 2

Parcel 6

DOC # 2001-0789070

OCT 30, 2001 4:59 PM

RECORDING
REQUESTED BY
STEWART TITLE OF CALIFORNIA

AND WHEN
RECORDED MAIL TO:

City Clerk
CITY OF CARLSBAD
1200 Carlsbad Village Dr.
Carlsbad, CA 92008

025102

OFFICIAL RECORDS
SAN DIEGO COUNTY RECORDER'S OFFICE
GREGORY J. SMITH, COUNTY RECORDER
FEES: 20.00

2001-0789070

SPACE ABOVE THIS LINE FOR RECORDER'S USE

ASSESSOR'S PARCEL NO. 210-010-24-00
PROJECT NO. & NAME: ADJ 00-10, Parcel 6
Encina Adjustment
Case No. CE 01-41

CERTIFICATE OF COMPLIANCE
FOR ADJUSTMENT PLAT
(Section 66499.35 of the Government Code)

The City Engineer has determined that the real property described below, has been divided or has resulted from a division or combining of lots in compliance with the Subdivision Map Act and with the provisions of the Carlsbad Municipal Code pursuant thereto.

OWNER(S): Cabrillo Power I LLC, a Delaware Limited Liability Company

DESCRIPTION: (See Exhibit "A" attached. Exhibit "B" is attached for clarity only.)

NOTE: The description in Exhibit "A" attached has been provided by the owner of the property and neither the City of Carlsbad nor any of its officers or employees assume responsibility for the accuracy of said description.

This Certificate of Compliance shall have no force and effect if the above owners or any subsequent transferee or assignee acquires any contiguous property other than a lot or lots shown on a recorded subdivision map, parcel map or record of survey map filed pursuant to and prior to repeal (Stats. 1955, Ch. 1593) of Section 11575 of the Business and Professions Code;

This Certificate of Compliance shall in no way affect the requirements of any other County, State or Federal agency that regulates development of real property.

DATE: 10/29/01

BY: Robert J. Wojcik
Deputy City Engineer
RCE ~~38081~~ EXP. ~~8~~/30/02
33698

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

025103

EXHIBIT "A"
LEGAL DESCRIPTION
ADJ 00-10 - ENCINA

PARCEL 6

That portion of Rancho Agua Hedionda, in the City of Carlsbad, County of San Diego, State of California, according to Partition Map thereof No. 823, filed in the Office of the County Recorder of said County, November 16, 1896, described as follows:

Commencing at the Northeasterly corner of Record of Survey No. 14621, in the City of Carlsbad, County of San Diego, State of California, recorded in the Office of the County Recorder of San Diego County, August 14, 1994 as File No. 1994-500086, said corner being on the Westerly line of the Right-of-Way of the Atchison Topeka and Santa Fe Railroad; thence along said Westerly line and Easterly line of said Record of Survey 14621 South 28°40'19" East, 656.70 feet to the most Southerly corner of said Record of Survey No. 14621; thence continuing South 28°40'19" East, 1110.14 feet; thence South 22°30'13" East, 2664.53 feet; thence continuing South 22°30'13" East, 362.82 feet to the Southeast corner of Parcel 1 described in Document No. 78-430841, recorded October 10, 1978, Official Records; thence leaving said Westerly line of Railroad and along the Southerly line of said Parcel 1, North 67°33'08" West, 941.91 feet TO THE TRUE POINT OF BEGINNING; thence leaving said Southerly line North 22°30'45" West, 324.69 feet; thence South 67°27'18" West, 343.53 feet to the Westerly line of the 100 foot wide Carlsbad Boulevard; thence along said Westerly line South 30°02'15" East, 326.98 feet to a line that bears South 67°33'08" West from the TRUE POINT OF BEGINNING; thence North 67°33'08" East, 300.71 feet to the TRUE POINT OF BEGINNING.

The hereinabove describe parcel of land contain 2.40 acres more or less.

Prepared By:

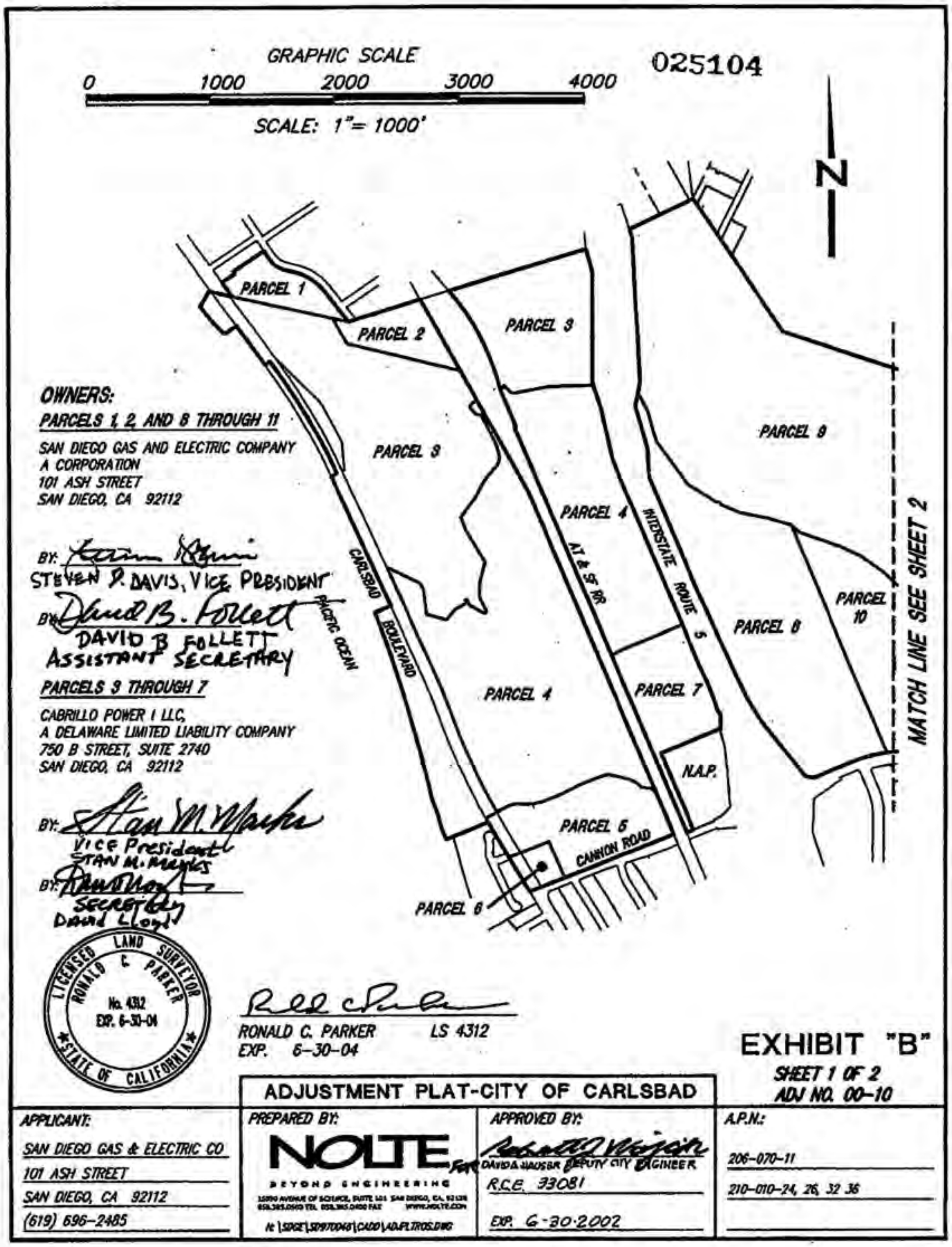
Nolte Associates, Inc.

Rld C Parker 10/22/01

Ronald C. Parker Date
Director of Survey

LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
Exp. 6/30/04
STATE OF CALIFORNIA

n:\sd1947\legal description parcel 6.doc



GRAPHIC SCALE
0
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4000
SCALE: 1"= 1000'
025104
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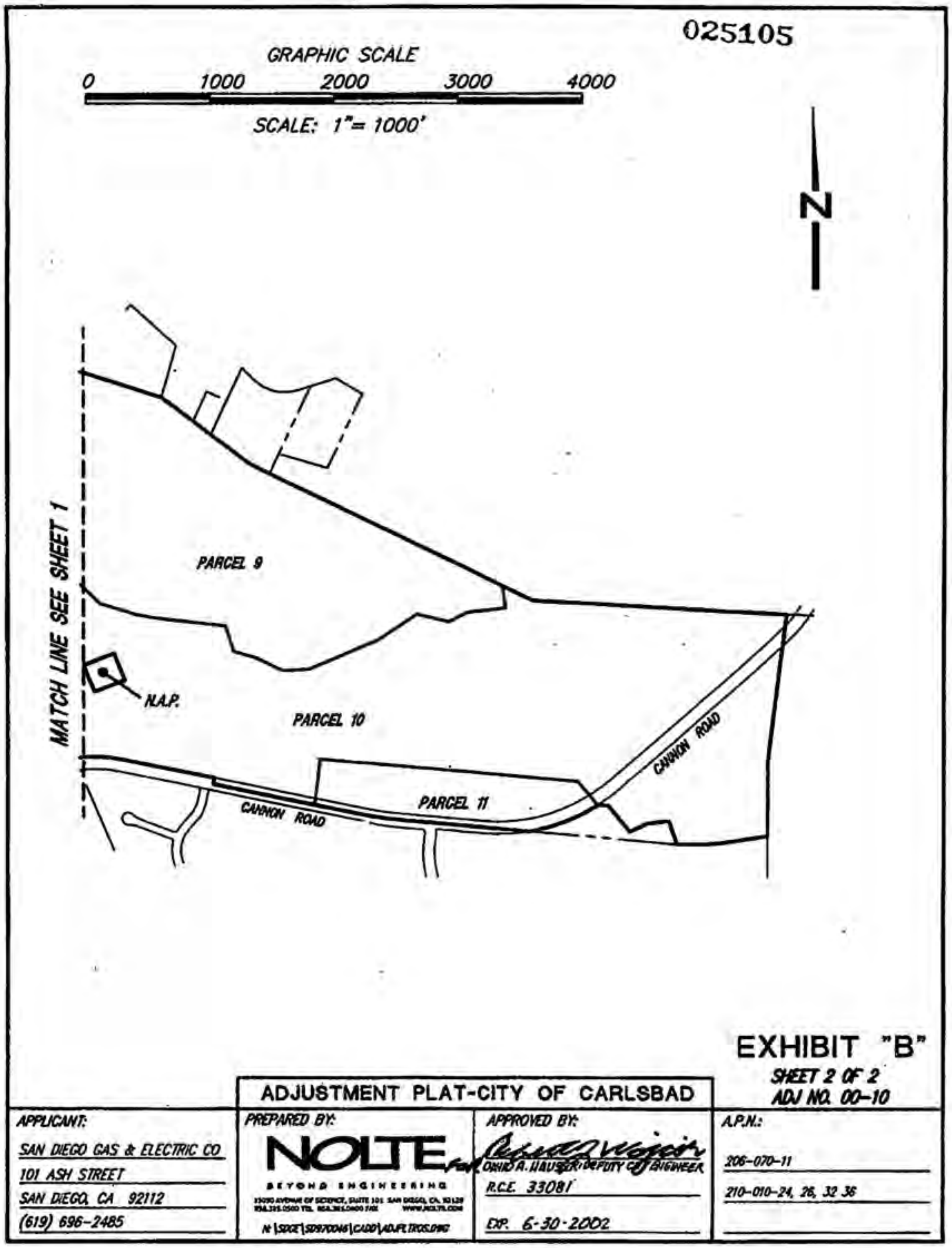
PARCEL 1
PARCEL 2
PARCEL 3
PARCEL 3
PARCEL 4
PARCEL 4
PARCEL 5
PARCEL 6
PARCEL 7
PARCEL 8
PARCEL 9
PARCEL 10
N.A.P.
CARLSBAD BOULEVARD
PACIFIC OCEAN
AT & SF RR
INTERSTATE ROUTE 5
CANNON ROAD
MATCH LINE SEE SHEET 2
OWNERS:
PARCELS 1, 2, AND 8 THROUGH 11
SAN DIEGO GAS AND ELECTRIC COMPANY
A CORPORATION
101 ASH STREET
SAN DIEGO, CA 92112
BY:
STEVEN D. DAVIS, VICE PRESIDENT
BY: David B. Follett
DAVID B FOLLETT
ASSISTANT SECRETARY
PARCELS 3 THROUGH 7
CABRILLO POWER I LLC,
A DELAWARE LIMITED LIABILITY COMPANY
750 B STREET, SUITE 2740
SAN DIEGO, CA 92112
BY: Stan M. Marks
VICE President
STAN M. MARKS
BY:
SECRETARY
David Lloyd
LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
EXP. 6-30-04
STATE OF CALIFORNIA
RONALD C. PARKER LS 4312
EXP. 6-30-04
EXHIBIT "B"
SHEET 1 OF 2
ADJ NO. 00-10
ADJUSTMENT PLAT-CITY OF CARLSBAD
APPLICANT:
SAN DIEGO GAS & ELECTRIC CO
101 ASH STREET
SAN DIEGO, CA 92112
(619) 696-2485
PREPARED BY:
NOLTE
BEYOND ENGINEERING
APPROVED BY:
DAVID A HAUSER DEPUTY CITY ENGINEER
R.C.E. 33081
EXP. 6-30-2002
A.P.N.:
206-070-11
210-010-24, 26, 32 36


025105
GRAPHIC SCALE
0
1000
2000
3000
4000
SCALE: 1"= 1000'
N
MATCH LINE SEE SHEET 1
PARCEL 9
N.A.P.
PARCEL 10
PARCEL 11
CANNON ROAD
CANNON ROAD
EXHIBIT "B"
SHEET 2 OF 2
ADJ NO. 00-10
ADJUSTMENT PLAT-CITY OF CARLSBAD
APPLICANT:
SAN DIEGO GAS & ELECTRIC CO
101 ASH STREET
SAN DIEGO, CA 92112
(619) 696-2485
PREPARED BY:
NOLTE
BEYOND ENGINEERING
APPROVED BY:
R.C.E. 33081
EXP. 6-30-2002
A.P.N.:
206-070-11
210-010-24, 26, 32 36

State of California)
County of San Diego)

025106

On October 29, 2001 before me, Kelly Murphy ,
(Date) (Name, Title of Officer)

personally appeared Robert J. Wojcik
(Name[s] of Signer[s])

, [X] personally known to me

- OR - [ ] (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal

KELLY MURPHY
COMM. #1172528
NOTARY PUBLIC • CALIFORNIA
ORANGE COUNTY
Commission Expires Feb. 6, 2002

Kelly Murphy
Signature of Notary

(This area for official notary seal)

Title or Type of Document Certificate of Compliance for Adjustment Plat ADJ 00-10, Parcel 6

Date of Document 10/29/01 No. of Pages 4

Signer(s) other than named above

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

EXHIBIT P

<u>Legal Description of Agua Hedionda North Shore Bluff Parcel</u>

[INSERTED ON NEXT PAGE**]**

LEGAL DESCRIPTION

EXHIBIT P

That certain parcel of land situated in the City of Carlsbad, County of San Diego, State of California, being more particularly described as follows:

Parcel 1 as described in the Certificate of Compliance recorded on October 30, 2001 as Document No. 2001-0789065 of Official Records of said San Diego County also as shown as Parcel 1 on Record of Survey No. 17350 filed in the Office of the County Recorder of said San Diego County on April 12, 2002 as File No. 2002-0308512.

Containing 5.76 acres more or less.

Prepared By:

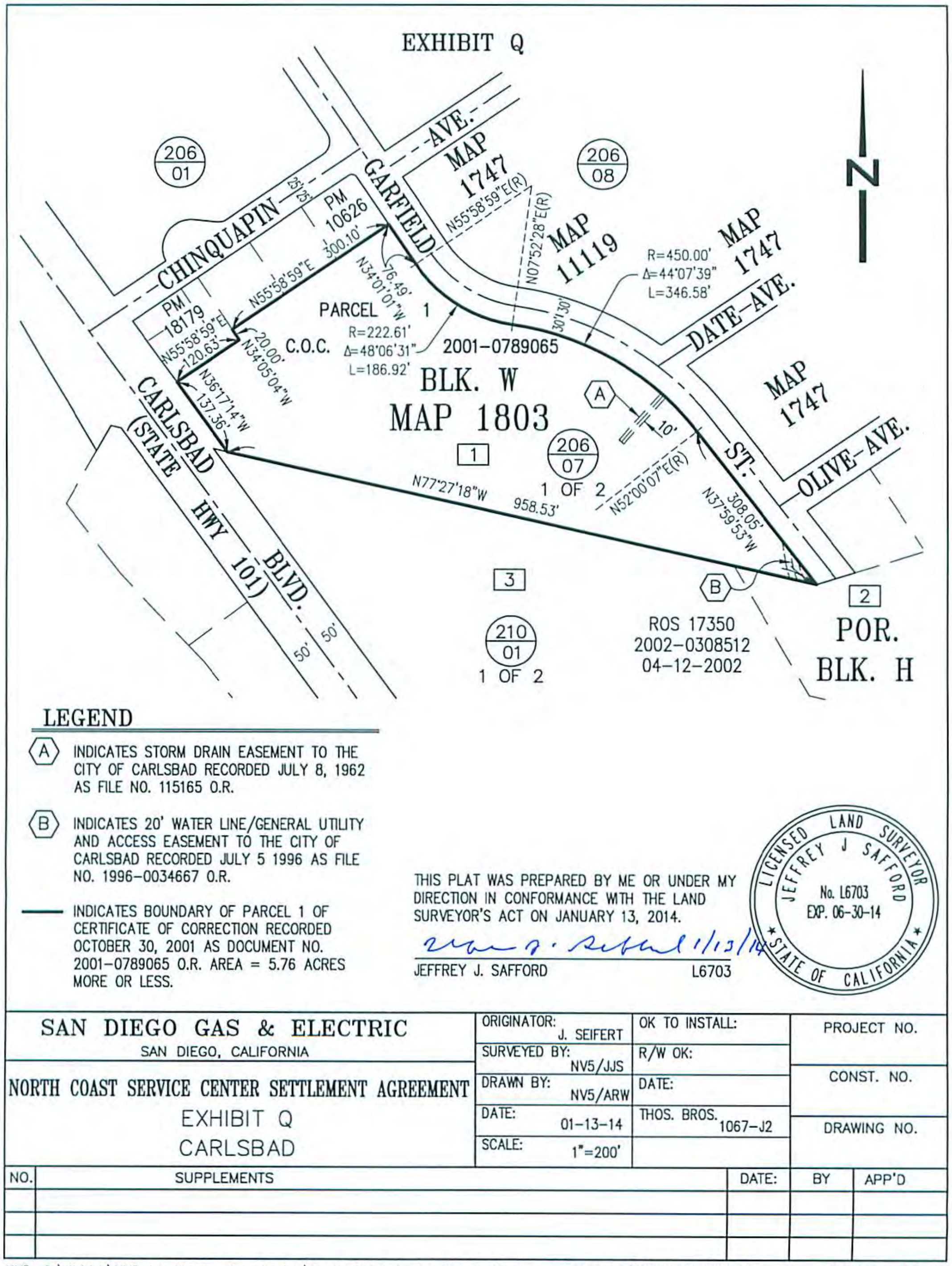
1/13/14

Jeffrey J. Safford, L6703 Date

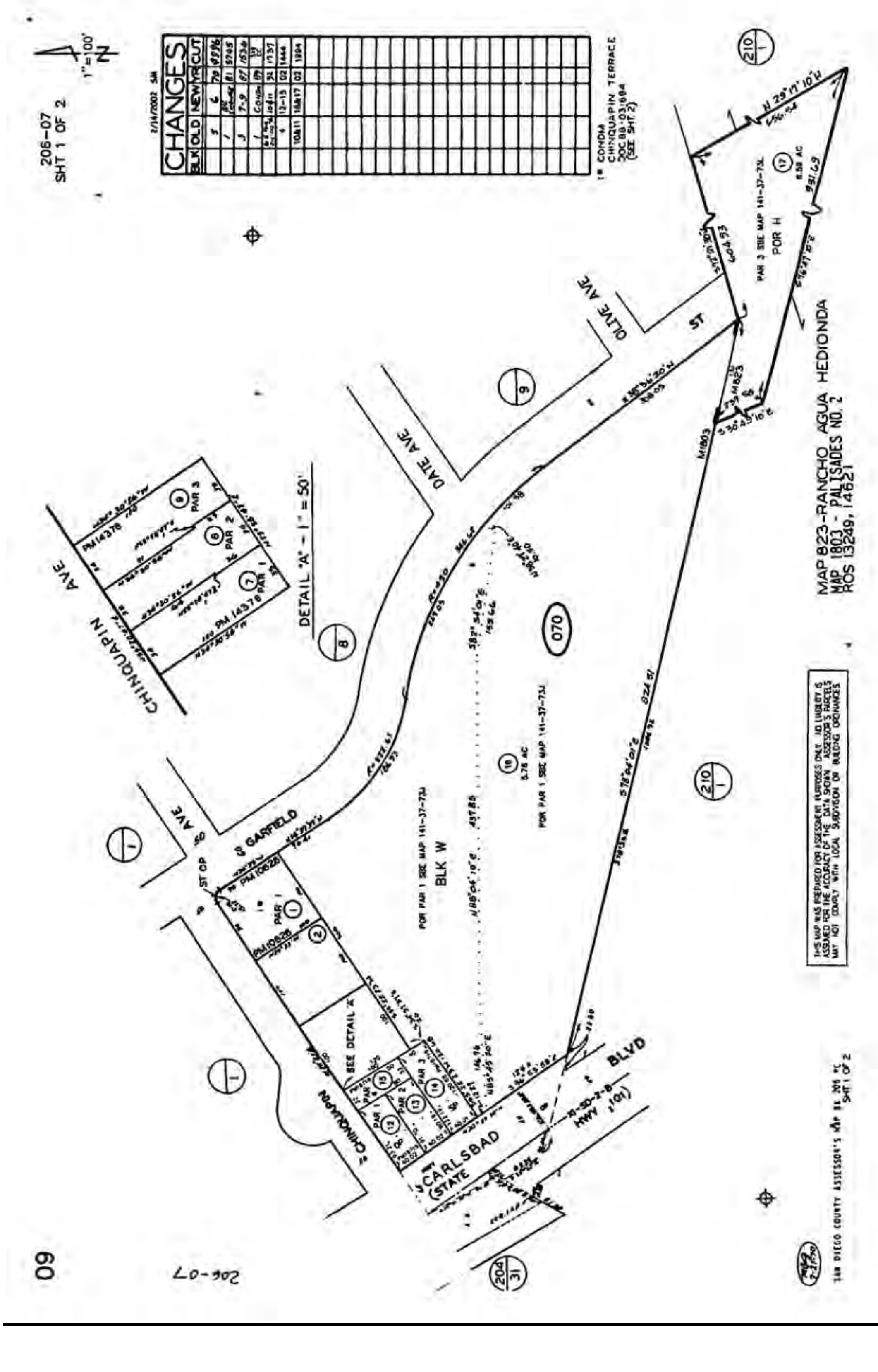
LICENSED LAND SURVEYOR
JEFFREY J SAFFORD
No. L6703
EXP. 06-30-14
STATE OF CALIFORNIA

EXHIBIT Q

Map of Agua Hedionda North Shore Bluff Parcel

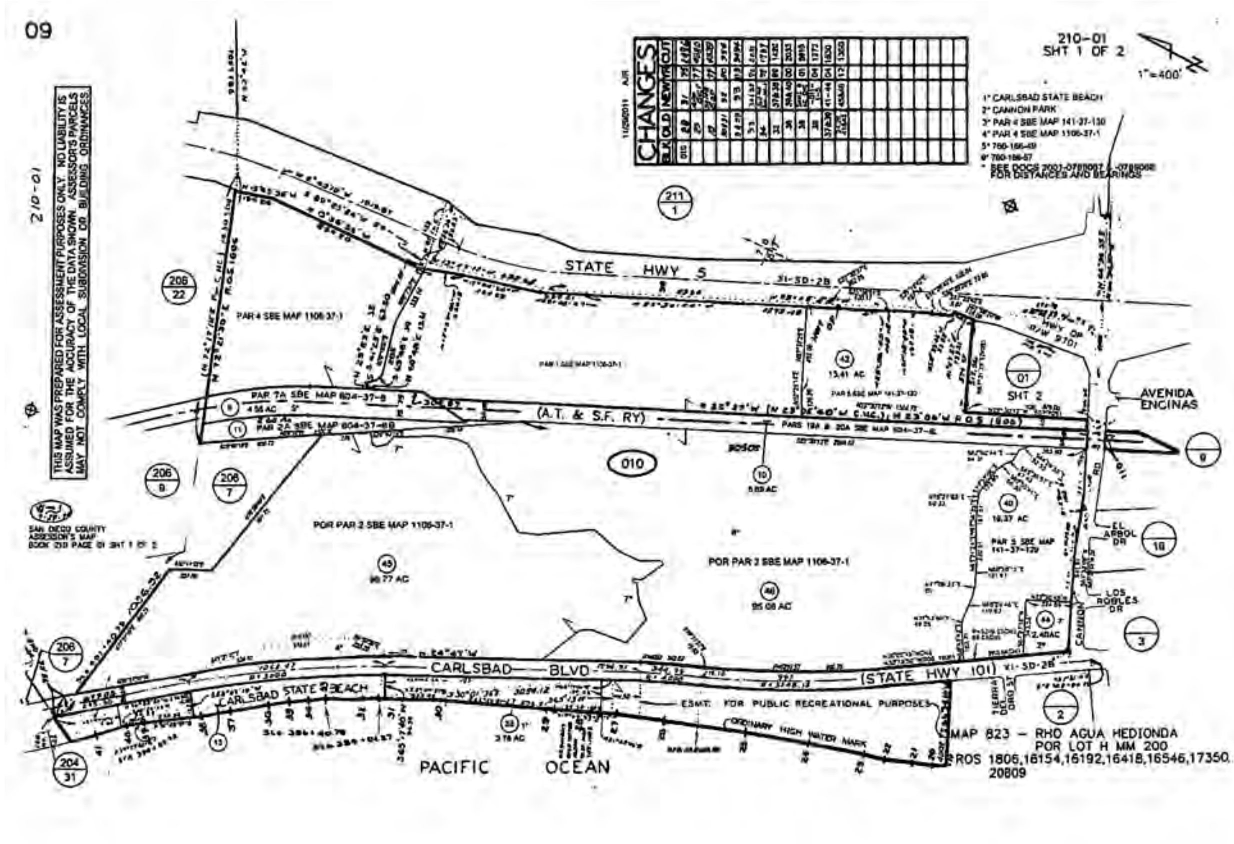


NV5: G:\Weirich\NV5 Job Storage Pre-Number\North Coast Service Center Settlement Agreement\NCSCSA EXHIBIT.dwg POINTS FILE: N/A

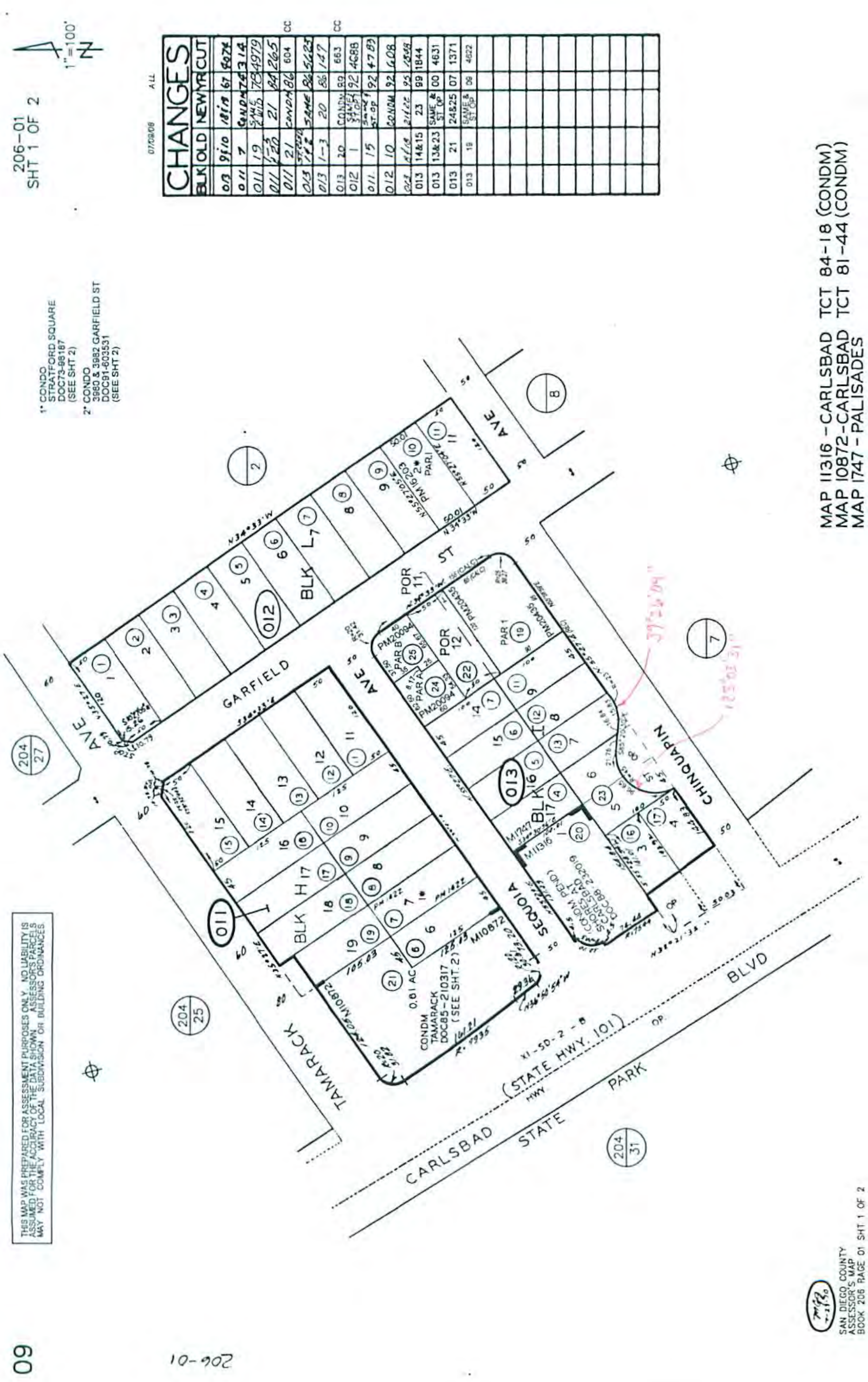


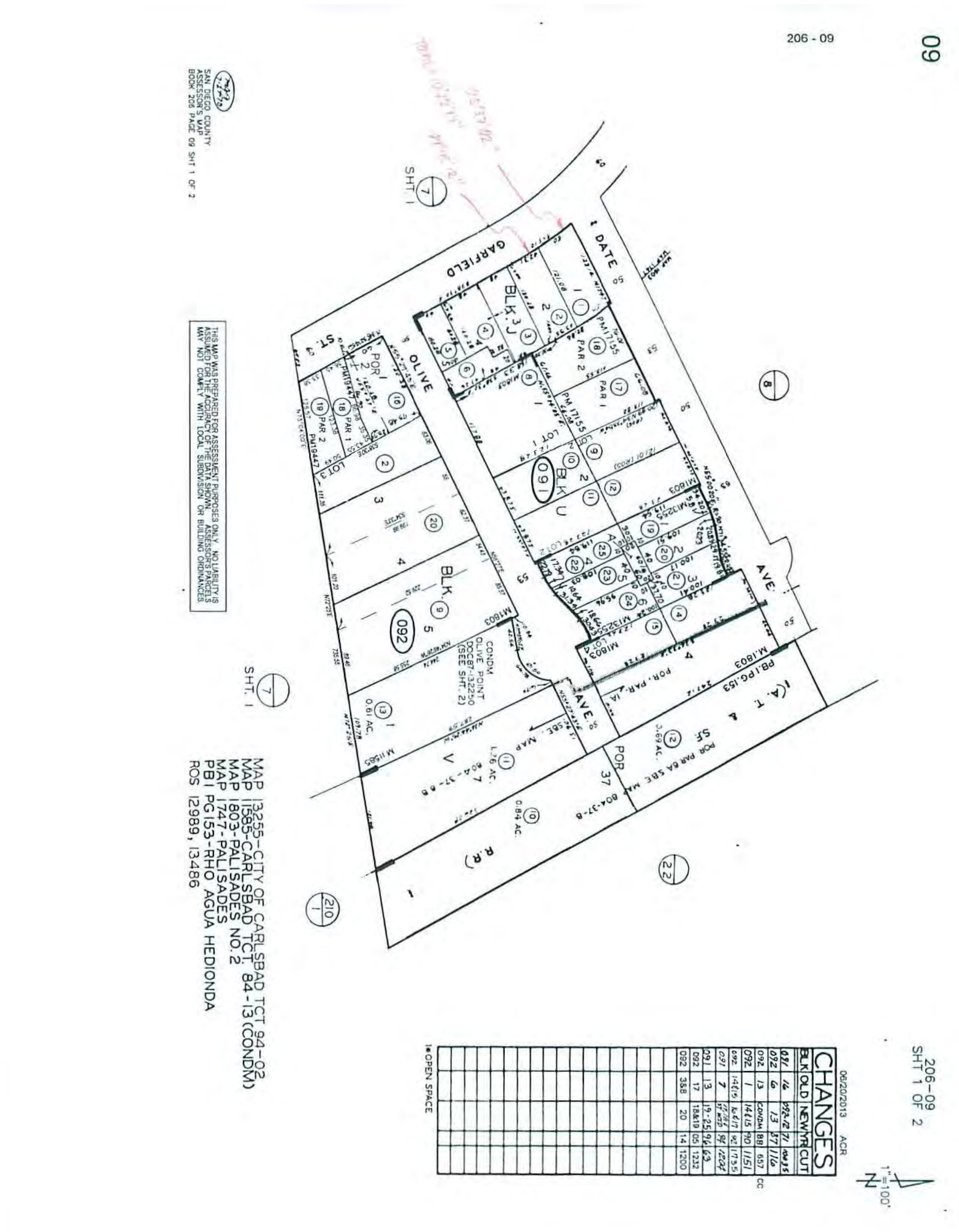
206-07
SHT 1 OF 2
1" = 100'
CHANGES
DETAIL 'A' - 1" = 50'
CHINQUAPIN AVE
DATE AVE
OLIVE AVE
CARLSBAD BLVD
MAP 823-RANCHO AGUA HEDIONDA
MAP 1803 - PALISADES NO. 2
ROS 13249, 14621

Exhibit Q – 2



09
210-01
SHT 1 OF 2
1"=400'
CHANGES
1" CARLSBAD STATE BEACH
2" CANNON PARK
STATE HWY 5
(A.T. & S.F. RY)
AVENIDA ENCINAS
CARLSBAD BLVD
(STATE HWY 101)
CARLSBAD STATE BEACH
ESMT. FOR PUBLIC RECREATIONAL PURPOSES
ORDINARY HIGH WATER MARK
PACIFIC OCEAN
MAP 823 – RHO AGUA HEDIONDA
POR LOT H MM 200
ROS 1806,16154,16192,16418,16546,17350,
20809
POR PAR 2 SBE MAP 1106-37-1
POR PAR 2 SBE MAP 1106-37-1
PAR 4 SBE MAP 1106-37-1
PAR 7A SBE MAP 604-37-8
PAR 2A SBE MAP 604-37-8B
EL ARBOL DR
LOS ROBLES DR
CANNON
SHT 2
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.
SAN DIEGO COUNTY ASSESSOR'S MAP BOOK 210 PAGE 01 SHT 1 OF 2


206-01
SHT 1 OF 2
1"=100'
N
CHANGES
BLK OLD NEW YR CUT
1* CONDO STRATFORD SQUARE DOC73-98187 (SEE SHT 2)
2* CONDO 3980 & 3982 GARFIELD ST DOC91-603531 (SEE SHT 2)
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.
GARFIELD ST
AVE
TAMARACK AVE
SEQUOIA AVE
CHINQUAPIN AVE
CARLSBAD STATE PARK BLVD
(STATE HWY. 101)
BLK H
BLK L
BLK I
011
012
013
CONDM TAMARACK DOC85-210317 (SEE SHT. 2)
MAP 11316 -CARLSBAD TCT 84-18 (CONDM)
MAP 10872-CARLSBAD TCT 81-44 (CONDM)
MAP 1747 - PALISADES
SAN DIEGO COUNTY ASSESSOR'S MAP BOOK 206 PAGE 01 SHT 1 OF 2
09
206-01


206 - 09
09
SAN DIEGO COUNTY
ASSESSOR'S MAP
BOOK 206 PAGE 09 SHT 1 OF 2
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.
DATE
GARFIELD
OLIVE
ST.
AVE.
BLK. J
BLK. U
BLK. 9
BLK. V
CONDM OLIVE POINT DOC87-132250 (SEE SHT. 2)
A.T. & S.F.
R.R.
MAP 13255-CITY OF CARLSBAD TCT 94-02
MAP 11585-CARLSBAD TCT. 84-13 (CONDM)
MAP 1803-PALISADES NO. 2
MAP 1747-PALISADES
PB1 PG153-RHO AGUA HEDIONDA
ROS 12989, 13486
206-09
SHT 1 OF 2
CHANGES
06/20/2013
ACR
1"=100'
1=OPEN SPACE

Parcel 1

DOC # 2001-0789065

OCT 30, 2001 4:59 PM

OFFICIAL RECORDS
SAN DIEGO COUNTY RECORDER'S OFFICE
GREGORY J. SMITH, COUNTY RECORDER
FEES: 20.00

025074

RECORDING
REQUESTED BY
STEWART TITLE OF CALIFORNIA
AND WHEN
RECORDED MAIL TO:

City Clerk
CITY OF CARLSBAD
1200 Carlsbad Village Dr.
Carlsbad, CA 92008

2001-0789065

SPACE ABOVE THIS LINE FOR RECORDER'S USE

ASSESSOR'S PARCEL NO.	206-070-10-00 and 206-070-11-00 (portion)
PROJECT NO. & NAME: Encina Adjustment	ADJ 00-10, Parcel 1
Case No. CE 01-36	

CERTIFICATE OF COMPLIANCE
FOR ADJUSTMENT PLAT
(Section 66499.35 of the Government Code)

The City Engineer has determined that the real property described below, has been divided or has resulted from a division or combining of lots in compliance with the Subdivision Map Act and with the provisions of the Carlsbad Municipal Code pursuant thereto.

OWNER(S): San Diego Gas & Electric Company, a Corporation

DESCRIPTION: (See Exhibit "A" attached. Exhibit "B" is attached for clarity only.)

NOTE: The description in Exhibit "A" attached has been provided by the owner of the property and neither the City of Carlsbad nor any of its officers or employees assume responsibility for the accuracy of said description.

This Certificate of Compliance shall have no force and effect if the above owners or any subsequent transferee or assignee acquires any contiguous property other than a lot or lots shown on a recorded subdivision map, parcel map or record of survey map filed pursuant to and prior to repeal (Stats. 1955, Ch. 1593) of Section 11575 of the Business and Professions Code;

This Certificate of Compliance shall in no way affect the requirements of any other County, State or Federal agency that regulates development of real property.

DATE: 10/29/01

BY: Robert J. Wojcik
Deputy City Engineer
RCE ~~33084~~ 33698 EXP. ~~8~~/30/02

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

025075

EXHIBIT "A"
LEGAL DESCRIPTION
ADJ 00-10 - ENCINA

PARCEL 1

All of Block "W" of Palisades Unit No. 2, according to Map thereof No. 1803, filed in the office of the County Recorder of said San Diego County, August 25, 1924; EXCEPTING therefrom, the Northeasterly 300 feet of the Northwesterly 100 feet thereof; ALSO EXCEPTING the Northwesterly 120 feet of said Block "W" lying Southwesterly of the Southwesterly line of said Northeasterly 300 feet, and the Southeasterly prolongation of said Southwesterly line.

The hereinabove described parcel of land contains 5.76 acres more or less.

Prepared By:

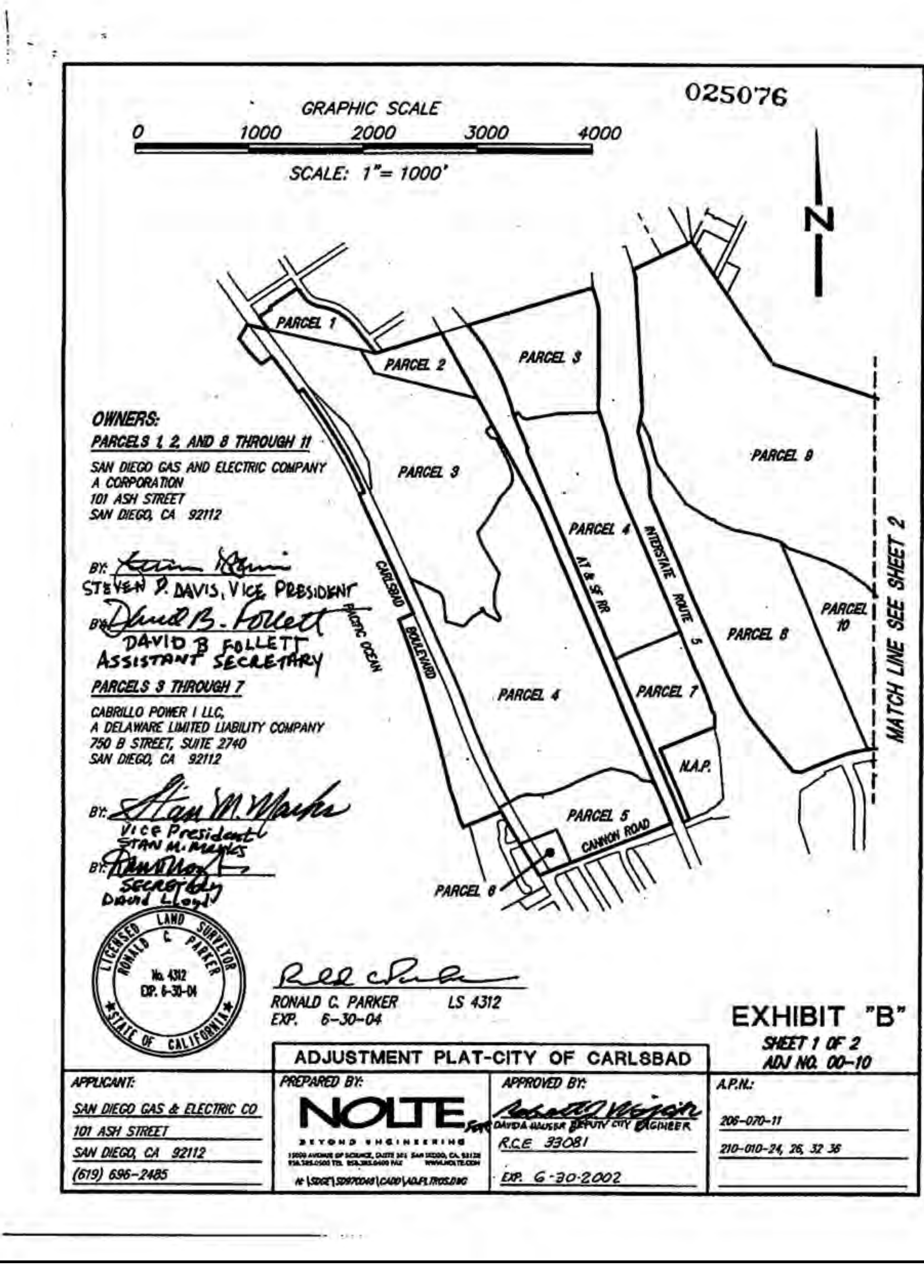
Nolte Associates, Inc.

10-22-01

Ronald C. Parker　　Date
Director of Survey

LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
Exp. 6/30/04
STATE OF CALIFORNIA

n:\sd1947\legal description parcel 1.doc



025076
GRAPHIC SCALE
0 1000 2000 3000 4000
SCALE: 1"= 1000'
N
PARCEL 1
PARCEL 2
PARCEL 3
PARCEL 3
PARCEL 4
PARCEL 4
PARCEL 5
PARCEL 6
PARCEL 7
PARCEL 8
PARCEL 9
PARCEL 10
N.A.P.
CARLSBAD BOULEVARD
PACIFIC OCEAN
AT & SF RR
INTERSTATE ROUTE 5
CANNON ROAD
MATCH LINE SEE SHEET 2
OWNERS:
PARCELS 1, 2, AND 8 THROUGH 11
SAN DIEGO GAS AND ELECTRIC COMPANY
A CORPORATION
101 ASH STREET
SAN DIEGO, CA 92112
BY:
STEVEN D. DAVIS, VICE PRESIDENT
BY: David B. Follett
DAVID B FOLLETT
ASSISTANT SECRETARY
PARCELS 3 THROUGH 7
CABRILLO POWER I LLC,
A DELAWARE LIMITED LIABILITY COMPANY
750 B STREET, SUITE 2740
SAN DIEGO, CA 92112
BY: Stan M. Marks
Vice President
STAN M. MARKS
BY:
SECRETARY
David Lloyd
LICENSED LAND SURVEYOR
RONALD C. PARKER
No. 4312
EXP. 6-30-04
STATE OF CALIFORNIA
RONALD C. PARKER LS 4312
EXP. 6-30-04
EXHIBIT "B"
SHEET 1 OF 2
ADJ NO. 00-10
ADJUSTMENT PLAT-CITY OF CARLSBAD
APPLICANT:
SAN DIEGO GAS & ELECTRIC CO
101 ASH STREET
SAN DIEGO, CA 92112
(619) 696-2485
PREPARED BY:
NOLTE
BEYOND ENGINEERING
APPROVED BY:
DAVID A HAUSER DEPUTY CITY ENGINEER
R.C.E. 33081
EXP. 6-30-2002
A.P.N.:
206-070-11
210-010-24, 26, 32 36

025077

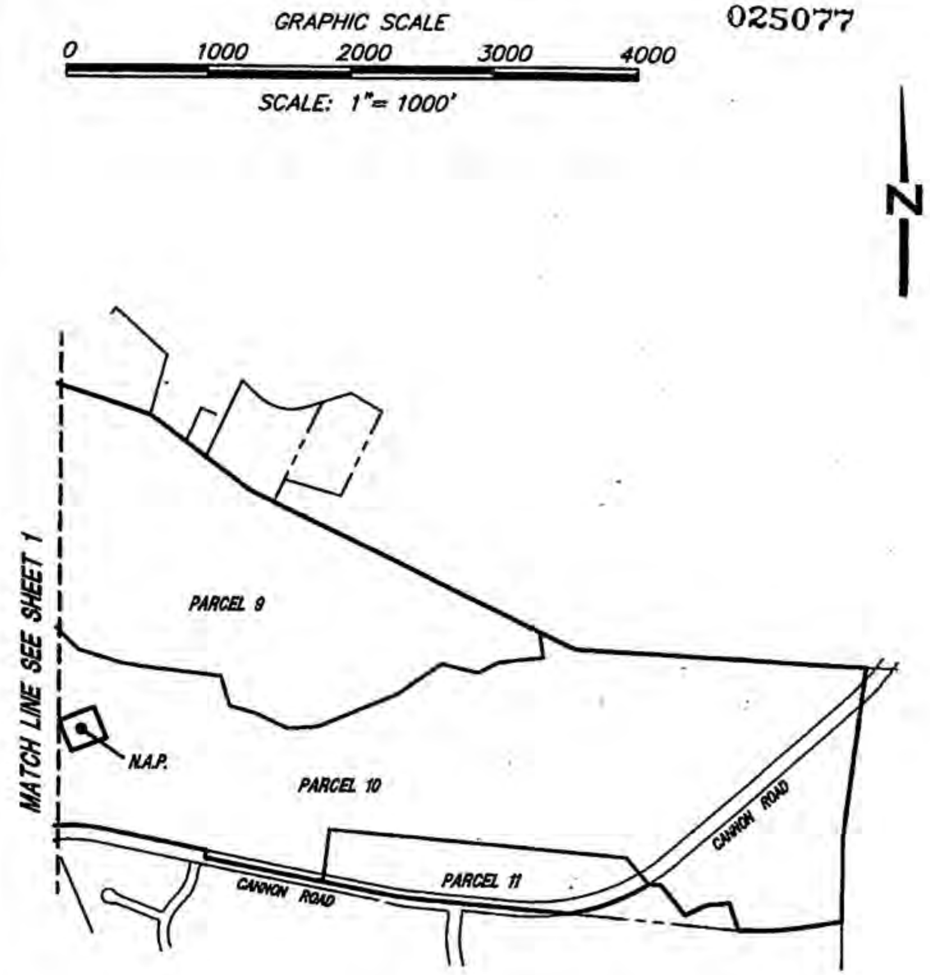


EXHIBIT "B"

SHEET 2 OF 2
ADJ NO. 00-10

ADJUSTMENT PLAT-CITY OF CARLSBAD			
APPLICANT:	PREPARED BY:	APPROVED BY:	A.P.N.:
SAN DIEGO GAS & ELECTRIC CO 101 ASH STREET SAN DIEGO, CA 92112 (619) 696-2485	NOLTE BEYOND ENGINEERING	DAVID A. HAUSER, DEPUTY CITY ENGINEER R.C.E. 33081 EXP. 6-30-2002	206-070-11 210-010-24, 26, 32 36

025078

State of California)
County of San Diego)

On October 29, 2001 before me, Kelly Murphy,
(Date) (Name, Title of Officer)

personally appeared Robert J. Wojcik
(Name[s] of Signer[s])

, ☒ personally known to me

- OR - ☐ (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal

KELLY MURPHY
COMM. #1172528
NOTARY PUBLIC • CALIFORNIA
ORANGE COUNTY
Commission Expires Feb. 6, 2002

Kelly Murphy
Signature of Notary

(This area for official notary seal)

Title or Type of Document Certificate of Compliance for Adjustment Plat ADJ 00-10, Parcel 1

Date of Document 10/29/01 No. of Pages 4

Signer(s) other than named above

Masters/Forms/Certificate of Compliance - Adj. Plat 12/17/97

EXHIBIT R

FORM OF GUARANTY

Independent Guaranty Amount

This Guaranty is executed and delivered as of this _____ day of --------------------, 2014 by NRG Energy, Inc., a Delaware corporation ("Guarantor"), in favor of the City of Carlsbad, a charter city, located in San Diego County ("City"), in connection with the performance by Cabrillo Power I LLC, a limited liability company, and Carlsbad Energy Center LLC, a limited liability company (collectively ("Owner") of a Settlement Agreement dated January 14, 2014 between Owner and City (the "Settlement").

- RECITALS -

A. WHEREAS, the Owner operates facilities known as Units 1-5 (individually a "Unit" and collectively the "Units," the "Encina Power Station" or the "Station") for the purpose of generating and selling electric power;

B. WHEREAS, the Owner intends to build and operate new facilities known as the Carlsbad Energy Center Project ("CECP") for the purpose of generating and selling electric power, and the City has historically opposed such project;

C. WHEREAS, the Parties have entered the Settlement to fully and finally resolve disputes involving the CECP and the retirement and removal of the Encina Power Station, by providing for, among other things: (i) the retirement, decommissioning, and removal of the Encina Power Station, (ii) the remediation and redevelopment of the Encina Power Station site, (iii) the provisions of the Amendment and the construction and development of the CECP, (iv) the relocation and construction of the new North Coast Service Center, and (v) other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.

D. WHEREAS, Owner is controlled by Guarantor. Guarantor expects to derive material benefits from the performance of the Settlement by Owner and City. To induce City to enter into the Settlement and undertake the obligations as set out in the Settlement, Guarantor has agreed to guarantee the obligations of Owner as provided in this Guaranty.

NOW, THEREFORE, in consideration of the foregoing, Guarantor agrees as follows:

- AGREEMENT -

1. Guaranty. Subject to the provisions of this Guaranty, Guarantor hereby absolutely, irrevocably, unconditionally, and fully guarantees to City the due, prompt, and complete observance, performance, and discharge of each and every obligation, including without limitation obligations that are financial or that require specific performance, of Owner under the Settlement, whether incurred before or after the date of delivery of this Guaranty (the "Obligations"). This is a guaranty of payment, not of collection, and as such, City shall not be required to institute, pursue, or exhaust any remedies against Owner before instituting suit, obtaining judgment, and executing thereon against Guarantor under this Guaranty.

2. Rights of City. Guarantor hereby grants to City, in City's discretion and without the need to notify or obtain any consent from Guarantor, and without termination, impairment, or any other effect upon Guarantor's duties hereunder, the power and authority from time to time:

(a) to renew, compromise, extend, accelerate, or otherwise change, substitute, supersede, or terminate the terms of performance of any of the Obligations, in each case in accordance with the Settlement;

(b) to grant any indulgences, forbearances, and waivers, on one or more occasions, for any length of time, with respect to Owner's performance of any of the Obligations; and

(c) to accept collateral, further guaranties, and/or other security for the Obligations, and, if so accepted, then to impair, exhaust, exchange, enforce, waive, or release any such security.

3. Performance. If any of the Obligations are not performed according to the tenor thereof, and any applicable notice and cure period provided by the Settlement has expired ("Default"), Guarantor shall immediately upon receipt of written demand by City (a) perform or cause Owner to perform the Obligation in Default, and (b) pay, reimburse, and indemnify City against any liabilities, damages, and related costs (including attorneys' fees) incurred by City as a result thereof up to but not to exceed a maximum cumulative amount of five million dollars ($5,000,000), all in such manner and at such times as City may reasonably direct.

4. Satisfaction. Satisfaction by Guarantor of any duty hereunder incident to a particular Default or the occurrence of any other Default shall not discharge Guarantor except with respect to the Default satisfied, it being the intent of Guarantor that this Guaranty be continuing until twenty (20) years after the execution date of this Guaranty or such time as all of the Obligations have irrevocably been discharged in full, whichever is sooner, at which time this Guaranty shall automatically terminate. If at any time the performance of any Obligation by Owner or Guarantor is rescinded or voided under the federal Bankruptcy Code or otherwise, then Guarantor's duties hereunder shall continue and be deemed to have been automatically reinstated, restored, and continued with respect to that Obligation, as though the performance of that Obligation had never occurred, regardless of whether this Guaranty otherwise had terminated or would have been terminated following or as a result of that performance.

5. Notice of Acceptance. Guarantor waives and acknowledges notice of acceptance of this Guaranty by City.

6. Waivers by Guarantor. Guarantor hereby waives and agrees not to assert or take advantage of:

(a) all set-offs, counterclaims, and, subject to Section 3 above, all presentments, demands for performance, notices of non-performance, protests, and notices of every kind that may be required by Applicable Laws;

(b) any right to require City to proceed against Owner or any other person, or to require City first to exhaust any remedies against Owner or any other person, before proceeding against Guarantor hereunder;

(c) any defense based upon an election of remedies by City;

(d) any duty of City to protect or not impair any security for the Obligations;

(e) the benefit of any laws limiting the liability of a surety;

(f) any duty of City to disclose to Guarantor any facts concerning Owner, the Settlement, or any other circumstances, that would or allegedly would increase the risk to Guarantor under this Guaranty, whether now known or hereafter learned by City, it being understood that Guarantor is capable of and assumes the responsibility for being and remaining informed as to all such facts and circumstances; and

(g) until all Obligations in Default have been fully paid and/or performed, any rights of subrogation, contribution, reimbursement, indemnification, or other rights of payment or recovery for any payment or performance by it hereunder. For the avoidance of doubt, if any amount is paid to Guarantor in violation of this provision, such amount shall be held by Guarantor for the benefit of, and promptly paid to, City.

7. Cumulative Remedies. The rights and remedies of City hereunder shall be cumulative and not alternative to any other rights, powers, and remedies that City may have at law, in equity, or under the Settlement. The obligations of Guarantor hereunder are independent of those of Owner and shall survive unaffected by the bankruptcy of Owner. City need not join Owner in any action against Guarantor to preserve its rights set forth herein.

8. Representations and Warranties. Guarantor represents and warrants to City as follows:

(a) Guarantor is a corporation, duly organized, validly existing, and in good standing under the laws of the state of its incorporation. Owner is a direct or indirect wholly-owned subsidiary of Guarantor. Guarantor has all necessary corporate power and authority to execute and deliver this Guaranty and to perform its obligations hereunder.

(b) The execution, delivery and performance of this Guaranty has been duly and validly authorized by all corporate proceedings of Guarantor and is not in violation of any law, judgment of court or government agency. This Guaranty has been duly and validly executed and delivered by Guarantor and constitutes a legal, valid and binding obligation of Guarantor, enforceable against Guarantor in accordance with its terms.

9. Collection Costs. Guarantor hereby agrees to pay to City, upon demand, all reasonable attorneys' fees and other expenses which City may expend or incur in enforcing the Obligations against Owner and/or enforcing this Guaranty against Guarantor, whether or not suit is filed, including, without limitation, all attorneys' fees, and other expenses incurred by City in connection with any insolvency, bankruptcy, reorganization, arrangement, or other similar proceedings involving Owner that in any way affect the exercise by City of its rights and remedies hereunder.

10. Severability. Should any one or more provisions of this Guaranty be determined to be illegal or unenforceable, all other provisions nevertheless shall be effective.

11. Waiver or Amendment. No provision of this Guaranty or right of City hereunder can be waived, nor can Guarantor be released from Guarantor's duties hereunder, except by a

writing duly executed by City. This Guaranty may not be modified, amended, revised, revoked, terminated, changed, or varied in any way whatsoever except by the express terms of a writing duly executed by City.

12. Successors and Assigns. This Guaranty shall inure to the benefit of and bind the successors and assigns of City and Guarantor.

13. Governing Law. This Guaranty shall be governed by and construed in accordance with the laws of the State of California without regard to the principles of conflicts of law thereof.

14. Notices. All notices, requests, claims, demands, and other communications hereunder shall be in writing and shall be given (and shall be deemed to have been duly given upon receipt) by delivery in the manner contemplated by the Settlement, addressed as follows:

(a) if to City as provided in the Settlement

(b) if to Guarantor:

Sean Beatty
West Region General Counsel
NRG Energy, Inc.
P.O. Box 192
Pittsburg, CA 94565
sean.beatty@nrgenergy.com

or to such other address(es) as the person to whom notice is given may have previously furnished to the others in writing in the manner set forth above.

IN WITNESS WHEREOF, Guarantor has caused this Guaranty to be duly executed and delivered to City as of the day written above.

NRG Energy, Inc.

By: ________________________________

Name: ______________________________

Title: _______________________________

STATE OF

By: ______________________________________

Name:
Title:

)

) ss.

COUNTY OF ____________________)

The foregoing instrument was acknowledged before me this _____ day of ______________, 20__, by _______________________________, as ______________________ of _______________________.

Witness my hand and official seal.

My commission expires: _______________________________.

Notary Public: ____

(S E A L)

(space above reserved for recording information)

Shut Down Guaranty Amount

This Guaranty is executed and delivered as of this _____ day of _________, 20__ by NRG Energy, Inc., a Delaware corporation ("Guarantor"), in favor of the City of Carlsbad, a charter city, located in San Diego County ("City"), in connection with the performance by Cabrillo Power I LLC, a limited liability company, and Carlsbad Energy Center LLC, a limited liability company (collectively ("Owner") of a Settlement Agreement dated January 14, 2014 between Owner and City (the "Settlement").

- RECITALS -

A. WHEREAS, the Owner operates facilities known as Units 1-5 (individually a "Unit" and collectively the "Units," the "Encina Power Station" or the "Station") for the purpose of generating and selling electric power;

B. WHEREAS, the Owner intends to build and operate new facilities known as the Carlsbad Energy Center Project ("CECP") for the purpose of generating and selling electric power and the City has historically opposed such project;

C. WHEREAS, the Parties have entered the Settlement to fully and finally resolve disputes involving the CECP and the retirement and removal of the Encina Power Station, by providing for, among other things: (i) the retirement, decommissioning, and removal of the Encina Power Station, (ii) the remediation and redevelopment of the Encina Power Station site, (iii) the provisions of the Amendment and the construction and development of the CECP, (iv) the relocation and construction of the new North Coast Service Center, and (v) other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.

D. WHEREAS, Owner is controlled by Guarantor. Guarantor expects to derive material benefits from the performance of the Settlement by Owner and City. To induce City to enter into the Settlement and undertake the obligations as set out in the Settlement, Guarantor has agreed to guarantee the obligations of Owner as provided in this Guaranty.

NOW, THEREFORE, in consideration of the foregoing, Guarantor agrees as follows:

- AGREEMENT -

1. Guaranty. Subject to the provisions of this Guaranty, Guarantor hereby absolutely, irrevocably, unconditionally, and fully guarantees to City the due, prompt, and complete observance, performance, and discharge of each and every obligation under Section 6.1 of the Settlement, including without limitation obligations that are financial or that require specific performance, of Owner, whether incurred before or after the date of delivery of this Guaranty (the "Obligations"). This is a guaranty of payment, not of collection, and as such, City shall not be required to institute, pursue, or exhaust any remedies against Owner before instituting suit, obtaining judgment, and executing thereon against Guarantor under this Guaranty.

2. Rights of City. Guarantor hereby grants to City, in City's discretion and without the need to notify or obtain any consent from Guarantor, and without termination, impairment, or any other effect upon Guarantor's duties hereunder, the power and authority from time to time:

(a) to renew, compromise, extend, accelerate, or otherwise change, substitute, supersede, or terminate the terms of performance of any of the Obligations, in each case in accordance with the Settlement;

(b) to grant any indulgences, forbearances, and waivers, on one or more occasions, for any length of time, with respect to Owner's performance of any of the Obligations; and

(c) to accept collateral, further guaranties, and/or other security for the Obligations, and, if so accepted, then to impair, exhaust, exchange, enforce, waive, or release any such security.

3. Performance. If any of the Obligations are not performed according to the tenor thereof, and any applicable notice and cure period provided by the Settlement has expired ("Default"), Guarantor shall immediately upon receipt of written demand by City (a) perform or cause Owner to perform the Obligation in Default, and (b) pay, reimburse, and indemnify City against any liabilities, damages, and related costs (including attorneys' fees) incurred by City as a result thereof up to but not to exceed a maximum cumulative amount of twenty million dollars ($20,000,000), which is in addition to the Independent Guaranty Amount, all in such manner and at such times as City may reasonably direct.

4. Satisfaction. Satisfaction by Guarantor of any duty hereunder incident to a particular Default or the occurrence of any other Default shall not discharge Guarantor except with respect to the Default satisfied, it being the intent of Guarantor that this Guaranty be continuing until such time as all of the Obligations have irrevocably been discharged in full, at which time this Guaranty shall automatically terminate. If at any time the performance of any Obligation by Owner or Guarantor is rescinded or voided under the federal Bankruptcy Code or otherwise, then Guarantor's duties hereunder shall continue and be deemed to have been automatically reinstated, restored, and continued with respect to that Obligation, as though the performance of that Obligation had never occurred, regardless of whether this Guaranty otherwise had terminated or would have been terminated following or as a result of that performance.

5. Notice of Acceptance. Guarantor waives and acknowledges notice of acceptance of this Guaranty by City.

6. Waivers by Guarantor. Guarantor hereby waives and agrees not to assert or take advantage of:

(a) all set-offs, counterclaims, and, subject to Section 3 above, all presentments, demands for performance, notices of non-performance, protests, and notices of every kind that may be required by Applicable Laws;

(b) any right to require City to proceed against Owner or any other person, or to require City first to exhaust any remedies against Owner or any other person, before proceeding against Guarantor hereunder;

(c) any defense based upon an election of remedies by City;

(d) any duty of City to protect or not impair any security for the Obligations;

(e) the benefit of any laws limiting the liability of a surety;

(f) any duty of City to disclose to Guarantor any facts concerning Owner, the Settlement, or any other circumstances, that would or allegedly would increase the risk to Guarantor under this Guaranty, whether now known or hereafter learned by City, it being understood that Guarantor is capable of and assumes the responsibility for being and remaining informed as to all such facts and circumstances; and

(g) until all Obligations in Default have been fully paid and/or performed, any rights of subrogation, contribution, reimbursement, indemnification, or other rights of payment or recovery for any payment or performance by it hereunder. For the avoidance of doubt, if any amount is paid to Guarantor in violation of this provision, such amount shall be held by Guarantor for the benefit of, and promptly paid to, City.

7. Cumulative Remedies. The rights and remedies of City hereunder shall be cumulative and not alternative to any other rights, powers, and remedies that City may have at law, in equity, or under the Settlement. The obligations of Guarantor hereunder are independent of those of Owner and shall survive unaffected by the bankruptcy of Owner. City need not join Owner in any action against Guarantor to preserve its rights set forth herein.

8. Representations and Warranties. Guarantor represents and warrants to City as follows:

(a) Guarantor is a corporation, duly organized, validly existing, and in good standing under the laws of the state of its incorporation. Owner is a direct or indirect wholly-owned subsidiary of Guarantor. Guarantor has all necessary corporate power and authority to execute and deliver this Guaranty and to perform its obligations hereunder.

(b) The execution, delivery and performance of this Guaranty has been duly and validly authorized by all corporate proceedings of Guarantor and is not in violation of any law, judgment of court or government agency. This Guaranty has been duly and validly executed and delivered by Guarantor and constitutes a legal, valid and binding obligation of Guarantor, enforceable against Guarantor in accordance with its terms.

9. Collection Costs. Guarantor hereby agrees to pay to City, upon demand, all reasonable attorneys' fees and other expenses which City may expend or incur in enforcing the Obligations against Owner and/or enforcing this Guaranty against Guarantor, whether or not suit is filed, including, without limitation, all attorneys' fees, and other expenses incurred by City in connection with any insolvency, bankruptcy, reorganization, arrangement, or other similar proceedings involving Owner that in any way affect the exercise by City of its rights and remedies hereunder.

10. Severability. Should any one or more provisions of this Guaranty be determined to be illegal or unenforceable, all other provisions nevertheless shall be effective.

11. Waiver or Amendment. No provision of this Guaranty or right of City hereunder can be waived, nor can Guarantor be released from Guarantor's duties hereunder, except by a

writing duly executed by City. This Guaranty may not be modified, amended, revised, revoked, terminated, changed, or varied in any way whatsoever except by the express terms of a writing duly executed by City.

12. Successors and Assigns. This Guaranty shall inure to the benefit of and bind the successors and assigns of City and Guarantor.

13. Governing Law. This Guaranty shall be governed by and construed in accordance with the laws of the State of California without regard to the principles of conflicts of law thereof.

14. Notices. All notices, requests, claims, demands, and other communications hereunder shall be in writing and shall be given (and shall be deemed to have been duly given upon receipt) by delivery in the manner contemplated by the Settlement, addressed as follows:

(a) if to City as provided in the Settlement

(b) if to Guarantor:

Sean Beatty
West Region General Counsel
NRG Energy, Inc.
P.O. Box 192
Pittsburg, CA 94565
sean.beatty@nrgenergy.com

or to such other address(es) as the person to whom notice is given may have previously furnished to the others in writing in the manner set forth above.

IN WITNESS WHEREOF, Guarantor has caused this Guaranty to be duly executed and delivered to City as of the day written above.

NRG Energy, Inc.

By: ________________________________

Name: ______________________________

Title: _______________________________

STATE OF

By: ______________________________________

Name:
Title:

)

) ss.

COUNTY OF ____________________)

The foregoing instrument was acknowledged before me this _____ day of ______________, 20__, by _______________________________, as ______________________ of _______________________.

Witness my hand and official seal.

My commission expires: _______________________________.

Notary Public: ____

(S E A L)

(space above reserved for recording information)

Relocation Guaranty Amount

This Guaranty is executed and delivered as of this _____ day of ___________, 20___ by NRG Energy, Inc., a Delaware corporation ("Guarantor"), in favor of the City of Carlsbad, a charter city, located in San Diego County ("City"), in connection with the performance by Cabrillo Power I LLC, a limited liability company, and Carlsbad Energy Center LLC, a limited liability company (collectively ("Owner") of a Settlement Agreement dated January 14, 2014 between Owner and City (the "Settlement").

- RECITALS -

A. WHEREAS, the Owner operates facilities known as Units 1-5 (individually a "Unit" and collectively the "Units," the "Encina Power Station" or the "Station") for the purpose of generating and selling electric power;

B. WHEREAS, the Owner intends to build and operate new facilities known as the Carlsbad Energy Center Project ("CECP") for the purpose of generating and selling electric power and the City has historically opposed such project;

C. WHEREAS, the Parties have entered the Settlement to fully and finally resolve disputes involving the CECP and the retirement and removal of the Encina Power Station, by providing for, among other things: (i) the retirement, decommissioning, and removal of the Encina Power Station, (ii) the remediation and redevelopment of the Encina Power Station site, (iii) the provisions of the Amendment and the construction and development of the CECP, (iv) the relocation and construction of the new North Coast Service Center, and (v) other changes in energy infrastructure and property considerations beneficial to the residents of Carlsbad.

D. WHEREAS, Owner is controlled by Guarantor. Guarantor expects to derive material benefits from the performance of the Settlement by Owner and City. To induce City to enter into the Settlement and undertake the obligations as set out in the Settlement, Guarantor has agreed to guarantee the obligations of Owner as provided in this Guaranty.

NOW, THEREFORE, in consideration of the foregoing, Guarantor agrees as follows:

- AGREEMENT -

1. Guaranty. Subject to the provisions of this Guaranty, Guarantor hereby absolutely, irrevocably, unconditionally, and fully guarantees to City the due, prompt, and complete observance, performance, and discharge of each and every obligation under Article 5 of the Settlement, including without limitation obligations that are financial or that require specific performance, of Owner, whether incurred before or after the date of delivery of this Guaranty (the "Obligations"). This is a guaranty of payment, not of collection, and as such, City shall not be required to institute, pursue, or exhaust any remedies against Owner before instituting suit, obtaining judgment, and executing thereon against Guarantor under this Guaranty.

2. Rights of City. Guarantor hereby grants to City, in City's discretion and without the need to notify or obtain any consent from Guarantor, and without termination, impairment, or any other effect upon Guarantor's duties hereunder, the power and authority from time to time:

(a) to renew, compromise, extend, accelerate, or otherwise change, substitute, supersede, or terminate the terms of performance of any of the Obligations, in each case in accordance with the Settlement;

(b) to grant any indulgences, forbearances, and waivers, on one or more occasions, for any length of time, with respect to Owner's performance of any of the Obligations; and

(c) to accept collateral, further guaranties, and/or other security for the Obligations, and, if so accepted, then to impair, exhaust, exchange, enforce, waive, or release any such security.

3. Performance. If any of the Obligations are not performed according to the tenor thereof, and any applicable notice and cure period provided by the Settlement has expired ("Default"), Guarantor shall immediately upon receipt of written demand by City (a) perform or cause Owner to perform the Obligation in Default, and (b) pay, reimburse, and indemnify City against any liabilities, damages, and related costs (including attorneys' fees) incurred by City as a result thereof up to but not to exceed a maximum cumulative amount of twenty-two million five hundred thousand dollars ($22,500,000), all in such manner and at such times as City may reasonably direct; provided that such maximum cumulative amount shall be reduced in proportion to Owner's payments made in accordance with Article 5.

4. Satisfaction. Satisfaction by Guarantor of any duty hereunder incident to a particular Default or the occurrence of any other Default shall not discharge Guarantor except with respect to the Default satisfied, it being the intent of Guarantor that this Guaranty be continuing until such time as all of the Obligations have irrevocably been discharged in full, at which time this Guaranty shall automatically terminate. If at any time the performance of any Obligation by Owner or Guarantor is rescinded or voided under the federal Bankruptcy Code or otherwise, then Guarantor's duties hereunder shall continue and be deemed to have been automatically reinstated, restored, and continued with respect to that Obligation, as though the performance of that Obligation had never occurred, regardless of whether this Guaranty otherwise had terminated or would have been terminated following or as a result of that performance.

5. Notice of Acceptance. Guarantor waives and acknowledges notice of acceptance of this Guaranty by City.

6. Waivers by Guarantor. Guarantor hereby waives and agrees not to assert or take advantage of:

(a) all set-offs, counterclaims, and, subject to Section 3 above, all presentments, demands for performance, notices of non-performance, protests, and notices of every kind that may be required by Applicable Laws;

(b) any right to require City to proceed against Owner or any other person, or to require City first to exhaust any remedies against Owner or any other person, before proceeding against Guarantor hereunder;

(c) any defense based upon an election of remedies by City;

(d) any duty of City to protect or not impair any security for the Obligations;

(e) the benefit of any laws limiting the liability of a surety;

(f) any duty of City to disclose to Guarantor any facts concerning Owner, the Settlement, or any other circumstances, that would or allegedly would increase the risk to Guarantor under this Guaranty, whether now known or hereafter learned by City, it being understood that Guarantor is capable of and assumes the responsibility for being and remaining informed as to all such facts and circumstances; and

(g) until all Obligations in Default have been fully paid and/or performed, any rights of subrogation, contribution, reimbursement, indemnification, or other rights of payment or recovery for any payment or performance by it hereunder. For the avoidance of doubt, if any amount is paid to Guarantor in violation of this provision, such amount shall be held by Guarantor for the benefit of, and promptly paid to, City.

7. Cumulative Remedies. The rights and remedies of City hereunder shall be cumulative and not alternative to any other rights, powers, and remedies that City may have at law, in equity, or under the Settlement. The obligations of Guarantor hereunder are independent of those of Owner and shall survive unaffected by the bankruptcy of Owner. City need not join Owner in any action against Guarantor to preserve its rights set forth herein.

8. Representations and Warranties. Guarantor represents and warrants to City as follows:

(a) Guarantor is a corporation, duly organized, validly existing, and in good standing under the laws of the state of its incorporation. Owner is a direct or indirect wholly-owned subsidiary of Guarantor. Guarantor has all necessary corporate power and authority to execute and deliver this Guaranty and to perform its obligations hereunder.

(b) The execution, delivery and performance of this Guaranty has been duly and validly authorized by all corporate proceedings of Guarantor and is not in violation of any law, judgment of court or government agency. This Guaranty has been duly and validly executed and delivered by Guarantor and constitutes a legal, valid and binding obligation of Guarantor, enforceable against Guarantor in accordance with its terms.

9. Collection Costs. Guarantor hereby agrees to pay to City, upon demand, all reasonable attorneys' fees and other expenses which City may expend or incur in enforcing the Obligations against Owner and/or enforcing this Guaranty against Guarantor, whether or not suit is filed, including, without limitation, all attorneys' fees, and other expenses incurred by City in connection with any insolvency, bankruptcy, reorganization, arrangement, or other similar proceedings involving Owner that in any way affect the exercise by City of its rights and remedies hereunder.

10. Severability. Should any one or more provisions of this Guaranty be determined to be illegal or unenforceable, all other provisions nevertheless shall be effective.

11. Waiver or Amendment. No provision of this Guaranty or right of City hereunder can be waived, nor can Guarantor be released from Guarantor's duties hereunder, except by a writing duly executed by City. This Guaranty may not be modified, amended, revised, revoked, terminated, changed, or varied in any way whatsoever except by the express terms of a writing duly executed by City.

12. Successors and Assigns. This Guaranty shall inure to the benefit of and bind the successors and assigns of City and Guarantor.

13. Governing Law. This Guaranty shall be governed by and construed in accordance with the laws of the State of California without regard to the principles of conflicts of law thereof.

14. Notices. All notices, requests, claims, demands, and other communications hereunder shall be in writing and shall be given (and shall be deemed to have been duly given upon receipt) by delivery in the manner contemplated by the Settlement, addressed as follows:

(a) if to City as provided in the Settlement

(b) if to Guarantor:

Sean Beatty
West Region General Counsel
NRG Energy, Inc.
P.O. Box 192
Pittsburg, CA 94565
sean.beatty@nrgenergy.com

or to such other address(es) as the person to whom notice is given may have previously furnished to the others in writing in the manner set forth above.

IN WITNESS WHEREOF, Guarantor has caused this Guaranty to be duly executed and delivered to City as of the day written above.

NRG Energy, Inc.

By: ________________________________

Name: ______________________________

Title: _______________________________

STATE OF

By: ______________________________________

Name:
Title:

)

) ss.

COUNTY OF ____________________)

The foregoing instrument was acknowledged before me this _____ day of ______________, 20__, by _______________________________, as ______________________ of _______________________.

Witness my hand and official seal.

My commission expires: _______________________________.

Notary Public: ____

(S E A L)

(space above reserved for recording information)

EXHIBIT S

Map of Encina Redevelopment Site

EXHIBIT T

Map of CECP Site

Appendix 2B
City Letter in Support of Petition to Amend

April 23, 2014

John V. Chillemi
Senior Vice President & President West Region
NRG Energy, Inc.
696 West 10th St.
Pittsburgh, CA 94565

CITY SUPPORT OF PETITION TO AMEND CECP APPLICATION

Dear Mr. Chillemi:

On January 14, 2014, the Carlsbad City Council and the Carlsbad Municipal Water District adopted resolutions approving an agreement between and among the City of Carlsbad (City) and the Carlsbad Municipal Water District (CMWD), Cabrillo Power I LLC and Carlsbad Energy Center LLC (collectively NRG), and San Diego Gas & Electric (SDG&E). The agreement addresses City and CMWD support for a change in the proposed technology of the approved Carlsbad Energy Center Project (CECP) plant and the submittal of a Petition to Amend (PTA) application to the California Energy Commission (CEC) for approval of this technology change. This support is conditioned upon the decommissioning, demolition, removal and remediation of the current Encina Power Station (EPS) site by a certain date, as well as other changes in CECP plant design, energy infrastructure and property considerations beneficial to the residents of Carlsbad. These significant benefits are provided for in the approved agreement.

Approval of the agreement reflects a noteworthy shift in the City's and CMWD's position regarding the CECP. Numerous environmental and land use concerns, including the possibility of having two power plants in operation at the same time on Carlsbad's coastline, caused the City to oppose the power plant throughout the five year CEC certification process. Despite the City's previous objections, the CEC approved the project, which remains unbuilt. However, the dramatic change in the local energy supply environment (due to the premature closure of the San Onofre Nuclear Generating Station), proposed change in CECP technology with reduced environmental and fire safety impacts, the date certain commitment to demolish and remove the EPS, and the many significant benefits to Carlsbad outlined in the executed agreement now enable the city to support an "Amended CECP."

The agreement commits the City and CMWD, along with NRG, to "review all city ordinances, resolutions, policies, regulatory documents, etc., that may conflict with the Amended CECP project. . . ." The agreement also requires the City "to consider recommending revisions to such documents to the City Council and CMWD Board of Directors."

The agreement also commits the City and NRG to "work in good faith to determine a mutually acceptable and appropriate alignment for the Coastal Rail Trail (Section 6.2(e) of Agreement)", and to "work together to establish related services to CECP, including recycled water supply, potable water supply, sanitary sewer service and fire response." (Section 4.2(c) of the Agreement).

As identified in the list below, city staff is well into the process of recommending the legislative and other actions necessary to support the Amended CECP. NRG has been involved in resolving the recommended actions listed.

1. **Land Use**

   a. **General Plan:** A General Plan Amendment is underway to revise the description of the Public Utility (U) designation of the Land Use Element which only allows the generation of electrical energy outside of the coastal zone. The proposed text amendment specifies that a primary function of the U designation may include the generation of electrical energy by fossil fuel only if it is the subject of an Agreement between and among the City of Carlsbad (City) and the Carlsbad Municipal Water District (CMWD), Cabrillo Power I LLC and Carlsbad Energy Center LLC, and San Diego Gas and Electric, and approved by the City and CMWD on January 14, 2014. **Status:** The Planning Commission reviewed this item on April 16, 2014. The City Council is expected to take final action on the Commission's recommendations in May 2014. Amendment of the General Plan is not subject to California Coastal Commission review and, as such, the final action will occur at the City Council.

   b. **Zoning Code:** A Zone Code Amendment is underway to repeal the previous legislative action (Ordinance CS-105 adopting ZCA 11-05) which amended Table "A" of Carlsbad Municipal Code (CMC) Chapter 21.36 – Public Utility Zone (P-U), Section 21.36.020 that permits the generation of electrical energy "by a government entity or by a company authorized or approved for such use by the California Public Utilities Commission outside the City's Coastal Zone only." The amendment simply restores the previous text that permits "Generation and transmission of electrical energy" – this would allow generation within the Coastal Zone. **Status:** The Planning Commission reviewed this item on April 16, 2014. The City Council is expected to take final action on the Commission's recommendations in May 2014. The Zone Code Amendment underway is not subject to California Coastal Commission review as it simply restores prior text regarding the generation and transmission of electrical energy that was previously approved by the Coastal Commission. As such, the final action will occur at the City Council.

      ZCA 11-05, the previous legislative action, was filed with but declared incomplete by the Coastal Commission. The City will withdraw this filing upon repeal of ordinances CS-105 and CS-170 (see 1.e. below).

   c. **Precise Development Plan:** A Precise Development Plan Amendment is underway to delete the previous text addition (PDP 00-02(E)) which demonstrated opposition to the CECP as originally proposed. The proposed amendment is required to ensure that the PDP is consistent with the proposed General Plan and Zone Code Amendments and that the Amended CECP is supported, subject to the terms of the agreement. **Status:** The Planning Commission reviewed this item on April 16, 2014. The City Council is expected to take final action on the Commission's recommendations in May 2014. Amendment of the PDP is not subject to California Coastal Commission review and, as such, the final action will occur at the City Council.

d. **Encina Specific Plan 144**: A Specific Plan Amendment is underway to repeal the Encina Specific Plan – SP 144. Future development would rely on other existing or future land use documents which provide land use information, procedures, standards and regulations. **Status:** The Planning Commission reviewed this item on April 16, 2014. The City Council is expected to take final action on the Commission's recommendations in May 2014. Repeal of SP 144 is not subject to California Coastal Commission review and, as such, the final action will occur at the City Council.

e. **Urgency Ordinance**: An ordinance is underway to repeal Urgency Ordinance CS-170. The Urgency Ordinance amended the CMC Section 21.36.020 to require generation and transmission of electrical energy to obtain City Council approval of a conditional use permit and a finding that the use serves an extraordinary public purpose in addition to the other required conditional use permit findings. As with the Zone Code Amendment described in 1.b. above, this proposed amendment simply restores the previous text that permits "Generation and transmission of electrical energy" – this would allow generation within the Coastal Zone. **Status:** The City Council approved this item on April 22, 2014. Planning Commission and California Coastal Commission review are not required.

f. **CR 98-145:** A resolution is proposed to find the purpose and objectives of City Council Resolution 98-145 have been fulfilled. This eliminates the Council policy requiring any proposed development within the Encina Specific Plan 144 to comprehensively update the specific plan (the Amended CECP would potentially be subject to this policy). As indicated in 1.d. above, repeal of SP 144 is also underway. **Status:** The City Council approved this item on April 22, 2014. Planning Commission and California Coastal Commission review are not required.

g. **Carlsbad Redevelopment Agency:** A resolution is underway to accept the transfer of all land use plans and functions of the former Carlsbad Redevelopment Agency, assume responsibility and authority for enforcement of said land use plans and functions, and find the Amended CECP complies with the land use policies of the South Carlsbad Coastal Redevelopment Area Plan because the use is permitted by the General Plan and Zoning Ordinance and will serve an extraordinary public purpose based on the findings of the City Council and as detailed in the Agreement. **Status:** The City Council approved this item on April 22, 2014. Planning Commission and California Coastal Commission review are not required.

h. **Agua Hedionda Land Use Plan** – No changes are required. This Plan has a 35' height limit that the CEC overrode. In light of the Settlement Agreement, the City supports that override. Additionally, a previous legislative action (LCPA 11-06) deleted a report requirement to show the 45-acre SDG&E parcel east of Interstate 5 is unnecessary for power plant expansion. This action did not affect the Encina Power Station or other NRG properties. If pursued, this action would have been subject to California Coastal Commission approval. **Status:** As noted, no changes are required and the City supports an override of the plan's height limit. Furthermore, LCPA 11-06, the previous legislative action, was filed with but declared incomplete by the Coastal Commission. The City will withdraw this filing upon repeal of ordinances CS-105 and CS-170 (see 1.b. and 1.e. above, respectively).

2. **Fire Safety:** In accordance with the Settlement Agreement, the Carlsbad Fire Department (CFD) and NRG have worked together in good faith to address and resolve fire safety concerns raised in the CECP AFC. This has resulted in an Amended CECP design such that NRG is able to provide emergency response access to the project that meets CFD approval. Based on the NRG and CFD discussions and the design of Amended CECP, CFD shall be in a primary emergency response position to Amended CECP.

3. **Agua Hedionda Lift Station and Sewer Line:** Work on providing the necessary easements for this project is proceeding cooperatively between NRG and the City. The easements are not expected to have any impact on the permitted or Amended CECP. No City Council or Board actions are contemplated or required. Construction on the lift station and sewer line is expected to begin by October 2014 and finish in late 2016.

4. **Recycled Water and other related services:** As part of the Settlement Agreement, CMWD and NRG are working cooperatively to provide recycled water to the Amended CECP. As noted in the AFC proceeding, the existing reclaimed or recycled water system does not have sufficient capacity to serve the CECP. However, NRG has indicated the Amended CECP, due to its proposed technology change, potentially has a smaller recycled water demand the existing system could meet.

   While refining of recycled water needs continue, the city notes its adoption of the Recycled Water Master Plan and Program Environmental Impact Report in late 2012. These documents anticipate expansion of the Carlsbad Water Recycling Facility (CWRF), which is about 1.5 miles south of the Encina Power Station, and extension of the recycled water system north from the CWRF along Avenida Encinas, the Encina Power Station and across Agua Hedionda Lagoon. Furthermore, construction of the Agua Hedionda Lift Station and Sewer Line project includes installation of the recycled water line from the CWRF north to Cannon Road. Discussion between NRG and the CMWD is taking place regarding constructing the reclaimed water line on NRG property for the Amended CECP operations; the city completed the permitting and environmental compliance for this portion of the recycled water line as part of the Agua Hedionda Lift Station and Sewer Line project approval.

   CMWD believes recycled water service to the NRG property and expansion of the CWRF will be complete before the end of 2017, the approximate time frame for the Amended CECP to begin commercial operation. NRG and the City are working cooperatively to enable the City to provide NRG with a letter indicating its intent to serve the project.

   Furthermore, NRG, the City and CMWD are working together to establish both potable water supply as well as sanitary and industrial sewer services to the Amended CECP.

5. **Coastal Rail Trail:** The City and NRG are working cooperatively on a plan to locate the Coastal Rail Trail on the west side of the railroad tracks consistent with both parties' interest in redeveloping the current site of the Encina Power Station. The language in the existing CEC condition LAND-1 is sufficient.

Our understanding is that this letter will be referred to and included as an attachment in NRG's Petition to Amend the CECP submitted to the CEC. The City is prepared to provide any additional information, respond to questions from the CEC, or provide written or oral testimony regarding this letter or the specific actions discussed. The City will also provide you and the CEC adopted versions of any ordinances or actions taken by the City Council related to the actions discussed in this letter.

If you have any questions, please contact me at (760) 434-2822.

Sincerely,

Gary T. Barberio
Assistant City Manager

c: Steve Sarkozy, City Manager
Celia Brewer, City Attorney
Kathy Dodson, Assistant City Manager
Jim Howell, Interim Public Works Director
Michael Lopez, Fire Division Chief
Glen Van Peski, Community and Economic Development Director

Appendix 2C
Engineering Design Criteria

APPENDIX 2C

Engineering Design Criteria

This appendix summarizes the codes, standards, criteria, and practices that generally will be used in the design and construction of the engineering systems for the Carlsbad Energy Center Project (CECP).

1.0 Introduction

The Engineering Design Criteria from the original Application for Certification (Carlsbad Energy Center LLC, 2007) essentially remains in force for the Petition to Amend (PTA). This design criteria also applies to the commercial buildings included in this PTA.

Originally, the design criteria were in seven (Appendices 2A-G) separate documents and are now included in this one appendix. The *Project Enhancement and Refinement Document* (CH2M HILL and Shaw, Stone & Webster, 2008) made no revisions to the design criteria. All laws, ordinances, regulations, and standards (LORS) published with the PTA will be the revisions as of the accepted date.

2.0 Civil Engineering Design Criteria

2.1 Introduction

This section summarizes the codes, standards, criteria, and practices that generally will be used in the design and construction of civil engineering systems for the CECP. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications.

2.2 Codes and Standards

The design of civil engineering systems for the project will be in accordance with the laws and regulations of the federal government, the State of California, and local government, and according to industry standards. The current issue or edition of the documents at the time of filing this PTA will apply, unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

2.2.1 Civil Engineering Codes and Standards

The following codes and standards have been identified as applicable, in whole or in part, to civil engineering design and construction of power plants.

- American Association of State Highway and Transportation Officials (AASHTO)—Standards and Specifications
- American Concrete Institute (ACI) – Standards and Recommended Practices
- American Institute of Steel Construction (AISC) – Standards and Specifications
- American National Standards Institute (ANSI) – Standards
- American Society of Testing and Materials (ASTM) – Standards, Specifications, and Recommended Practices
- American Water Works Association (AWWA) – Standards and Specifications
- American Welding Society (AWS) – Codes and Standards
- Asphalt Institute (AI) – Asphalt Handbook

- State of California Department of Transportation (Caltrans) Standard Specification
- California Energy Commission (CEC) – Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California
- Concrete Reinforcing Steel Institute (CRSI) – Standards
- Factory Mutual (FM) – Standards
- National Fire Protection Association (NFPA) – Standards
- California Building Code (CBC)
- Steel Structures Painting Council (SSPC) – Standards and Specifications

2.2.2 Engineering Geology Codes, Standards, and Certifications

Engineering geology activities will conform to the applicable federal, state, and local laws, regulations, ordinances, and industry codes and standards.

2.2.2.1 Federal

None are applicable.

2.2.2.2 State

The Warren-Alquist Act, Public Resources Code Section 25000 et seq., and the CEC Code of Regulations (CCR), Siting Regulations, Title 20 CCR, Chapter 2, require that a PTA address the geologic and seismic aspects of the site.

The California Environmental Quality Act (CEQA) and the CEQA Guidelines require that potential significant effects, including geologic hazards, be identified and a determination made as to whether they can be substantially reduced.

2.2.2.3 Local

California State Planning Law, Government Code Section 65302, requires each city and county to adopt a general plan, consisting of nine mandatory elements, to guide its physical development. Section 65302(g) requires that a seismic safety element be included in the general plan.

The site development activities will require certification by a Professional Geotechnical Engineer and a Professional Engineering Geologist during and following construction, in accordance with California Building Code (CBC) Chapter 70. The Professional Geotechnical Engineer and the Professional Engineering Geologist will certify the placement of earthen fills and the adequacy of the site for structural improvements, as follows:

- Both the Professional Geotechnical Engineer and the Professional Engineering Geologist will address CBC Chapter 70, Sections 7006 (Grading Plans), 7011 (Cuts), 7012 (Terraces), 7013 (Erosion Control), and 7015 (Final Report).
- The Professional Geotechnical Engineer will also address CBC Chapter 70, Sections 7011 (Cuts) and 7012 (Terraces).

Additionally, the Professional Engineering Geologist will present findings and conclusions pursuant to PRC, Section 25523 (a) and (c); and 20 CCR, Section 1752 (b) and (c).

3.0 Structural Engineering Design Criteria

3.1 Introduction

This section summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of structural engineering systems for the CECP. More specific project information will be developed during execution of the project to support detail design, engineering, material procurement specification, and construction specifications.

3.2 Codes and Standards

The design of structural engineering systems for the project will be in accordance with the laws and regulations of the federal government, the State of California, and local government, and according to industry standards. The current issue or edition of the documents at the time of filing of this PTA will apply unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

The following codes and standards have been identified as applicable, in whole or in part, to structural engineering design and construction of power plants.

- California Building Code
- American Institute of Steel Construction (AISC):
  - Manual of Steel Construction—13th Edition
  - Specification for Structural Steel Buildings
  - Specification for Structural Joints Using ASTM A325 or A490 Bolts
  - Code of Standard Practice for Steel Buildings and Bridges
- American Concrete Institute (ACI):
  - ACI 318-05, Building Code Requirements for Structural Concrete
  - ACI 301-05, Specifications for Structural Concrete for Buildings
- American Society of Civil Engineers (ASCE):
  - ASCE 7-05, Minimum Design Loads for Buildings and Other Structures
- American Society of Mechanical Engineers (ASME):
  - STS-1-2000, Steel Stacks
- American Welding Society (AWS):
  - D1.1—Structural Welding Code—Steel
  - D1.3—Structural Welding Code—Sheet Steel
- Code of Federal Regulations, Title 29—Labor, Chapter XVII, Occupational Safety and Health Administration (OSHA):
  - Part 1910—Occupational Safety and Health Standards
  - Part 1926—Construction Safety and Health Regulations
- National Association of Architectural Metal Manufacturers (NAAMM)—Metal Bar Grating Manual
- Hoist Manufacturers Institute (HMI), Standard Specifications for Electric Wire Rope Hoists (HMI 100)
- IEEE 980 – Guide for Containment and Control of Oil Spills in Substations
- National Electric Safety Code (NESC), C2-2007

- National Fire Protection Association (NFPA Standards):
  - NFPA 850 Fire Protection for Electric Generating Plants
- OSHA Williams-Steiger Occupational Safety and Health Act of 1970
- Steel Deck Institute (SDI)—Design Manual for Floor Decks and Roof Decks

3.2.1 CEC Special Requirements

Prior to the start of any increment of construction, the proposed seismic-force procedures for project structures and the applicable designs, plans, and drawings for project structures will be submitted for approval.

Proposed seismic-force procedures, designs, plans, and drawings shall be those for:

- Major project structures
- Major foundations, equipment supports, and anchorage
- Large, field-fabricated tanks
- Switchyard structures

3.3 Structural Design Criteria

3.3.1 Datum

Site topographic elevations will be based on an elevation survey conducted using known elevation benchmarks.

3.3.2 Frost Penetration

The site is located in an area free of frost penetration. Bottom elevation of all foundations for structures and equipment, however, will be maintained at a minimum of 12 inches below the finished grade.

3.3.3 Temperatures

The design basis temperatures for civil and structural engineering systems will be as follows:

Maximum	104°F
Minimum	37°F

3.3.4 Design Loads

3.3.4.1 General

Design loads for structures and foundations will comply with all applicable building code requirements.

3.3.4.2 Dead Loads

Dead loads will consist of the weights of structure and all equipment of a permanent or semi-permanent nature including tanks, bins, wall panels, partitions, roofing, drains, piping, cable trays, bus ducts, and the contents of tanks and bins measured at full operating capacity. The contents of the tanks and bins, however, will not be considered as effective in resisting structure uplift due to wind forces, but will be considered as effective for seismic forces.

3.3.4.3 Live Loads

Live load will consist of uniform floor live loads and equipment live loads. Uniform live loads are assumed equivalent unit loads that are considered sufficient to provide for movable and transitory loads, such as the weights of people, portable equipment and tools, small equipment or parts that may be moved over or placed on the floors during maintenance operations, and planking. The uniform live loads will not be applied to floor areas that will be permanently occupied by equipment.

Lateral earth pressures, hydrostatic pressures, and wheel loads from trucks will be considered as live loads.

Uniform live loads will be in accordance with ASCE Standard 7, but will not be less than the following:

- Roofs 20 pounds per square foot (psf)
- Floors and platforms 100 psf
  (steel grating and checkered plates)

In addition, a uniform load of 50 psf will be used to account for piping and cable trays except where the piping and cable loads exceed 50 psf, in which case the actual loads will be used.

Furthermore, a concentrated load of 5 kips will be applied concurrently to the supporting beams of the floors to maximize stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

- Floors (elevated concrete floors) 100 psf

In addition, elevated concrete slabs will be designed to support an alternate concentrated load of 2 kips in lieu of the uniform loads, whichever governs. The concentrated load will be treated as a uniform distributed load acting over an area of 2.5 square feet and will be located in a manner to produce the maximum stress conditions in the slabs.

- Control room floor 150 psf
- Stairs, landings, and walkways 100 psf

In addition, a concentrated load of 2 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

- Pipe racks 50 psf

Where the piping and cable tray loads exceed the design uniform load, the actual loads will be used. In addition, a concentrated load of 8 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

- Hand railings

Hand railings will be designed for a 200-pound concentrated load applied at any point and in any direction.

- Slabs on grade 250 psf
- Truck loading surcharge adjacent to structures 250 psf
- Truck support structures AASHTO-HS-20-44
- Special loading conditions Actual loadings

Laydown loads from equipment components during maintenance and floor areas where trucks, forklifts, or other transports have access will be considered in the design of live loads.

Live loads may be reduced in accordance with the provisions of CBC, Section 1607.

Posting of the floor load capacity signs for all roofs, elevated floors, platforms, and walkways will be in compliance with the OSHA Occupational Safety and Health Standard, Walking and Working Surfaces, Subpart D. Floor load capacity for slabs on grade will not be posted.

3.3.4.4 Earth Pressures

Earth pressures will be in accordance with the recommendations contained in the project-specific geotechnical report.

3.3.4.5 Groundwater Pressures

Hydrostatic pressures due to groundwater or temporary water loads will be considered.

3.3.4.6 Wind Loads

The wind forces will be calculated in accordance with CBC with a basic wind speed of 85 miles per hour (mph) and an exposure category of C.

3.3.4.7 Seismic Loads

Structures will be designed and constructed to resist the effects of earthquake loads as determined in CBC, Section 1613. The Seismic Design Category is D. The occupancy category of the structure is III (per CBC Table 1604.5) and corresponding importance factor (I) is 1.25. Other seismic parameters will be obtained from the geotechnical report.

3.3.4.8 Snow Loads

Snow loads will not be considered.

3.3.4.9 Turbine Generator Loads

The combustion turbine generator loads for pedestal and foundation design will be furnished by the equipment manufacturers, and will be applied in accordance with the equipment manufacturers' specifications, criteria, and recommendations.

3.3.4.10 Special Considerations for Steel Stacks

Steel stacks will be designed to withstand the normal and abnormal operating conditions in combination with wind loads and seismic loads, and will include the along-wind and across-wind effects on the stacks. The design will meet the requirements of ASME/ANSI STS-1-2000, "Steel Stacks," using allowable stress design method, except that increased allowable stress for wind loads as permitted by AISC will not be used.

3.3.4.11 Special Considerations for Structures and Loads during Construction

For temporary structures, or permanent structures left temporarily incomplete to facilitate equipment installations, or temporary loads imposed on permanent structures during construction, the allowable stresses may be increased by 33 percent.

Structural backfill may be placed against walls, retaining walls, and similar structures when the concrete strength attains 80 percent of the design compressive strength (f'_c), as determined by sample cylinder tests. Restrictions on structural backfill, if any, will be shown on the engineering design drawings.

Design restrictions imposed on construction shoring removal that are different from normal practices recommended by the ACI codes will be shown on engineering design drawings.

Metal decking used as forms for elevated concrete slabs will be evaluated to adequately support the weight of concrete plus a uniform construction load of 50 psf, without increase in allowable stresses.

3.4 Design Bases

3.4.1 General

Reinforced concrete structures will be designed by the strength design method, in accordance with the CBC and ACI 318, "Building Code Requirements for Structural Concrete."

Steel structures will be designed by the working stress method, in accordance with the CBC and the AISC Specification for Structural Steel Buildings.

Allowable soil bearing pressures for foundation design will be in accordance with the "Final Subsurface Investigation and Foundation Report" for the facility.

3.4.2 Factors of Safety

The factor of safety for all structures, tanks, and equipment supports will be as follows:

Against overturning	1.50
Against sliding	1.50 for wind loads 1.10 for seismic loads
Against uplift due to wind	1.50
Against buoyancy	1.25

3.4.3 Allowable Stresses

Calculated stresses from the governing loading combinations for structures and equipment supports will not exceed the allowable limits permitted by the applicable codes, standards, and specifications.

3.4.4 Load Factors and Load Combinations

For reinforced concrete structures and equipment supports, using the strength method, the strength design equations will be determined based on CBC 2007, Sections 1605.2.1, 1605.4, 1912, and ACI-318-08 Section 9.2. The Allowable Stress Design load combinations of CBC Section 1605.3 will be used to assess soil bearing pressure and stability of structures per CBC Sections 1805 and 1613, respectively.

Steel-framed structures will be designed in accordance with CBC, Chapter 22, and the ANSI/AISC 360-05 Specification for Structural Steel Buildings. Connections will conform to Research Council on Structural Connections of the Engineering Foundation Specification for Structural Joints.

3.5 Construction Materials

3.5.1 Concrete and Grout

The design compressive strength (f'_c) of concrete and grout, as measured at 28 days, will be as follows:

Underground electrical duct bank encasement and lean concrete backfill (Class D)	2,000 psi
Structural concrete (Classes CSA & CLA)	3,000 psi
Structural concrete (Class BSA & BLA)	4,000 psi
Structural grout	5,000 psi

The classes of concrete and grout to be used will be shown on engineering design drawings or indicated in design specifications.

3.5.2 Reinforcing Steel

Reinforcing steel bars for concrete will be deformed bars of billet steel, conforming to ASTM A615, Grade 60 or A706, Grade 60.

Welded wire fabric for concrete will conform to ASTM A185.

3.5.3 Structural and Miscellaneous Steel

Structural and miscellaneous steel will generally conform to ASTM A36, ASTM A572, or ASTM A992 except in special situations where higher strength steel is required.

High-strength structural bolts, including nuts and washers, will conform to ASTM A325 or ASTM A490.

Bolts other than high-strength structural bolts will conform to ASTM A307, Grade A.

3.5.4 Concrete Masonry

Concrete masonry units will be hollow, normal weight, non-load-bearing Type I, conforming to ASTM C90, lightweight.

Mortar will conform to ASTM C270, Type S.

Grout will conform to ASTM C476.

3.5.5 Other Materials

Other materials for construction, such as anchor bolts, shear connectors, concrete expansion anchors, embedded metal, etc., will conform to industry standards and will be identified on engineering design drawings or specifications.

4.0 Mechanical Engineering Design Criteria

4.1 Introduction

This section summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of mechanical engineering systems for the CECP. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications.

4.2 Codes and Standards

The design of the mechanical systems and components will be in accordance with the laws and regulations of the federal government, State of California, City of Carlsbad, and local government, and according to industry standards. The current issue or revision of the documents at the time of the filing of this PTA will apply unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirements shall apply.

The following codes and standards are applicable to the mechanical aspects of the power facility.

- California Building Standards Code
- American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code
- ASME/ANSI B31.1 Power Piping Code
- ASME Performance Test Codes
- ASME Standard TDP-1
- American National Standards Institute (ANSI) B16.5, B16.34, and B133.8
- American Boiler Manufacturers Association (ABMA)
- American Gear Manufacturers Association (AGMA)
- Air Moving and Conditioning Association (AMCA)
- American Society for Testing and Materials (ASTM)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Welding Society (AWS)
- Cooling Tower Institute (CTI)
- Heat Exchange Institute (HEI)
- Manufacturing Standardization Society (MSS) of the Valve and Fitting Industry

- National Fire Protection Association (NFPA)
- Hydraulic Institute Standards (HIS)
- Tubular Exchanger Manufacturer's Association (TEMA)

4.3 Mechanical Engineering General Design Criteria

4.3.1 General

The systems, equipment, materials, and their installation will be designed in accordance with the applicable codes; industry standards; and local, state, and federal regulations, as well as the design criteria; manufacturing processes and procedures; and material selection, testing, welding, and finishing procedures specified in this section.

Detailed equipment design will be performed by the equipment vendors in accordance with the performance and general design requirements to be specified later by the project architect/engineering firm. Equipment vendors will be responsible for using construction materials suited for the intended use.

Modular building configurations will be considered to the maximum extent possible to expedite constructability.

4.3.2 Materials—General

Asbestos and mercury will not be used in the materials and equipment supplied. Where feasible, materials will be selected to withstand the design operating conditions, including expected ambient conditions, for the design life of the plant. It is anticipated that some materials will require replacement during the life of the plant due to corrosion, erosion, etc.

4.3.2.1 Pumps

Pumps will be sized in accordance with industry standards. Where feasible, pumps will be selected for maximum efficiency at the normal operating point. Pumps will be designed to be free from excessive vibration throughout the operating range.

4.3.2.2 Tanks

Large outdoor storage tanks will not be insulated except where required to maintain appropriate process temperatures or for personnel protection.

Overflow connections and lines will be provided. Maintenance drain connections will be provided for complete tank drainage.

Manholes, where provided, will be at least 24 inches in diameter and hinged to facilitate removal. Storage tanks will have ladders and cleanout doors as required to facilitate access/maintenance. Provisions will be included for proper tank ventilation during internal maintenance.

4.3.2.3 Heat Exchangers

The heat exchangers will be provided as components of mechanical equipment packages and may be air-cooled or water-cooled shell-and-tube or plate type. Heat exchangers will be designed in accordance with TEMA or manufacturer's standards. Fouling factors will be specified in accordance with TEMA.

4.3.2.4 Pressure Vessels

Pressure vessels will include the following features/appurtenances:

- Process, vent, and drain connections for startup, operation, and maintenance
- Materials compatible with the fluid being handled
- A minimum of one manhole and one air ventilation opening (e.g., handhole) where required for maintenance or cleaning access

- For vessels requiring insulation, shop-installed insulation clips spaced not greater than 18 inches on center
- Relief valves in accordance with the applicable codes

4.3.2.5 Piping and Piping Supports

Underground piping may be high-density polyethylene (HDPE) or polyvinyl chloride (PVC) where permitted by code, operating conditions, and fluid properties. In general, water system piping will be HDPE or PVC where embedded or underground and carbon steel where above ground. Appropriately lined and coated carbon steel pipe may alternately be used for buried water piping.

Threaded joints will not normally be used in piping used for lubricating oil and natural gas service. Natural gas piping components will not use synthetic lubricants. Victaulic, or equal, couplings may be used for low energy aboveground piping, where feasible.

Piping systems will have high point vents and low point drains.

Hose and process tubing connections to portable components and systems will be compatible with the respective equipment suppliers' standard connections for each service.

Stainless steel piping will be used for portions of the lubricating oil system downstream of the filters. Carbon steel piping may be used elsewhere.

4.3.2.6 Valves

4.3.2.6.1 General Requirements

Valves will be arranged for convenient operation from floor level where possible and, if required, will have extension spindles, chain operators, or gearing. Hand-actuated valves will be operable by one person. Gear operators will be provided on manual valves 8 inches or larger.

Valves will be arranged to close when the handwheel is rotated in a clockwise direction when looking at the handwheel from the operating position. The direction of rotation to close the valve will be clearly marked on the face of each handwheel.

The stops that limit the travel of each valve in the open or closed position will be arranged on the exterior of the valve body. Valves will be fitted with an indicator to show whether they are open or closed; however, only critical valves will be remotely monitored for position.

Valve materials will be suitable for operation at the maximum working pressure and temperature of the piping to which they are connected. Steel valves will have cast or forged steel spindles. Seats and faces will be of low friction, wear resistant materials. Valves in throttling service will be selected with design characteristics and of materials that will resist erosion of the valve seats when the valves are operated partly closed.

Valves operating at less than atmospheric pressure will include means to prevent air in-leakage. No provision will be made to repack valve glands under pressure.

Drain and Vent Valves and Traps

Drains and vents in 600 pound class or higher piping and 900°F or higher service will be double-valved.

Drain traps will include air cock and easing mechanism. Internal parts will be constructed from corrosion-resistant materials and will be renewable.

Trap bodies and covers will be cast or forged steel and will be suitable for operating at the maximum working pressure and temperature of the piping to which they are connected. Traps will be piped to drain collection tank or sumps and returned to the cycle if convenient.

4.3.2.6.2 Low-pressure Water Valves

Low-pressure water valves will be the butterfly type of cast iron construction. Ductile iron valves will have ductile iron bodies, covers, gates (discs), and bridges; the spindles, seats, and faces will be bronze. Fire protection valves will be Underwriters Laboratories-approved butterfly valves meeting NFPA requirements.

Instrument Air Valves

Instrument air valves will be the ball type of bronze construction, with valve face and seat of approved wear-resistant alloy.

Nonreturn Valves

Nonreturn valves for steam service will be in accordance with ANSI standards and properly drained. Nonreturn valves in vertical positions will have bypass and drain valves. Bodies will have removable access covers to enable the internal parts to be examined or renewed without removing the valve from the pipeline.

Motor Actuated Valves

Electric motor actuators will be designed specifically for the operating speeds, differential and static pressures, process line flowrates, operating environment, and frequency of operations for the application. Electric actuators will have self-locking features. A handwheel and declutching mechanism will be provided to allow handwheel engagement at any time except when the motor is energized. Actuators will automatically revert to motor operation, disengaging the handwheel, upon energizing the motor. The motor actuator will be placed in a position relative to the valve that prevents leakage of liquid, steam, or corrosive gas from valve joints onto the motor or control equipment.

Safety and Relief Valves

Safety valves and/or relief valves will be provided as required by code for pressure vessels, heaters, and boilers. Safety and relief valves will be installed vertically. Piping systems that can be over-pressurized by a higher-pressure source will also be protected by pressure-relief valves. Equipment or parts of equipment that can be over pressurized by thermal expansion of the contained liquid will have thermal-relief valves.

Instrument Root Valves

Instrument root valves will be specified for operation at the working pressure and temperature of the piping to which they are connected. Test points and sample lines in systems that are 600 pound class or higher service will be double valved.

4.3.2.7 Heating, Ventilating, and Air Conditioning (HVAC)

HVAC system design will be based on site ambient conditions and ASHRAE design principles.

Except for the HVAC systems serving the control room, maintenance shop, lab areas, and administration areas, the systems will not be designed to provide comfort levels for extended human occupancy.

Air conditioning will include both heating and cooling of the inlet filtered air. Air velocities in ducts and from louvers and grills will be low enough not to cause unacceptable noise levels in areas where personnel are normally located.

Fans and motors will be mounted on anti-vibration bases to isolate the units from the building structure. Exposed fan outlets and inlets will be fitted with guards. Wire guards will be specified for belt driven fans and arranged to enclose the pulleys and belts.

Air filters will be housed in a manner that facilitates removal. The filter frames will be specified to pass the air being handled through the filter without leakage.

Ductwork, filter frames, and fan casings will be constructed of mild steel sheets stiffened with mild steel flanges and galvanized. Ductwork will be the sectional bolted type and will be adequately supported. Duct joints will be leak tight.

Grills and louvers will be of adjustable metal construction.

4.3.2.8 Thermal Insulation and Cladding

Parts of the facility requiring insulation to reduce heat loss or afford personnel safety will be thermally insulated. Minimum insulation thickness for hot surfaces near personnel will be designed to limit the outside lagging surface temperature to a maximum of 140°F.

The thermal insulation will have as its main constituent calcium silicate, foam glass, fiber glass, or mineral wool, and will consist of preformed slabs or blankets, where feasible. Asbestos-containing materials are prohibited. An aluminum jacket or suitable coating will be provided on the outside surface of the insulation.

Insulation at valves, pipe joints, steam traps, or other points to which access may be required for maintenance will be specified to be removable with a minimum of disturbance to the pipe insulation. At each flanged joint, the molded material will terminate on the pipe at a distance from the flange equal to the overall length of the flange bolts to permit their removal without damaging the molded insulation. Outdoor aboveground insulated piping will be clad with textured aluminum of not less than 30 mil thickness and frame reinforced. At the joints, the sheets will be sufficiently overlapped and caulked to prevent moisture from penetrating the insulation. Steam trap stations will be "boxed" for ease of trap maintenance.

Design temperature limits for thermal insulation will be based on system operating temperature during normal operation.

Outdoor and underground insulation will be moisture resistant.

4.3.2.9 Testing

Hydrostatic testing, including pressure testing at 1.5 times the design pressure, or as required by the applicable code, will be specified and performed for pressure boundary components where an in-service test is not feasible or permitted by code.

4.3.2.10 Welding

Welders and welding procedures will be certified in accordance with the requirements of the applicable codes and standards before performing any welding. Records of welder qualifications and weld procedures will be maintained.

4.3.2.11 Painting

Except as otherwise specified, equipment will receive the respective manufacturer's standard shop finish. Finish colors will be selected from among the paint manufacturer's standard colors.

Finish painting of uninsulated piping will be limited to that required by OSHA for safety or for protection from the elements.

Piping to be insulated will not be finish painted.

4.3.2.12 Lubrication

The types of lubrication specified for facility equipment will be suited to the operating conditions and will comply with the recommendations of the equipment manufacturers.

The initial startup charge of flushing oil will be the equipment manufacturer's standard lubricant for the intended service. Subsequently, such flushing oil will be sampled and analyzed to determine whether it can also be used for normal operation or must be replaced in accordance with the equipment supplier's recommendations.

Rotating equipment will be lubricated as designed by the individual equipment manufacturers. Oil cups will be specified. Where automatic lubricators are fitted to equipment, provision for emergency hand lubrication will also be specified. Where applicable, equipment will be designed to be manually lubricated while in operation without the removal of protective guards. Lubrication filling and drain points will be readily accessible.

5.0 Electrical Engineering Design Criteria

5.1 Introduction

This section summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of electrical engineering systems for the CECP. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications.

5.2 Codes and Standards

The design of the electrical systems and components will be in accordance with the laws and regulations of the federal government, the State of California, local ordinances, and industry standards. The current issue or revision of the documents at the time of filing this PTA will apply unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirement will apply.

The following codes and standards are applicable to the electrical aspects of the power facility:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Anti-Friction Bearing Manufacturers Association (AFBMA)
- California Building Standards Code
- California Electrical Code
- Insulated Cable Engineers Association (ICEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Illuminating Engineering Society (IES)
- National Association of Corrosion Engineers (NACE)
- National Electrical Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- Underwriters Laboratories, Inc. (UL)

5.3 Switchyard and Transformers

5.3.1 Switchyard

Four generators will connect to the 230 kV system and two generators will connect to the 138kV system.

The switchyard will consist of circuit breakers and lines to the grid. Each line will be equipped with the appropriate instrument transformers for protection and metering. Surge arresters will be provided for the outgoing lines in the area of the takeoff towers.

The switchyard will be located near the main step-up transformers and will require an overhead span for the connection for the 138kV system. The 230 kV system will require overhead and some underground installations.

The breakers will be of the dead tank design with current transformers on each bushing. Disconnect switches will be located on each side of the breakers to isolate the breaker, and one switch will be located at each line termination or transformer connection for isolation of the lines or transformer for maintenance.

A grounding grid will be provided to control step and touch potentials in accordance with IEEE Standard 80, Safety in Substation Grounding. Metallic equipment, structures, and fencing will be connected to the grounding grid of buried conductors and ground rods, as required for personnel safety. The substation ground grid will be tied to the plant ground grid.

Lightning protection will be provided by shield wires or lightning masts. The lightning protection system will be designed in accordance with IEEE 998 guidelines.

All faults will be detected, isolated, and cleared in a safe and coordinated manner as soon as practical to ensure the safety of equipment, personnel, and the public. Protective relaying will meet IEEE requirements and will be coordinated with the utility.

Revenue metering will be provided on both systems connections.

5.3.2 Generator Circuit Breakers

Each generator will have a dedicated generator circuit breaker (GCB). The GCBs will be capable of handling the generator nameplate output. They will also be rated for the available through fault currents associated with the circuit.

The GCBs will serve two purposes. They will allow each generator to be isolated from the grid and they will be used to synchronize the generators with the grid.

During plant startup, the GCBs will be open. When the generator is at full speed and synchronized with the grid, the GCBs will be closed to allow power flow from the generators to the grid.

5.3.3 Transformers

- The generators will be connected to the 138 and 230 kV switchyards through individual main step-up transformers. The step-up transformers will be designed in accordance with ANSI standards C57.12.00, C57.12.90, and C57.91. The main transformers will be two-winding, delta-wye, ONAN/ONAF/ONAF. The neutral point of high-voltage winding will be solidly grounded. Each main step-up transformer will have metal oxide surge arrestors connected to the high-voltage terminals and will have manual de-energized (“no-load”) tap changers located in high-voltage windings.

An auxiliary transformer will be installed for both voltage levels. The auxiliary transformers will be used to feed all of the electrical loads associated with the plant from either source but not both.

During plant startup, power will be backed through the generator step-up transformers to the auxiliary transformers. Once each generator has been started and synchronized with the utility bus, the generator circuit breakers will be closed. When this occurs, the generators will begin feeding power to the auxiliary transformers (only applies to the units connected to auxiliary transformers) and exporting power to the grid.

6.0 Control Engineering Design Criteria

6.1 Introduction

This section summarizes the codes, standards, criteria, and practices that will be generally used in the design and installation of instrumentation and controls for CECP. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications.

6.2 Codes and Standards

The design specification of all work will be in accordance with the laws and regulations of the federal government, the State of California, and local codes and ordinances. A summary of general codes and industry standards applicable to design and control aspects of the power facility follows.

- American National Standards Institute (ANSI)

- American Society of Mechanical Engineers (ASME)
- The Institute of Electrical and Electronics Engineers (IEEE)
- International Society of Automation (ISA)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- American Society for Testing and Materials (ASTM)

6.3 Control Systems Design Criteria

6.3.1 General Requirements

Electronic signal levels, where used, will be ISA type 2 analog or industrial fieldbus technologies, controller outputs, electric-to-pneumatic converter inputs, and valve positioner inputs.

Discrete inputs and outputs are at industry standard interrogations voltages.

6.3.2 Pressure Instruments

In general, pressure instruments will have linear scales with units of measurement in pounds per square inch, gauge (psig).

Pressure gauges will have either a blowout disk or a blowout back and an acrylic or shatterproof glass face.

Pressure gauges on process piping will be resistant to plant atmospheres.

Pressure test points will have isolation valves and caps or plugs. Pressure devices on pulsating services will have pulsation dampers.

6.3.3 Temperature Instruments

In general, temperature instruments will have scales with temperature units in degrees Fahrenheit.

Bimetal-actuated dial thermometers will have 4.5- or 5-inch-diameter (minimum) dials and white faces with black scale markings and will consist of every angle-type. Dial thermometers will be resistant to plant atmospheres.

Temperature elements and dial thermometers will be protected by thermowells except when measuring gas or air temperatures at atmospheric pressure. Temperature test points will have thermowells and caps or plugs.

Resistance temperature detectors will be 100-ohm platinum, 3-wire type. The element will be spring-loaded, mounted in a thermowell, and connected to a cast iron head assembly.

Thermocouples will be Type J or K dual-element, grounded, spring-loaded, for general service. Additional types will be considered in special installations. Materials of construction will be dictated by service temperatures. Thermocouple heads will be the cast type with an internal grounding screw.

6.3.4 Level Instruments

Reflex-glass or magnetic level gauges will be used. Level gauges for high-pressure service will have suitable personnel protection.

Gauge glasses used in conjunction with level instruments will cover a range that includes the highest and lowest trip/alarm set points.

6.3.5 Flow Instruments

Flow transmitters will typically be the differential pressure-type with the range similar to that of the primary element. In general, linear scales will be used for flow indication and recording.

Magnetic flow transmitters may be used for liquid flow measurement below 200°F.

Custody transfer meters will be of the type designed for this accurate service.

6.3.6 Control Valves

Control valves in throttling service will generally be the globe-body cage type with body materials, pressure rating, and valve trims suitable for the service involved. Other style valve bodies (e.g., butterfly, eccentric disk) may also be used when suitable for the intended service.

Valves will be designed to fail in a safe position.

Control valve body size will not be more than two sizes smaller than line size, unless the smaller size is specifically reviewed for stresses in the piping.

Control valves in 600-Class service and below will be flanged where economical. Where flanged valves are used, minimum flange rating will be ANSI 300 Class.

Critical service valves will be defined as ANSI 900 Class and higher in valves of sizes larger than 2 inches.

Severe service valves will be defined as valves requiring anticavitation trim, low noise trim, or flashing service, with differential pressures greater than 100 pounds per square inch (psi).

In general, control valves will be specified for a noise level no greater than 90 decibel A-rated (dBA) when measured 3 feet downstream and 3 feet away from the pipe surface.

Valve actuators will use positioners and the highest-pressure, smallest-size actuator, and will be the pneumatic-spring diaphragm or piston type. Actuators will be sized to shut off against at least 110 percent of the maximum shutoff pressure and designed to function with instrument air pressure ranging from 80 to 125 psig.

Handwheels will be furnished only on those valves that can be manually set and controlled during system operation (to maintain plant operation) and do not have manual bypasses.

Control valve accessories, excluding controllers, will be mounted on the valve actuator unless severe vibration is expected.

Solenoid valves supplied with the control valves will have Class H coils. The coil enclosure will normally be a minimum of NEMA 4 but will be suitable for the area of installation. Terminations will typically be by pigtail wires.

6.3.7 Instrument Tubing and Installation

Tubing used to connect instruments to the process line will be stainless steel for primary instruments and sampling systems.

Instrument tubing fittings will be the compression type. One manufacturer will be selected for use and will be standardized as much as practical throughout the plant.

Differential pressure (flow) instruments will be fitted with three-valve manifolds; two-valve manifolds will be specified for other instruments as appropriate.

Instrument installation will be designed to correctly sense the process variable. Taps on process lines will be located so that sensing lines do not trap air in liquid service or liquid in gas service. Taps on process lines will be fitted with a shutoff (root or gauge valve) close to the process line. Root and gauge valves will be main-line class valves.

Instrument tubing will be supported in both horizontal and vertical runs as necessary. Expansion loops will be provided in tubing runs subject to high temperatures. The instrument tubing support design will allow for movement of the main process line.

6.3.8 Pressure and Temperature Switches

Field-mounted pressure and temperature switches will have either NEMA Type 4 housings or housings suitable for the environment.

In general, switches will be applied such that the actuation point is within the center one-third of the instrument range.

6.3.9 Field-mounted Instruments

Field-mounted instruments will be of a design suitable for the area in which they are located. They will be mounted in areas accessible for maintenance and relatively free of vibration, and will not block walkways or prevent maintenance of other equipment.

Field-mounted instruments will be grouped on racks. Supports for individual instruments will be prefabricated, off-the-shelf, 2-inch pipestand. Instrument racks and individual supports will be mounted to concrete floors, to platforms, or on support steel in locations not subject to excessive vibration.

Individual field instrument sensing lines will be sloped or pitched in such a manner and be of such length, routing, and configuration that signal response is not adversely affected.

Liquid level controllers will generally be the nonindicating, displacement-type with external cages.

6.3.10 Instrument Air System

Branch headers will have a shutoff valve at the takeoff from the main header. The branch headers will be sized for the air usage of the instruments served, but will be no smaller than 3/8 inch. Each instrument air user will have a shutoff valve, filter, outlet gauge, and regulator at the instrument.

7.0 Chemical Engineering Design Criteria

7.1 Introduction

This section summarizes the general chemical engineering design criteria for the CECP project. These criteria form the basis of the design for the chemical components and systems of the project. More specific design information is developed during detailed design to support equipment and erection specifications. It is not the intent of this appendix to present the detailed design information for each component and system, but rather to summarize the codes, standards, and general criteria that will be used.

7.2 Design Codes and Standards

The design and specification of all work will be in accordance with the laws and regulations of the federal government, the State of California, and local codes and ordinances. Industry codes and standards relevant to chemical engineering design to be used in design and construction are summarized below.

- ANSI B31.1 Power Piping Code
- ASME Performance Test Code 31, Ion Exchange Equipment
- American Society for Testing and Materials (ASTM)
- California Building Code (CBC)
- Occupational Safety and Health Administration (OSHA)
- Steel Structures Painting Council Standards (SSPC)
- Underwriters Laboratories
- American Waterworks Association (AWWA)

Other recognized standards will be used as required to serve as design, fabrication, and construction guidelines when not in conflict with the above-listed standards.

The codes and industry standards used for design, fabrication, and construction will be the codes and industry standards, including all addenda, in effect as stated in equipment and construction purchase or contract documents.

7.3 General Criteria

7.3.1 Design Water Quality

7.3.1.1 Reclaimed Water

The City of Carlsbad will provide Title 22 water for use in water treatment to the CECP. Existing potable water sources and metering will be reused as a drinking water, eyewash, and emergency fire system fill source.

7.3.1.2 Ocean Water

Should the reclaimed source be unavailable, the Ocean Water System will be deployed as an alternate source.

7.3.1.3 Reverse Osmosis Membrane System

Raw water will be filtered and purified via a reverse osmosis (RO) system to remove suspended solids and the majority of the dissolved solids. The RO permeate will be forwarded to an RO storage tank that will supply the evaporative cooler makeup demand and demineralized water system. The high total dissolved solids RO reject stream will be discharged to the City of Carlsbad wastewater treatment plant.

7.3.1.4 Demineralized Water System

Demineralized water will be produced by an RO and ion exchange system. The high-quality demineralized water will be used for the combustion turbine water injection, online water wash, and SPRINT systems. The demineralized water will be the highest practical quality. Minimum quality requirements are detailed in Table 1.

TABLE 1
Demineralized Water Purity Requirements

Parameter	Units	Value
Total Solids	ppm	5.0
Total Dissolved Solids	ppm	3.0
Silica as Silicon Dioxide (SiO_2)	ppm	0.1
Conductivity*	µΩ/cm	< 0.1 @ 25°C
pH*	Standard Units	6.5 – 7.5
Sodium + Potassium $(Na+K)_{max}$	ppm	0.1
$Chlorides_{max}$	mg/L	0.5
$Sulfates_{max}$	mg/L	0.5

*measured in the absence of carbon dioxide (CO_2)
°C = degrees Celsius
mg/L = milligrams per liter
ppm = parts per million
µΩ/cm = micromho per centimeter

7.3.1.5 Construction Water

Water for use during construction will be supplied from the existing City of Carlsbad potable water sources

7.3.1.6 Fire Protection Water

The makeup source of water for fire protection will be from the CECP water treatment system with an emergency and initial fill from the potable water source. The tank will have a minimum capacity of 2 hours of firewater reserved in the tank.

7.3.2 Chemical Conditioning

7.3.2.1 Reverse Osmosis Membrane System Chemical Conditioning

Chemical feed systems will supply the following water-conditioning chemicals to the RO system to minimize corrosion and control, the formation of mineral scale, and biofouling:

- Dechlorination: sodium bisulfite to remove chlorine residual
- Mineral scale dispersant: polyacrylate based solution
- Corrosion inhibitor: phosphate based
- pH control: sulfuric acid for alkalinity consumption and scaling tendencies
- Clean-in-place (CIP): chemical cleaning solution contains sodium hydroxide, sodium hypochlorite, and citric acid
- Biocide: sodium hypochlorite, stabilized bromine, or sodium bromide will be fed into the system to prevent bio-fouling

7.3.3 Chemical Storage

7.3.3.1 Storage Capacity

A trailer-mounted water treatment system is being deployed with the chemical storage self-contained. Trailers with regeneration requirements will be removed from the site for offsite rework and materials handling and a replacement trailer installed to return the system to service.

7.3.3.2 Containment

Chemical storage tanks containing corrosive fluids will be surrounded by curbing. Curbing and drain piping design will allow a full tank capacity spill without overflowing the curbing. For multiple tanks located within the same curbed area, the largest single tank will be used to size the curbing and drain piping. For outdoor chemical containment areas, additional containment volume will be included for stormwater.

7.3.3.3 Closed Drains

Waste piping for volatile liquids and wastes with offensive odors will use closed drains to control noxious fumes and vapors.

7.3.3.4 Coatings

Tanks, piping, and curbing for chemical storage applications will be provided with a protective coating system. The specific requirements for selection of an appropriate coating will be identified prior to equipment and construction contract procurements.

7.3.4 Wastewater Treatment

The primary wastewater collection system will collect process wastewater from all of the plant equipment, including the evaporative coolers and water treatment equipment.

General plant drains will collect area washdown, sample drains, and drainage from facility equipment areas. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the wastewater collection system. Drains that potentially could contain oil or grease will first be routed through the existing oil/water separator.

Wastewater from combustion turbine water washes will be collected in a water wash drains tank. The wastewater will be discharged to oil/water separator and then sent to the wastewater tank.

8.0 Geologic and Foundation Design Criteria

8.1 Introduction

This section provides a description of the site conditions and preliminary foundation-related subsurface conditions. Soil-related hazards addressed include soil liquefaction, hydrocompaction (or collapsible soils), and expansive soils. Preliminary foundation and earthwork considerations are addressed based on the results of general published information available for the project area and collected for the PTA, and established geotechnical engineering practices.

Information contained in this appendix reflects the codes, standards, criteria, and practices that will be used in the design and construction of site and foundation engineering systems for the facility. More specific project information will be developed during execution of the project to support detailed design, engineering, material procurement specification, and construction specifications. This information will be included in a geotechnical engineering study, which, if requested, will be provided to the CEC upon completion.

8.2 Codes and Standards

- California Building Code.
- Department of the Navy. “Identification and Classification of Soil and Rock.” Chapter 1 in *Soil Mechanics Design Manual 7.1*. Naval Facilities Engineering Command. Alexandria, VA.
- USGS. Seismic Design Values for Buildings. Earthquake Ground Motion Parameters software, Version 5.0.9. October 6, 2008.

8.3 Scope of Work

The scope of services for the preparation of this appendix included an assessment of soils-related hazards, a summary of preliminary foundation and earthwork considerations, and preliminary guidelines for inspection and monitoring of geotechnical aspects of construction based on available published data as analyzed in Section 5.4, Geologic Hazards and Resources.

8.4 Site Subsurface Conditions

8.4.1 Stratigraphy

Borings will be performed at the project site to verify the soil consistency and characteristics.

8.4.2 Seismicity / Ground Shaking

The project site lies within a seismically active region with the largest fault approximately 4.3 miles away. Large earthquakes have occurred in the past and will occur in the future. Currently, the project area is considered to be seismically active and is designated as CBC Seismic Design Category 4.

8.4.3 Ground Rupture

Ruptures along the surface trace of a fault tend to occur along lines of previous faulting. A ground rupture is caused when an earthquake event along a fault creates rupture at the surface. Because no known faults exist at the project site, the likelihood of ground rupture to occur at the project site is low. However, a ground rupture study at the project site will be performed as part of the geotechnical investigation in order to verify this assumption.

8.4.4 Liquefaction Potential

During strong ground shaking, loose, saturated, cohesionless soils can experience a temporary loss of shear strength. This phenomenon is known as liquefaction. Liquefaction is dependent on grain size distribution, relative density of the soils, degree of saturation, and intensity and duration of the earthquake. The potential hazard associated with liquefaction is seismically induced settlement. Soil liquefaction can lead to foundation bearing failures and excessive settlements when:

- The design ground acceleration is high (up to 0.4g)
- The water level is relatively shallow
- Low standard penetration tests (SPT) blow counts are measured in granular deposits (suggesting low soil density)

Further geotechnical investigation will be required to confirm liquefaction assumptions assumption.

8.4.5 Groundwater

The groundwater elevation will be confirmed during a more thorough geotechnical investigation prior to major plant construction.

8.5 Assessment of Soil-related Hazards

8.5.1 Expansive Soils

Expansive soils shrink and swell with wetting and drying. The shrink-swell capacity of expansive soils can result in differential movement beneath foundations. Expansive soils have not been identified as a potential hazard in the San Joaquin Valley area. Based on this, the likelihood of expansive soils to be present at the site is low.

Laboratory test results for representative soil samples at the top 10 feet below grade will be tested to determine overall soil expansiveness. The soils near the project site are generally not clayey and indicate no soils with a potential for expansion. A soil investigation will be performed at the project site to confirm these assumptions.

8.5.2 Collapsible Soils

Soil collapse (hydrocompaction) is a phenomenon that results in relatively rapid settlement of soil deposits due to addition of water. This generally occurs in soils having a loose particle structure cemented together with soluble minerals or with small quantities of clay. Water infiltration into such soils can break down the interparticle cementation, resulting in collapse of the soil structure. Collapsible soils are usually identified with index tests, such as dry density and liquid limit, and consolidation tests where soil collapse potential is measured after inundation under load.

Based on the available data, the potential for soil collapse at the site is expected to be remote. However, this will be confirmed by testing soil samples retrieved from borings at the project site.

8.6 Preliminary Foundation Considerations

8.6.1 General Foundation Design Criteria

For satisfactory performance, the foundation of any structure must satisfy two independent design criteria. First, it must have an acceptable factor of safety against bearing failure in the foundation soils under maximum design load. Second, settlements during the life of the structure must not be of a magnitude that will cause structural damage, endanger piping connections, or impair the operational efficiency of the facility. Selection of the foundation type to satisfy these criteria depends on the nature and magnitude of dead and live loads, the base area of the structure, and the settlement tolerances. Where more than one foundation type satisfies these criteria, then cost, scheduling, material availability, and local practice will probably influence or determine the final selection of the type of foundation.

Based on the information collected from the preliminary geotechnical report, no adverse foundation-related subsurface and groundwater conditions would be encountered that would preclude the construction and operation of the proposed structures. The site can be considered suitable for development of the proposed structures, pursuant to completion of a geotechnical investigation, and the preliminary foundation and earthwork considerations discussed in this appendix.

8.6.2 Shallow Foundations

Completion of the geotechnical investigation will determine if the proposed structures can be supported directly on the native soils. Engineered fill material may be required directly under the more heavily loaded shallow-depth foundations.

Allowable bearing pressures will include a safety factor of at least 3 against bearing failures. Settlements of footings are expected to be limited to 1 inch, and differential settlement between neighboring foundations to less than 0.5 inch. Tanks can usually undergo much larger settlements.

Frost depth is likely to be less than 5 inches at the site, but will be confirmed through a geotechnical investigation. Pursuant to a geotechnical investigation, exterior foundations and foundations in unheated areas should be placed at a depth of at least 1 foot below the ground surface for protection. Interior footings in permanently heated areas can be placed at nominal depths. The minimum recommended width is 3 feet for spread footings and 2 feet for wall footings.

8.6.3 Deep Foundations

Compressible soils are not expected based on the information obtained from preliminary geotechnical reports. However, if compressible soils are present at the project site, which would preclude use of shallow foundations mentioned above, drilled shaft foundations will be needed. A typical drilled shaft could be 24 inches in diameter and 10 feet deep based on preliminary geotechnical investigation. These types of drilled shafts are expected to develop allowable loads of 15 to 20 tons in compression, 10 tons in uplift. The length, size, allowable bearing, uplift, and lateral capacity of the drilled shafts for the project site, if needed, will be determined using available software programs.

8.6.4 Corrosion Potential and Ground Aggressiveness

Corrosivity tests will be conducted to determine whether the site soils are noncorrosive or corrosive for buried steel based on the chloride content and pH values.

8.7 Preliminary Earthwork Considerations

8.7.1 Site Preparation and Grading

The subgrade preparation would include the complete removal of all vegetation and topsoil. The majority of the vegetation on the site consists of weeds and grasses with a maximum root depth of less than a foot. Topsoil can be stockpiled and may be reused in remote areas of the site where no future construction is expected.

Any site fill work should be performed as detailed below. All soil surfaces to receive fill should be proof-rolled with a heavy vibratory roller or a fully loaded dump truck to detect soft areas.

8.7.2 Temporary Excavations

All excavations should be sloped in accordance with Occupational Safety and Health Act (OSHA) requirements. Sheet piling could also be used to support any excavation. The need for internal supports in the excavation will be determined based on the final depth of the excavation. Any excavation below the water table should be dewatered using well points or other suitable system installed prior to the start of excavation.

8.7.3 Permanent Slopes

Cut and fill slopes shall be 2h:1v (horizontal to vertical) maximum. Embankments for creek diversions, if required, shall be 5h:1v maximum.

8.7.4 Backfill Requirements

All fill material will be free of organic matter, debris, or clay balls, with a maximum size not exceeding 3 inches. Structural fill will also have a Plastic Index of less than 15, a Liquid Limit of less than 30, and a maximum fine content (passing the 200 sieve) of 30 percent. Granular, uniformly graded material with a maximum aggregate size of 0.5 inch may be used for pipe bedding. Based on the available site grading, it is anticipated that fill material will be available on site.

Structural fill will be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 when used for raising the grade throughout the site, below footings or mats, or for rough grading. Fill placed behind retaining structures may be compacted to 90 percent of the maximum dry density as determined by ASTM D 1557. Initially, structural fill will be placed in lifts not exceeding 8 inches loose thickness. Thicker lifts may be used pursuant to approval based on results of field compaction performance. The moisture content of all compacted fill will fall within 3 percentage points of the optimum moisture content measured by ASTM D 1557, except the top 12 inches of subgrade will be compacted to 95 percent of ASTM D 1557 maximum density.

Pipe bedding can be compacted in 12-inch lifts to 90 percent of the maximum dry density as determined by ASTM D 1557. Common fill to be placed in remote and/or unsurfaced areas may be compacted in 12-inch lifts to 85 percent of the maximum dry density as determined by ASTM D 1557.

8.8 Inspection and Monitoring

A California-registered Geotechnical Engineer or Engineering Geologist will monitor geotechnical aspects of foundation construction and/or installation and fill placement. At a minimum, the Geotechnical Engineer/Engineering Geologist will monitor the following activities:

- Surfaces to receive fill will be inspected prior to fill placement to verify that no pockets of loose/soft or otherwise unsuitable material were left in place and that the subgrade is suitable for structural fill placement.
- Fill placement operations will be monitored by an independent testing agency. Field compaction control testing will be performed regularly and in accordance with the applicable specification to be issued by the Geotechnical Engineer.
- The Geotechnical Engineer will witness drilled shaft installation if required.
- Settlement monitoring of significant foundations and equipment is recommended on at least a quarterly basis during construction and the first year of operation, and then semiannually for the next 2 years.

8.9 Foundation Design Criteria

8.9.1 General

Allowable soil-bearing pressures for foundation design will be in accordance with this appendix and the detailed geotechnical investigation for the site.

8.9.2 Groundwater Pressures

Hydrostatic pressures due to groundwater or temporary water loads will be considered.

8.9.3 Factors of Safety

The factor of safety for structures, tanks, and equipment supports with respect to overturning, sliding, and uplift due to wind and buoyancy will be as defined in Appendix 2B, Structural Engineering Design Criteria.

8.9.4 Load Factors and Load Combinations

For reinforced concrete structures and equipment supports, using the strength method, the load factors and load combinations will be in accordance with Appendix 2B, Structural Engineering Design Criteria.

9.0 References

Carlsbad Energy Center LLC. 2007. *Carlsbad Energy Center Project Application for Certification.* November. Available online at: http://www.energy.ca.gov/sitingcases/carlsbad/documents/applicant/afc/.

CH2M HILL and Shaw, Stone & Webster. 2008. *Carlsbad Energy Center Project (07-AFC-6) Project Enhancement and Refinement Document. Submitted by Carlsbad Energy Center LLC.* July. Available online at: http://www.energy.ca.gov/sitingcases/carlsbad/documents/applicant/2008-08-27_PROJECT_ENHANCEMENT_AND_REFINEMENT.PDF

Appendix 3A
Interconnection Reassessment Study Report

Interconnection Reassessment Study Report

SDG&E Area Report

October 22, 2013

This study has been completed in coordination with San Diego Gas & Electric Company (SDG&E) per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP)

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Appendices:

A. Introduction

In accordance with the California Independent System Operator Corporation (CAISO) Generator Interconnection and Deliverability Allocation Procedures (GIDAP) Tariff Appendix DD, the CAISO and San Diego Gas & Electric Company (SDG&E) performed a reassessment study prior to the beginning of the Queue Cluster 5 (QC5) Phase II Interconnection Study.

The reassessment evaluates the impacts on the Network Upgrades identified in previous interconnection studies due to:

- Interconnection Request withdrawals
- Transmission additions and upgrades approved by the CAISO in the most recent TPP cycle
- SONGS Retirement

The reassessment evaluates the impact from all the active generation projects prior to QC5. This report focuses on the impacts and requirements for the generation projects seeking interconnection to SDG&E-owned transmission facilities. The following Network Upgrades have been identified in the previous interconnection studies for Pre-QC5 projects seeking interconnection to SDG&E-owned transmission facilities:

1. East County (ECO) 500/230/138 kV Substation
2. Boulevard East (BUE) 138/69/12 kV Substation
3. TL13844 BUE-ECO 138 kV Transmission Line (T/L)
4. Reconductor TL649A Otay-Otay Lakes Tap 69 kV and TL649D Otay Lakes Tap-San Ysidro 69 kV T/L
5. Imperial Valley Bank 82 500/230 kV Transformer Bank #3
6. Miguel 230 kV Reconfiguration
7. Otay Mesa-Tijuana TL23040 Series Reactor
8. Upgrade TL23042 Miguel-Bay Boulevard 230 kV T/L
9. Imperial Valley SPSs to trip generation interconnected to Imperial Valley, BUE/ECO substations, and/or the Ocotillo switchyard under specific system conditions
10. SPS for generators connected to Border 69 kV Substation
11. SPS to trip generation for the overload or outage of the TL687 Borrego-Narrows 69 kV T/L or the outage of the TL686 Narrows-Warners 69 kV T/L
12. SPS for generators connected to Otay Mesa 230 kV Switchyard
13. SPS to protect ECO Bank 60 230/138 kV transformer bank for overload or outage
14. SPS to protect ECO Bank 80 500/230 kV transformer bank for overload or outage

15. SPS to protect TL13844 ECO-BUE 138 kV T/L for overload or outage
16. Implement an SPS to protect TL23042 Miguel-Bay Boulevard 230 kV T/L
17. SPS for generators connected in the Crestwood Area
18. Re-route of Eldorado–Lugo 500kV T/L
19. Upgrade Eldorado-Lugo 500 kV T/L series caps to 3800 Amps at each end
20. Upgrade Eldorado-Lugo 500 kV T/L Substation terminal equipment to 4000 Amps at each end
21. Upgrade Lugo-Mohave 500 kV T/L series cap at Mohave to 3800 Amps
22. Equip Lugo line position at Mohave with 4000 Amps rated equipment
23. Implement an SPS to protect TL23022 and TL23023 Miguel-Mission 230 kV #1 and #2
24. Implement an SPS to protect TL23029 Silvergate-Old Town 230 kV
25. Implement an SPS to protect TL23027 Mission-Old Town 230 kV

Upgrades 18, 19 and 20 were approved by the CAISO as “Policy-driven” transmission projects in the 2012 -2013 CAISO Transmission Plan.

The reassessment for generators seeking interconnection to SDG&E-owned transmission facilities consisted of a Reliability Assessment and Deliverability Assessment. The reassessment study was comprised of steady state power flow analysis, transient analysis, post-transient voltage analysis and short circuit study. This reassessment report provides the updated mitigation requirements for impacted generation projects in the pre-Transition Cluster, Transition Cluster, Queue Cluster 1 & 2, and Queue Cluster 3 & 4.

B. Study Assumptions

B.1 Load and Intertie Flows

B.1.1 Reliability Assessment

The Reliability Assessment evaluated the Pre-QC5 projects under the 2016 Heavy Summer and Light Load system conditions. In an attempt to capture the most adverse condition, the reassessment cases modeled Pre-QC5 projects (higher-queued), with In-Service Dates within the 2016 timeframe. Interconnection Request withdrawals were removed from the studies. Transmission additions and upgrades that were approved in the most recent TPP cycle were added to the cases. In addition, SONGS was not dispatched due to its retirement. Curtailment of existing or higher-queued generation was required for certain scenarios as discussed in Section E. The 230 kV and 500 kV facilities in the APS transmission system and 230 kV facilities in CFE and the IID transmission system were monitored for adverse impacts caused by different dispatch scenarios.

B.1.2 Deliverability Assessment

The Deliverability Assessment On-Peak case modeled 5,308 MW load + losses (1-in-5 load forecast for 2016 from the California Energy Commission (CEC) in the SDG&E system.

The On-Peak Deliverability Assessment base case modeled the import target shown in Table B-1.

Table B-1: On-Peak Deliverability Assessment Import Target

Branch Group Name	Direction	Net Import MW	Import Unused ETC & TOR MW
Lugo-Victorville-BG	N-S	1432	141
COI_BG	N-S	3770	548
BLYTHE_BG	E-W	45	0
CASCADE_BG	N-S	36	0
CFE_BG	S-N	-119	0
ELDORADO_MSL	E-W	1213	0
IID-SCE_BG	E-W	1400	0
IID-SDGE_BG	E-W		0
LAUGHLIN_BG	E-W	-38	0
MCCULLGH_MSL	E-W	7	316
MEAD_MSL	E-W	938	455
NGILABK4_BG	E-W	-131	168
NOB_BG	N-S	1208	0
PALOVRDE_MSL	E-W	2872	168
PARKER_BG	E-W	126	28
SILVERPK_BG	E-W	0	0
SUMMIT_BG	E-W	6	0
SYLMAR-AC_MSL	E-W	-164	368
Total		12599	2192

B.2 Generation Dispatch Assumptions

B.2.1 Reliability Assessment

Several reassessment cases were developed to monitor SDG&E and neighboring transmission systems for adverse impacts caused by generation connecting in the SDG&E area. General descriptions of these base cases are listed in Table B-2.

Definitions for abbreviations used to define cases in Table B-2:

A. **INT:** Internal Area. High internal generation & reduced East of Miguel generation.

B. **EAST of MIGUEL:** Imperial Valley Area, Ocotillo Switchyard, ECO/BUE Area, and North Gila Area. High East of Miguel generation & reduced Internal generation.

C. **Pre-QC5:** transmission and generation topology after transmission additions and upgrades that were approved in the most recent TPP cycle and withdrawn generation from the studies

Table B-2: Reliability Assessment Case Description

Season	Pre-QC5 Area	Case Name
Light Load	Internal	C5_Reassess_ll_Int.sav
	East of Miguel	C5_Reassess_ll_EAST.sav
Heavy Summer	Internal	C5_Reassess_hs_Int.sav
	East of Miguel	C5_Reassess_hs_EAST.sav

Generation assumptions are shown in Table F-1 of Appendix F.

While it is impractical to study all combinations of system load and generation levels during all seasons and at all times of the day, the base cases were developed to represent stressed scenarios of loading and generation conditions for the various clusters. The load, resource, and dispatch summary table is included in Appendix C.

B.2.2 Deliverability Assessment

Generation dispatch assumptions in Deliverability Assessment can be found at http://www.caiso.com/Documents/On-PeakDeliverabilityAssessmentMethodology.pdf.

In the On-Peak scenario, the Summer Peak Qualified Capacity (QC) for proposed FC generation projects is set to 64% of the requested PMax for wind generation and 100% of the requested PMax for solar generation initially. The Summer Peak QC may be adjusted to 40% of the requested PMax for wind generation and 85% for solar generation if a mix of different fuel type generation is identified in the Deliverability Assessment as the 5% DFAX group for a transmission limitation.

B.3 Transmission Assumptions

The reassessment included the modeling of all CAISO-approved transmission projects, as well as any Network Upgrades that have received regulatory approval or are under construction, in the SDG&E Area base cases.

B.4 Power Flow Base Cases

The reassessment study power flow cases were developed from the previous Cluster 5 Phase I cases. The reassessment studies were based on a 2016 load forecast. These power flow cases included all CAISO approved transmission projects, as well as earlier queued Serial Group and cluster generation projects with associated Network Upgrades, and Interconnection Customer projects deemed withdrawn were removed with associated Network Upgrades.

B.4.1 2016 Base Cases

The Heavy Summer case includes transmission system topology updates provided by CFE and IID for their respective areas. CFE requested an import (flow from SDG&E to CFE) of 100 MW for the 2016 Heavy Summer, simulating CFE generation retiring and/or not developing as planned. The loads and topology of other WECC areas replicated the “15hs2a” case.

In the Light Load case, IID’s area export matched the WECC 2014 Light Autumn approved base case (“14la1sa”) export of 462 MW. The Light Load case includes transmission system topology updates provided by CFE and IID. CFE was modeled exporting 350 MW (flow from CFE to SDG&E) to create a stressed scenario. The loads and topology of other WECC areas replicated the “14la1sa” case.

Table B-3 - Reliability Assessment Base Case Assumptions, MW

		Heavy Summer	Light Load
		Reassess case	Reassess case
CAISO Load +Losses		61541	33402
SDG&E			
	Load+Losses	5468	2960
	Area Generation	6822	3940
	Imports	1354	980
SDG&E Cut Plane		3042	2315
In-Basin Generation		2441	1014
Out-of-Basin Generation		4382	2927
PG&E			
	Load+Losses	29806	15156
	Area Generation	23917	13192
	Imports	-5887	-1964
SCE			
	Load+Losses	26304	15400
	Area Generation	19721	8205
	Imports	-6582	-7194
IID			
	Load+Losses	1060	525
	Area Generation	1269	987
	Imports	209	462
CFE			
	Load+Losses	2507	1159
	Area Generation	2406	1509
	Imports	-101	350
Arizona (Area 14)			
	Load+Losses	22643	10678
	Area Generation	29639	17578
	Imports	6996	6900
WECC Path 43 (North of SONGS) “+” flow is exiting SDG&E		700	771
Path 44 (South of SONGS)“-“ flow is exiting SDG&E and “+” flow is entering SDG&E		-710	- 781
Path 45 (CFE-SDG&E)“+” flow is entering SDG&E		-100	350

B.5 Deliverability Base Cases

B.5.1 Master Deliverability Assessment Base Case

A master base case was developed for the reassessment on-peak deliverability assessment which modeled all the Pre-QC5 generation projects. The resources in the master base case are dispatched as follows:

- Existing capacity resources are dispatched at 80% of their summer peak Net Qualified Capacity (NQC).
- Proposed Full Capacity (FC) resources are dispatched to balance load and maintain expected imports, but not exceeding 80% of their summer peak NQC.
- Energy-Only (EO) resources are considered off-line.
- Imports are at the maximum summer peak simultaneous historical level by branch group as shown in Table B-1.
- Non-pump load is at the 1-in-5 peak load level for CAISO.
- Pump load is dispatched within expected range for summer peak load hours.

B.5.2 SDG&E Area Deliverability Assessment Base Case

The SDG&E Area deliverability assessment base case was developed from the master base case by dispatching all proposed full capacity resources in the SDG&E Area to 80% of their NQC.

B.6 Pre-QC5 Generation Projects

All Pre-QC5 generation projects, as listed in Appendix F Table F.1, were modeled in the base cases. However, some generation projects were either turned off or modeled with reduced output to create a more stressed case for the Reliability Assessment, observe generation dispatch limitations as discussed in Section E.2 or to balance the loads and resources in the power flow model.

C. Study Methodology

C.1 Reliability Standards and Criteria

The Reliability Assessment is comprised of steady state power flow analysis, transient analysis, post-transient voltage analyses, and a short circuit study.

The study results for this reassessment study will be communicated to neighboring entities that may be impacted for coordination and incorporation of its transmission assessments. Input from neighboring entities is solicited to ensure coordination of transmission systems.

While it is impractical to study all combinations of system load and generation levels during all seasons and at all times of the day, the base cases were developed to represent stressed scenarios of loading and generation conditions for the study group area. The CAISO and SDG&E cannot guarantee that generation projects can operate at maximum rated output at all times without adverse economic or reliability impacts during times, seasons, and other operating conditions not studied in the reassessment study. The results of this reassessment study will serve as documentation that the reliability impacts of new facilities and their connections on interconnected transmission systems are evaluated.

C.1.1 NERC Reliability Standards

The CAISO analyzed the need for transmission upgrades and additions in accordance with NERC reliability standards. These standards set forth criteria for system performance requirements that must be met under specific set of operating conditions. The following NERC reliability standards are applicable to the CAISO, as a registered NERC Planning Authority, and the PTOs, as Transmission Planners, and are the primary standards for the interconnection of new facilities and system performance[1]:

- FAC-001: Facility Connection Requirements[2]
- FAC-002: Coordination of Plans for New Facilities
- TPL-001: System Performance Under Normal Conditions (category A)
- TPL-002: System Performance Following Loss of a Single Bulk Electric System (BES) Element (category B)
- TPL-003: System Performance Following Loss of Two or More BES Elements (category C)

C.1.2 WECC Regional Criteria

The WECC TPL system performance criteria are applicable to the CAISO as a Planning Authority and set forth additional requirements that must be met under specific sets of operating conditions[3].

[1] http://www.nerc.com/page.php?cid=2%7C20

[2] http://www.nerc.com/files/FAC-001-1.pdf; FAC-001 is applicable to PTOs, but not to the ISO

[3] http://compliance.wecc.biz/application/ContentPageView.aspx?ContentId=71

C.1.3 California ISO Planning Standards

The California ISO Planning Standards specify the grid planning criteria to be used in the planning of CAISO transmission facilities[4]. These standards cover the following:

- Address specifics not covered in the NERC reliability standards and WECC regional criteria;
- Provide interpretations of the NERC reliability standards and WECC regional criteria specific to the CAISO Controlled Grid;
- Identify whether specific criteria should be adopted that are more stringent than the NERC standards or WECC regional criteria.

C.1.4 Contingencies

The system performance with the addition of the generation projects were evaluated under normal conditions and following loss of single or multiple BES elements as defined by the applicable reliability standards and criteria.

Table C-1 summarizes the contingencies per NERC Reliability Standards, WECC Regional Criteria, and CAISO Planning Standards.

[4] http://www.caiso.com/Documents/TransmissionPlanningStandards.pdf

Table C-1: Contingencies

Contingencies	Description
NERC TPL-001 NERC Category A (No contingency)	All facilities in service – Normal Conditions
NERC TPL-002 Category B	B1 – SLG or 3Φ Fault, with Normal Clearing: single generator outage B2 – SLG or 3Φ Fault, with Normal Clearing: single transmission circuit outage B3 – SLG or 3Φ Fault, with Normal Clearing: single transformer outage B4 – Single Pole Block, with Normal Clearing: single pole (dc) line outage
CAISO Planning Standard Category B	II.2. – Selected overlapping single generator and transmission circuit outages II.5. – Loss of combined cycle power plant module
NERC TPL-003 Category C	C1 – SLG Fault, with Normal Clearing: Bus outages C2 – SLG Fault, with Normal Clearing: Breaker failures C3 – SLG or 3Φ Fault, Combination of any two-generator/transmission line/transformer outages except these in CAISO Category B C4 – Bipolar Block, with Normal Clearing: Bipolar (dc) Line C5 – Outages of double circuit tower lines C6 – SLG Fault, with Delayed Clearing: Generator C7 – SLG Fault, with Delayed Clearing: Transformer C8 – SLG Fault, with Delayed Clearing: Transmission Circuit C9 – SLG Fault, with Delayed Clearing: Bus Section
WECC Business Practice TPL-001-WECC-RBP-2 Category C	WR1.1 –SLG Fault, with Normal Clearing: two adjacent transmission circuits (greater than 300 kV) on separate towers

In the reassessment study, all NERC Category B, WECC WR1.1, as well as the worst Category C1 through C9 outages, in the electrical vicinity of the general study area were analyzed. The worst Category C contingencies were selected by taking into account the following factors:

- Amount of generation lost immediately following the outage
- N-0 condition loading of a transmission facility
- Bus outages and breaker failures that cause disconnection of the entire bus during the transient period

C.2 Steady State Study Criteria

C.2.1 Normal Overloads

Normal overloads are those that exceed 100 percent of normal facility rating under NERC Category A conditions (no contingency). Normal overloads are identified in Deliverability Assessment and Reliability Assessment power flow analyses in accordance with the Reliability Standard TPL-001. It is required that loading of all transmission system facilities be within their normal ratings under NERC Category A conditions.

C.2.2 Emergency Overloads

Emergency overloads are those that exceed 100 percent of emergency ratings under NERC/WECC/CAISO Category B and Category C contingency conditions. Emergency overloads are identified in the Deliverability Assessment and Reliability Assessment power flow analyses in accordance with Reliability Standards TPL-002 and TPL-003.

C.2.3 Voltage Criteria

A voltage criteria violation occurs if a bus within the CAISO Controlled Grid fails to meet the requirements defined in Table C-2.Table C-2: Voltage Criteria
(Bus voltages are relative to the nominal bus voltages of the system under study)

Voltage level	Normal Conditions (TPL-001)		Contingency Conditions (TPL-002 & TPL-003)		Voltage Deviation	
	Vmin (pu)	Vmax (pu)	Vmin (pu)	Vmax (pu)	TPL-002	TPL-003
≤ 200 kV	0.95	1.05	0.90	1.1	≤5%	≤10%
≥ 200 kV	0.95	1.05	0.90	1.1	≤5%	≤10%
≥ 500 kV	1.0	1.05*	0.90	1.1	≤5%	≤10%

*Most of the 500 kV buses have specific requirements.

C.3 Transient Stability Criteria

Transient stability analysis is a time-domain simulation that assesses the performance of the power system during (and shortly following) a system disturbance. Transient stability studies are performed to ensure system stability following severe system disturbances.

The system is considered stable if the following conditions are met:

1. All machines in the WECC interconnected system must remain in synchronism as demonstrated by relative rotor angles (unless modeling problems are identified and concurrence is reached that a problem does not really exist);
2. A stability simulation will be deemed to exhibit positive damping if a curve defined by the peaks of the machine relative rotor angle swing curves tends to intersect a second curve defined by the valleys of the relative rotor angle swing curves with the passing of time;
3. Corresponding lines on bus voltage swing curves will likewise tend to intersect. A stability simulation, which satisfies these conditions, will be defined as stable;
4. Duration of a stability simulation run will be ten (10) seconds unless a longer time is required to ascertain damping;
5. The transient performance analysis will start immediately after the fault clearing and conclude at the end of the simulation;
6. A case will be defined as marginally stable if it appears to have zero percent damping and the voltage dips are within (or at) the WECC Reliability Criteria limits.

Performance of the transmission system is measured against the NERC Reliability Standards and WECC Regional Criteria. NERC TPL-001, TPL-002, and TPL-003 require no loss of demand or curtailed firm transfers under Category A and Category B conditions, and planned/controlled loss of demand or curtailed firm transfers under Category C contingencies. Category A, B, and C contingencies should not result in cascading outages.

Table C-3 illustrates the WECC reliability criteria. The reliability and performance criteria are applied to the entire WECC transmission system.

Table C-3: WECC Disturbance-Performance Table of Allowable Effects on Other Systems (In addition to the NERC requirements)

NERC and WECC Categories	Outage Frequency Associated with the Performance Category (Outage/Year)	Transient Voltage Dip Standard	Minimum Transient Frequency Standard	Post-Transient Voltage Deviation Standard (See Note 1)
A	Not Applicable	Nothing in Addition to NERC		
B	≥ 0.33	Not to exceed 25% at load buses or 30% at non-load buses. Not to exceed 20% for more than 20 cycles at load buses.	Not below 59.6 Hz for 6 cycles or more at a load bus	Not to exceed 5% at any bus
C	0.033 – 0.33	Not to exceed 30% at any bus. Not to exceed 20% for more than 40 cycles at load buses.	Not below 59.0 Hz for 6 cycles or more at a load bus	Not to exceed 10% at any bus
D	< 0.033	Nothing in Addition to NERC		

Note 1: As an example in applying the WECC Disturbance-Performance Table, Category B disturbance in one system shall not cause a transient voltage dip in another system that is greater than 20% for more than 20 cycles at load buses, or exceed 25% at load buses or 30% at non-load buses at any time other than during the fault.

C.4 Post-Transient Voltage Stability Criteria

The last column of the above Table C-3 illustrates the post-transient voltage stability criteria. The governor power flow is utilized to test for the post-transient voltage deviation criteria.

C.5 Reactive Power Deficiency Criteria

Table C-4 summarizes the voltage support and reactive power criteria of requirement R3 of the WECC Regional Criterion TPL-001-WECC-CRT-2. The system performance will be evaluated accordingly.

Table C-4: Reactive Power Deficiency Analysis Criteria Summary

Contingency Category	Reactive Power Criteria
B	Voltage stability is required at 105% of load level or transfer path rating
C	Voltage stability is required at 102.5% of load level or transfer path rating

C.6 Short Circuit Criteria

The short circuit analysis will be performed by simulating single-line-to-ground (SLG) and three-line-to-ground (3LG) bus faults in a study area. This is deemed to be the worst-case condition in order to determine the maximum available fault current.

SDG&E uses the following criteria to identify breakers that are over-duty:

Table C-5: SDG&E's Short Circuit Criteria

Equipment	Disturbance	Criteria
• Existing Generator Breakers • Non-Generator Breakers ≥ 30 Years Old	SLG and 3LG faults	No fault current exceeds 100% of the nameplate interrupting rating
Existing Non-Generator Breakers < 30 Years Old	SLG and 3LG faults	No fault current exceeds 115% of the nameplate interrupting rating

C.7 Deliverability Methodology

C.7.1 On-Peak Deliverability Assessment Methodology

The assessment was performed following the on-peak Deliverability Assessment methodology (http://www.caiso.com/Documents/On-PeakDeliverabilityAssessmentMethodology.pdf). The main steps of the on-peak Deliverability Assessment are described below.

Screening for Potential Deliverability Problems Using DC Power Flow Tool

A DC transfer capability/contingency analysis tool was used to identify potential deliverability problems. For each analyzed facility, an electrical circle was drawn which includes all generating units including unused Existing Transmission Contract (ETC) injections that have a 5% or greater:

- Distribution factor (DFAX) = (Δ flow on the analyzed facility / Δ output of the generating unit) *100%

or

- Flow impact = (DFAX * NQC / Applicable rating of the analyzed facility) *100%.

Load flow simulations were performed, which study the worst-case combination of generator output within each 5% Circle.

Verifying and Refining the Analysis Using AC Power Flow Tool

The outputs of units requesting Full Capacity Deliverability Status that are within the 5% Circle were increased starting with units with the largest impact on the transmission facility. No more than twenty units were increased to their maximum output. In addition, no more than 1500 MW of generation was increased. All remaining generation within the Balancing Authority Area (BAA) was proportionally displaced, to maintain a load and resource balance.

When the 20 units with the highest impact on the facility can be increased more than 1500 MW, the impact of the remaining amount of generation to be increased was considered using a Facility Loading Adder. The Facility Loading Adder was calculated by taking the remaining MW amount available from the 20 units with the highest impact times the DFAX for each unit. An equivalent MW amount of generation with negative DFAXs was also included in the Facility Loading Adder, up to 20 units. If the net impact from the Facility Loading Adders was negative, the impact was set to zero and the flow on the analyzed facility without applying Facility Loading Adders was reported.

D. Deliverability Assessment

D.1 Previously Identified Mitigations

Pre-Transition Cluster

Pre-Transition Cluster studies identified the following Network Upgrades:

1. East County (ECO) 500/230/138 kV Substation
2. Boulevard East (BUE) 138/69/12 kV Substation
3. TL13844 BUE-ECO 138 kV T/L
4. Reconductor TL649A Otay-Otay Lakes Tap 69 kV and TL649D Otay Lakes Tap-San Ysidro 69 kV T/L
5. Imperial Valley Bank 82 500/230 kV Transformer Bank #3
6. Imperial Valley SPSs to trip generation interconnected to Imperial Valley, BUE/ECO Substations and/or the Ocotillo switchyard under specific system conditions
7. SPS for generators connected to Border 69 kV Substation

Transition Cluster

Transition Cluster studies identified the following Network Upgrades:

1. SPS to trip generation for the overload or outage of the TL687 Borrego-Narrows 69 kV T/L or the outage of the TL686 Narrows-Warners 69 kV T/L
2. Imperial Valley SPSs to trip generation interconnected to Imperial Valley, BUE/ECO Substations, and/or the Ocotillo switchyard under specific system conditions

Queue Cluster 1 & 2

Queue Cluster 1 & 2 studies identified the following Network Upgrades:

1. Miguel 230 kV Reconfiguration
2. Otay Mesa-Tijuana TL23040 Series Reactor
3. SPS for generators connected to Otay Mesa 230 kV Switchyard
4. SPS to protect ECO Bank 60 230/138 kV transformer bank for overload or outage
5. Imperial Valley SPSs to trip generation interconnected to Imperial Valley, BUE/ECO Substations, and/or the Ocotillo switchyard under specific system conditions

Queue Cluster 3 & 4

Queue Cluster 3 & 4 studies identified the following Network Upgrades:

1. Upgrade TL23042 Miguel-Bay Boulevard 230 kV T/L
2. SPS for generators connected in the Crestwood Area
3. Imperial Valley SPSs to trip generation interconnected to Imperial Valley, BUE/ECO Substations, and/or the Ocotillo switchyard under specific system conditions
4. Re-route of Eldorado–Lugo 500kV T/L
5. Upgrade Eldorado-Lugo 500 kV T/L series caps to 3800 Amps at each end
6. Upgrade Eldorado-Lugo 500 kV T/L Substation terminal equipment to 4000 Amps at each end
7. Upgrade Lugo-Mohave 500 kV T/L series cap at Mohave to 3800 Amps
8. Equip Lugo line position at Mohave with 4000 Amps rated equipment
9. Implement an SPS to protect TL23042 Miguel-Bay Boulevard 230 kV T/L
10. Implement an SPS to protect TL23022 and TL23023 Miguel-Mission 230 kV #1 and #2
11. Implement an SPS to protect TL23029 Silvergate-Old Town 230 kV
12. Implement an SPS to protect TL23027 Mission-Old Town 230 kV

Upgrades 4, 5, and 6 were approved by the CAISO as “Policy-driven” transmission projects in the 2012-2013 CAISO Transmission Plan.

D.2 Reassessment Results and Mitigation

Results for generators in the Pre-Transition Cluster

The reassessment study results identified the following overload.

Table D-1: Pre-Transition Cluster Overloads

Contingency	Contingency Category	Overloaded Facilities	Applicable Rating	Max Flow
TL23003 Encina-San Luis Rey 230 kV #1 and TL23011 Encina-San Luis Rey-Palomar 230 kV #1	Category C	San Luis Rey Bank 51 138/69 kV #1	160	174%

The reassessment identified the preferred mitigation for this overload is a Special Protection System (SPS) to trip generation. Implementing an SPS to trip generation at Encina is the most effective solution for this overload. Therefore, it is recommended that the following generation projects participate in this SPS, if all of the generation modeled in the reassessment study is developed.

- Q137
- Q189

If this SPS is not implemented, the above generators may have their annual Net Qualifying Capacity (NQC) substantially reduced as a result of this constraint. Although other generators have a 5% distribution factor on this constraint and would have a NQC reduction if the SPS were not implemented, reducing those projects’ NQC to zero is insufficient to mitigate the problem. Generators with less than a 5% distribution factor are not responsible for the problem, pursuant to the CAISO Deliverability Assessment methodology. SDG&E and the CAISO would work with each project individually to incorporate the SPS, if it is determined to be needed based on actual generation development.

All other Network Upgrades identified in previous studies for pre-Transition Cluster projects remain unchanged.

Results for generators in the Transition Cluster

All Network Upgrades identified in previous studies for Transition Cluster projects remain unchanged.

Results for generators in Queue Cluster 1&2

The updated study results identified the following overload.

Table D-2: Queue Cluster 1 & 2 Overloads

Contingency	Contingency Category	Overloaded Facilities	Applicable Rating	Max Flow
TL23022 Miguel-Mission 230 kV #1	Category B	TL23042 Miguel-Bay Boulevard 230 kV #1 T/L	1176	101%
TL23021 Miguel-Sycamore 230 kV #1 and TL23041A Miguel-Sycamore 230 kV #2	Category C			101%
TL23022 Miguel-Mission 230 kV #1 and TL23023 Miguel-Mission 230 kV #2	Category C			119%
TL13809 Proctor Valley-Telegraph Canyon 138 kV #1 and TL13824 Los Coches-Telegraph Canyon-Miguel 138 kV #1	Category C			101%
TL23022 Miguel-Mission 230 kV #1 and TL13824 Los Coches-Telegraph Canyon-Miguel 138 kV #1	Category C			107%

The reassessment study identified the preferred mitigation for this overload is an SPS to trip generation. Therefore, it is recommended that the following generation projects participate in this SPS, if all of the generation modeled in the reassessment study is developed.

- Q510
- Q574
- Q590
- Q608

If this SPS is not implemented, the above generators may have their annual NQC substantially reduced as a result of this constraint. SDG&E and the CAISO would work with each project individually to incorporate the SPS, if it is determined to be needed based on actual generation development.

All other Network Upgrades identified in previous studies for Queue Cluster 1 & 2 projects remain unchanged.

Results for generators in Queue Cluster 3 & 4

All Network Upgrades identified in previous studies for Queue Cluster 3 & 4 projects remain unchanged.

E. Reliability Assessment

E.1 Detailed Base Case Assumptions

The reassessment study steady-state analysis evaluated the SDG&E owned transmission system under stressed conditions. In the steady-state base cases, Pre-QC5 projects were dispatched in two geographic regions: Internal Area and East of Miguel Area. Interconnection Request withdrawals were removed from the studies, and transmission additions and upgrades that were approved by the CAISO in the most recent TPP cycle were modeled. In addition, SONGS was assumed off-line.

In the Heavy Summer power flow base cases, the San Diego area was modeled with a CEC 1-in-10 2016 load forecast of 5,398 MW (load + losses) , a moderate Cut Plane import target, and moderate In-Basin generation. The Heavy Summer case includes transmission system topology updates provided by CFE for the CFE area. CFE requested an import (flow from the CAISO Balancing Authority to the CFE Balancing Authority) of 100 MW for the 2016 Heavy Summer case, simulating CFE generation retiring and/or not developing as planned. The loads and topology of other WECC power flow areas replicated the “15hs2a” case.

In the Light Load power flow base cases, the San Diego area was modeled with a forecast load of 2,960 MW (load + losses) (55% of the 1-in-10 CEC 2016 load forecast), a moderate Cut Plane import target, and moderate In-Basin generation. The Light Load case includes transmission system topology updates provided by CFE. CFE is modeled exporting 350 MW (flow from the CFE Balancing Authority to the CAISO Balancing Authority) to create a stressed scenario. The loads and topology of other WECC power flow areas replicated the “14la1sa” case.

E.2 Dispatch Limitations

SDG&E’s Reliability Study dispatched Pre-QC5 projects. The steady-state power flow analysis considered several dispatch constraints identified for Pre-QC5 projects. Not all generation may be simultaneously dispatched at maximum rated output due to these constraints as shown in Table E-1 and Table E-3. While this study identifies dispatch limitations for each geographic study area under stressed dispatch scenarios, in real time/operations, actual dispatch will be dictated by CAISO market operations.

- **ECO/BUE Dispatch Limitations by SPS: ECO Bank 80 500/230 kV Transformer**

Pre-QC5 projects interconnecting to ECO Substation and BUE Substation are limited by SPS action to prevent a continuous overload of the single ECO 500/230 kV transformer bank under N-0 conditions. Furthermore, generation projects interconnecting to ECO and BUE Substations are limited to 1,150 MW due to the CAISO N-1 generation tripping limit (for an N-1 loss of the single ECO 500/230 kV transformer bank). Generators interconnecting at ECO or BUE Substations will be required to participate in the proposed ECO/BUE SPS which trips all generation connected at ECO and BUE Substations in the event of an N-1 loss of the ECO 500/230 kV transformer bank.

- **ECO/BUE Dispatch Limitations by SPS: ECO Bank 60 230/138 kV Transformer**

Pre-QC5 projects interconnecting to BUE Substation and the ECO 138 kV bus are limited by SPS action to prevent a continuous overload of the single ECO 230/138 kV transformer bank under N-0 conditions. These generator projects will be required to participate in the proposed ECO/BUE SPS which trips all generation connected to BUE Substation and ECO 138 kV bus in the event of an N-1 loss of the single ECO 230/138 kV transformer bank.

- **ECO/BUE Dispatch Limitations by SPS: TL13844 138 kV Transmission Line**

Pre-QC5 projects interconnecting to BUE 138 kV Substation are limited by SPS action to prevent an overload of the ECO-BUE 138 kV transmission line under N-0 conditions. These generator projects will be required to participate in the proposed ECO/BUE SPS which trips all generation connected to BUE Substation and ECO 138 kV bus in the event of an N-1 loss of the single ECO 30/138 kV transformer bank.

- **Crestwood/Barrett/Cameron Dispatch Limitations by SPS**

Dispatch of generators connected to Barrett Substation, Crestwood Substation, or the Barrett-Cameron 69 kV line, are limited by SPS action in order to prevent the overload of the Q781 – Barrett 69 kV and Glencliff Tap-Cameron Tap 69 kV transmission lines under N-0 conditions.

E.3 Steady-State Thermal Results for East of Miguel Area in SDG&E System

East of Miguel Area generation consists of generation interconnecting to Imperial Valley Substation, Ocotillo Switchyard, ECO/BUE Substations, and North Gila Area.

- **East of Miguel Area Dispatch Limitations**

The combined generation at East of Miguel Area adheres to the limitations described in Section E.2. The dispatch for each area is defined in Table E-1. The output of existing or higher-queued generators in the Internal Area were scaled down or turned off to fully dispatch East of Miguel Area projects.

Table E-1: Dispatch Scenarios for East of Miguel Area

Area Generation	Dispatched Heavy Summer Load		Dispatched Light Load	
	Pre-QC5	**Reassessment**	**Pre-QC5**	**Reassessment**
Imperial Valley Area	1,944 MW	3,028 MW	1,544 MW	1,922 MW
ECO/BUE Area	798 MW *(Note 2)*	1,055 MW *(Note 1,2,3)*	788 MW *(Note 2)*	937 MW *(Note 1,2,3)*
North Gila Area	1,574 MW	455 MW	290 MW	455 MW
Internal Area	2,817 MW	2,284 MW	1,079 MW	557 MW

Note 1: Generation limited to adhere to the ECO/BUE dispatch limitations (500/230 kV transformer) as described in Section E.2.

Note 2: Generation limited to adhere to the ECO/BUE dispatch limitations (230/138 kV transformer) as described in Section E.2.

Note 3: Generation limited to adhere to the ECO/BUE dispatch limitations (138 kV line) as described in Section E.2.

- **East of Miguel Area Results**

In addition to adhering to the dispatch limitations identified above, as well as taking into account the retirement of SONGS, the results of the analysis indicated there will be one (1) new Category C and no new Category B overloads.

Table E-2: East of Miguel Overloads Due to Contingencies

NERC Criteria Violation	Overloaded Facilities	Contingency	Rating (MVA)	Loading (%)
Category C (N-2)	San Luis Rey Bank 51 138/69 kV Transformer	TL23003 San Luis Rey-Encina 230 kV line & TL23011 Encina-PEN-San Luis Rey 230 kV	160	157%
Category C (N-2)	TL23042 Miguel-Bay Boulevard 230 kV #1 T/L	TL23022 Miguel-Mission 230 kV #1 and TL23023 Miguel-Mission 230 kV #2	1176	105%

E.4 Steady-State Thermal Results for San Diego Internal Area in SDG&E System

The Internal Area consists of Pre-QC5 projects interconnecting within the San Diego Local Capacity Requirement (LCR) area Cut Plane and includes WDAT projects.

- **Internal Area Dispatch Limitations**

The dispatch of projects in the Crestwood/Barrett/Cameron area and Border area are limited as described in Section E.2. Table E-3 describes the dispatch scenarios for the internal area power flow case.

Table E-3: Dispatch Scenarios for Internal Area

Area Generation	Dispatched Heavy Summer Load		Dispatched Light Load	
	Pre-QC5	**Reassessment**	**Pre-QC5**	**Reassessment**
Imperial Valley Area	1,944 MW	2,604 MW	1,544 MW	310 MW
ECO/BUE Area *(Note 1)*	798 MW	10 MW	788 MW	240 MW
North Gila Area	1,574 MW	290 MW	290 MW	85 MW
Internal Area *(Note 2)*	2,817 MW	3,727 MW	1,079 MW	3,217 MW

Note 1: Generation interconnecting in the ECO/BUE Area have dispatch limitations as defined in Sections E.2.

Note 2: Generation interconnecting in the Crestwood/Barrett/Cameron have dispatch limitations as defined in Section E.2.

- **Internal Area Results**

In addition to adhering to the dispatch limitations identified above, as well as taking into account the retirement of SONGS, the results of the analysis indicated there will be one (1) new Category B overload.

Table E-4: Internal Overloads Due to Contingencies

NERC Criteria Violation	Overloaded Facilities	Contingency	Rating (MVA)	Loading (%)
Category C (N-2)	San Luis Rey Bank 51 138/69 kV Transformer	TL23003 San Luis Rey-Encina 230 kV line & TL23011 Encina-PEN-San Luis Rey	160	157%

F. Short Circuit Duty Analysis

Using SDG&E's short circuit duty criteria as summarized in Section C.6, short circuit studies were performed to determine the maximum fault duty on all SDG&E-owned transmission buses. This study determined the impact of interconnection request withdrawals and transmission additions and upgrades approved in the most recent TPP cycle.

F.1 SDG&E Owned Transmission System

Short circuit analysis results indicated that there are no new overstressed circuit breakers to report. The ICs are not responsible for mitigating any pre-existing overstressed circuit breakers.

F.2 Affected Systems

Based on the negligible changes in short circuit duty resulting at boundary buses with affected systems due to interconnection request withdrawals and Transmission additions and upgrades approved in the most recent TPP cycle, no short circuit impacts are expected on neighboring transmission systems that require mitigation. Table F-1 summarizes the change in available fault current at boundary buses.

Table F-1: Short Circuit Current at Boundary Buses

Boundary Buses	Pre-QC5 Phase I Case		Reassessment Case	
	SLG (kA)	3LG (kA)	SLG (kA)	3LG (kA)
Imperial Valley 230 kV	52.6	50.1	48.4	48.5
Otay Mesa 230 kV	34.8	37.0	34.6	36.6
Tijuana (CFE) 230 kV	24.7	25.1	24.5	24.7
La Rosita (CFE) 230 kV	30.9	32.3	30.3	31.4
Imperial Valley (IID) 230 kV	51.0	49.4	47.0	47.7

G. Transient Stability Analysis

The Pre-QC5 projects were analyzed per the criteria set forth in Section C.3 to identify potentially adverse impacts to the stability of the WECC system following disturbances and abnormal system conditions. Each base case was subjected to simulated disturbances to determine the system performance under transient conditions following disturbances on SDG&E owned transmission and within neighboring transmission systems. If the voltage at any of the monitored buses deviated by more than that allowed by the standard shown in Table C-3, the transmission system operator was deemed to be in potential violation of WECC/NERC criteria.

Pursuant to LGIA Appendix H, the Pre-QC5 projects were also reviewed to ensure they did not trip offline during low voltage conditions due to the disturbances simulated for the specified time period. Details of the general results are covered in Appendix H Worst Case Analysis and Appendix I Transient Stability Plots. The project-specific results are provided in Appendix A (Individual Project Reports).

Note that Pre-QC5 distribution projects were not included in the transient stability analysis.

G.1 Transient Stability Study Scenarios

Disturbance simulations were performed for a study period 20 seconds for Pre-QC5 cases to determine whether the Pre-QC5 projects would cause any system instability during a variety of disturbances (causing line and/or generator outages). Heavy Summer and Light Load scenarios were evaluated.

Disturbances are modeled as switching sequences and are simulated by the “switch” files outlined in Table G-1. The Pre-QC5 base cases were subjected to the 31 disturbances and a no disturbance flat run is used to test and validate the case for all the dynamic models also listed in Table G-1. A description of the switching sequences is provided in Appendix G.

Table G-1: Switch Files

	Switch Files
1	BAYBLVD-ML-slo.swt
2	Dev-Val-slo.swt
3	FLAT.swt
4	HAA-HDWSH-slo.swt
5	HAA-NGila-slo.swt
6	HDWSH-NGila-slo.swt
7	IVECO-RASX-slo.swt
8	IV-ECO-slo.swt
9	IV-OCO-slo.swt
10	IV-RASX-dlo.swt
11	IVROA(IV)-slo.swt
12	IVROA(ROA)-slo.swt
13	MLECO-RASX-slo.swt
14	ML-MS-RASX-dlo.swt
15	ML-MS-RAS-dlo.swt
16	NGila-IV-slo.swt
17	OCO-SCR-slo.swt
18	OM-ML-slo.swt
19	PAL-COL-slo.swt
20	PaloVerde-g1.swt
21	PaloVerde-g2.swt
22	PEN230kv-dlo.swt
23	PEN-ES-SA-dlo.swt
24	PEN-ES-dlo.swt
25	PEN-SX-slo.swt
26	PQ-OT-slo.swt
27	SA-EA-slo.swt
28	SONGSMESA-TA-slo.swt
29	SO-SA-dlo.swt
30	SO-SA-MS-dlo.swt
31	SX-ML-dlo.swt
32	TA-ES-slo.swt

G.2 Parameters Monitored to Evaluate System Stability Performance

G.2.1 Rotor Angle

The rotor angle plots shown in Appendix I provide a measure for determining how the proposed generation units, where applicable, would swing with respect to one another. The plots also provide a measure of how the units would swing with respect to other generation units in the area.

G.2.2 Bus Voltage

The bus voltage plots, in conjunction with the relative rotor angle plots, also shown in Appendix I, provide a means of detecting out-of-step conditions. The bus voltage plots are useful in assessing the magnitude and the duration of post-disturbance voltage dips and peak-to-peak voltage oscillations. The bus voltage plots also give an indication of system damping and the level to which voltages are expected to recover in steady-state conditions. In addition to obtaining the bus voltage deviations from plots, Appendix H contains information on the bus voltage deviations from the Worst Condition Analysis.

G.2.3 Bus Frequency

The bus frequency plots, also shown in Appendix I, provide information on the magnitude and the duration of post-fault frequency swings with the project in-service. These plots indicate the extent of possible over-frequency or under-frequency, which can occur because of the imbalance between the generation and load within an area. In addition to obtaining this information from plots, Appendix H contains information on the frequency deviations as shown from the Worst Condition Analysis.

G.2.4 Other Parameters

The following parameters can also be monitored when required and applicable:

Generator Terminal Power	Bus Angle
Generator Terminal Voltage	Line Flow
Generator Rotor Speed	Voltage Spread
Generator Field Voltage	Frequency Spread

G.3 Transient Stability Results

No transient stability issues were identified in this reassessment study and there are no damping issues for any of the reassessment cases and contingencies.

H. Post-Transient Voltage Stability Analysis

Using the Heavy Summer and Light Load cases described in Section E post-transient voltage stability analysis indicated that, under the studied conditions and system configuration (including all Local Delivery Network Upgrades for Pre-QC5 projects), interconnection request withdrawals and Transmission additions and upgrades approved in the most recent TPP cycle did not result in any post-transient voltage deviations of 5% or more for Category B contingencies and 10% or more for Category C contingencies from the pre-project levels or cause post-transient voltage stability violations on the SDG&E transmission system.

Note that Pre-QC5 distribution projects were not included in the post-transient voltage stability analysis.

Detailed results of this analysis are provided in Appendix J.

I. Conclusions

Based on the above study results, the following Network Upgrades were identified:

Table I-2: Newly Identified Network Upgrades

Upgrade	Impacted Cluster	Impacted Generation Projects
Implement an SPS to protect San Luis Rey Bank 51 138/69 kV transformer following a Category C contingency	Pre-Transition Cluster	Q137, Q189
Modify the proposed SPS to protect TL23042 Miguel-Bay Boulevard 230 kV line following various contingencies	Queue Cluster 1 & 2	Q510, Q574, Q590, Q608

J. Upgrades, Cost Estimates, and Time to Construct Estimates

The cost estimates are good faith estimates and are based on the published unit costs, when applicable. Customized costs were developed when the unit costs did not reflect the unique circumstances of a project. When appropriate, these customized costs include: anticipated land acquisition costs, environmental mitigation, licensing/permitting, looping lines into substations/switchyards, new switchyards, substation upgrades not included in unit costs, and PTO's Interconnection Facilities.

The estimated cost of Reliability Network Upgrades identified in this Group Study is assigned to all Interconnection Requests in that Group Study according to the following rules: for all other Reliability Network Upgrades, the cost will be assigned pro rata on the basis of the maximum megawatt electrical output of each proposed new Generating Facility or the amount of megawatt increase in the generating capacity of each existing Generating Facility as listed by the Interconnection Customer in its Interconnection Request. The Reliability Network Upgrades required for a project to "physically" interconnect (i.e. bus extension, new switchyard, etc.) are presented only in the Individual Project Reports. Some mitigation measures are related to the telecommunications needed for each individual SPS. SPS costs may have two components. The cost for the SDG&E protection and communication equipment for the monitored facilities is assigned pro rata on the basis of the maximum megawatt electrical output of each project. The cost for the protection and communication equipment to interface between SDG&E and each project is assigned directly to the participating project.

Costs for each generation project are confidential and are not published in this Group Report. Each IC is also receiving an Individual Project Report (Appendix A), specific only to their generation project, containing the details of the IC's cost responsibilities.

The cost of the mitigation plan for overloads of SDG&E facilities or violations attributed to the reassessment projects evaluated are shown in Table J-1.

Table J-1: SDG&E Network Upgrades, Estimated Costs, Estimated Time to Construct

Type of Upgrade	Upgrade		Estimated Cost x 1,000 Constant Dollar (2013)	Estimated Cost x 1,000 Escalated *(Note 1)*		Estimated Time to Construct *(Note 2)*
Reliability Network Upgrades (Note 3)	Implement an SPS to protect San Luis Rey Bank 51 138/69 kV transformer following a Category C contingency	SDG&E protection and communication equipment for Encina and San Luis Rey substations	[redacted]	[redacted]	2016	12 Months
		Protection and communication equipment to interface between SDG&E and the projects	[redacted]	[redacted]	2016	12 Months
	Modify the proposed SPS to protect TL23042 Miguel-Bay Boulevard 230 kV following various contingencies	SDG&E protection and communication equipment for Miguel and Bay Boulevard substations (Note 4)	[redacted]	[redacted]	2016	6 Months
		Protection and communication equipment to interface between SDG&E and the projects (Note 5)	[redacted]	[redacted]	2016	6 Months

Note 1: Estimated costs in "as year spent" dollars and in thousands of dollars, excluding Allowance for Funds Used During Construction (AFUDC). Estimated costs include land purchases and licensing/permitting costs, when appropriate.

Note 2: Time to construct estimates includes time for licensing/permitting, when appropriate. The estimated time to construct is for a typical project; construction duration may change due to the number of projects simultaneously in construction. Multiple projects impact resources, system outage availability, and environmental windows of construction. A key assumption is SDG&E will need to obtain CPUC licensing and regulatory approvals prior to design, procurement, and construction of the proposed facilities. The time to construct is not cumulative.

Note 3: Per CAISO guidelines, all Special Protection Systems are classified as Reliability Network Upgrades to ensure compatibility with the ISO market model. SPS can minimize overburdening of CAISO's congestion management system, which can increase processing time to a point that could create reliability concerns, and once an SPS is introduced, all new generation must participate to avoid the need for complex programming that is incompatible with the ISO market model capabilities.

Note 4: The SPS cost assumes all the generator and SDG&E equipment is installed or charged in the previous study.

Note 5: The SPS cost is for an additional logic and equipment to implement a modified SPS. This cost will be divided evenly among the Projects that were tagged with this SPS.

K. Coordination with Affected Systems

Per CAISO Appendix DD GIDAP Tariff, Section 3.7, the CAISO has notified CFE (Comision Federal de Electricidad), IID (Imperial Irrigation District), SRP (Salt River Project), and APS (Arizona Public Service Company) that their systems may be potentially affected by the interconnecting generators that are the subject of this report. Studies performed by, or under the direction of, the Affected System owner, to determine the impact on any Affected Systems should be coordinated with the CAISO. It is anticipated that the cost of these Affected System studies will be borne by the applicable Interconnection Customer under the terms of the study agreement between the Affected System owner and the Interconnection Customer.

The CAISO analysis primarily focuses on the CAISO system, and a definitive analysis of the impacts on Affected Systems is the responsibility of the Affected System Operators. The Interconnection Customer is expected to contact the Affected System Operators to determine if the project adversely impacts any of the Affected Systems.

The CAISO and SDG&E will work with Affected Systems and with subject ICs, at the cost to the subject ICs, to provide any input required by the Affected Systems under the terms of the study agreement between the Affected System owner and the Interconnection Customer (base cases, impedance diagrams, outage files, host meetings, etc.).

Appendix 3B
Individual Reports Q137 and Q189

Interconnection Reassessment Study Individual Report

Carlsbad Energy Center, LLC

Encina Peaking Project

October 22, 2013

This study has been completed in coordination with San Diego Gas & Electric Company (SDG&E) per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP)

Carlsbad Energy Center LLC, the Interconnection Customer (IC), proposes to interconnect their 260 MW net output combined cycle Encina Peaking Project (Project) to the California Independent System Operator (CAISO) Controlled Grid. In a letter dated December 9, 2011 and addressed to the CAISO and San Diego Gas & Electric Company (SDG&E), the IC delayed the Commercial Operation Date (COD) of the Project to July 1, 2015. (The original COD was August 1, 2008 and was subsequently changed to March 1, 2013.) However, on April 16, 2013, the Commercial Operation Date (COD) of the Project was extended to September 1, 2016. The Participating Transmission Owner (PTO) is SDG&E. The revised Point of Interconnection (POI) is at SDG&E's 230 kV bus at Encina Substation, located in Carlsbad, San Diego County, California. (The original POI was at a new 230 kV switchyard to be constructed east of the existing Encina 230 kV switchyard and directly south of SDG&E's 138/12kV Cannon Substation. This change in POI is a result of a bay position becoming available at the existing 230 kV Encina switchyard.) The Project occupies Queue Position #137 in the CAISO Controlled Grid Generation Queue (Queue). The CAISO issued the final Interconnection Facilities Study (IFAS) Report for this Project on June 4, 2008 to NRG West (now assigned as Carlsbad Energy Center LLC), which provided an analysis of the system impacts and necessary mitigation measures.

The purpose of this reassessment report is to update the results of the IFAS based on a study performed in accordance with the CAISO Generator Interconnection and Deliverability Allocation Procedures (GIDAP) Tariff Appendix DD. Details of the study assumptions and results for the entire SDG&E area reassessment study can be found in the SDG&E Area Report. This individual report addresses only the results specific to the Project.

In situations where the reassessment identifies any Network Upgrades and/or Interconnection Facilities, the CAISO will use the results to amend the existing executed Large Generation Interconnection Agreements.

The reassessment study results identified the following Network Upgrade that is recommended for the Project:

- Implement an SPS to protect San Luis Rey 138/69 kV Transformer following the N-2 outage of Encina-San Luis Rey 230 kV and Encina-San Luis Rey-Palomar 230 kV lines

If this SPS is not implemented, the Project may have its annual Net Qualifying Capacity (NQC) substantially reduced as a result of this constraint. SDG&E and the CAISO would work with the project to incorporate the SPS, if it is determined to be needed based on actual generation development.

In order to interconnect at the new POI, the following Reliability Network Upgrade to Physically Interconnect was identified:

- Extend the 230 kV Encina bus to accommodate the Project's interconnection

Table 1 shows the costs and scope of work for the PTO's Interconnection Facilities for the new POI and Reliability Network Upgrades. Table 1 replaces the cost tables identified in the final Interconnection Facilities Study Report dated June 4, 2008 and the Large Generator Interconnection Agreement dated September 4, 2009.

Table 1: Upgrades, Estimated Costs, and Estimated Time to Construct Summary

Type of Upgrade	Upgrade		Estimated Cost x 1,000 *(Note 1)*	Estimated Time to Construct *(Note 2)*
PTO's Interconnection Facilities	Extend gen-tie from POI at the 230 kV Encina bus to the PTO property line	• Install 1-termination stand • Install 255' of 3500 KCMIL copper • Install 500' of 4/0 bare strand copper • Install 200' 6-8" conduit	[redacted]	12 Months
Reliability Network Upgrades to Physically Interconnect	Extend the 230 kV Encina bus to accommodate the Project's interconnection	• Extend the 230 kV Encina low bus • Install 2-230 kV circuit breakers • Install 4-230 kV disconnects • Install control and protection panels • Update RTU	[redacted]	12 Months
Reliability Network Upgrades	Implement an SPS to trip generation at Encina following the N-2 outage of Encina-San Luis Rey 230 kV and Encina-San Luis Rey-Palomar 230 kV lines	SDG&E protection and communication equipment for Encina and San Luis Rey substations *(Note 3)*	[redacted]	12 Months
		Protection and communication equipment to interface between SDG&E and the Project *(Note 4)*	[redacted]	12 Months
Total			[redacted]	**12 Months**

Note 1: *Estimated costs in "as year spent" dollars and in thousands of dollars, excluding Allowance for Funds Used During Construction (AFUDC). Estimated costs do not include any land purchases or licensing/permitting costs.*

Note 2: *Time to construct estimates includes time for licensing/permitting, when appropriate. The estimated time to construct is for a typical project; construction duration may change due to the number of projects simultaneously in construction. Multiple projects impact resources, system outage availability, and environmental windows of construction. A key assumption is SDG&E will need to obtain CPUC licensing and regulatory approvals prior to design, procurement, and construction of the proposed facilities. The time to construct is not cumulative.*

Note 3: *The SPS cost includes the equipment on the PTO's system. This is a one-time setup and equipment cost. The SPS cost does not include any control, protection, and/or fiber-optic communication costs at the Project's facility.*

Note 4: *The SPS cost includes project-specific equipment required on the PTO's system for interface with the Project, as well as equipment provided to the Project for installation at the Project's facility. Additional SPSs would require updated logic, but minimal/no cost.*

Interconnection Reassessment Study Individual Report

Carlsbad Energy Center, LLC

Encina Repower Project

October 22, 2013

This study has been completed in coordination with San Diego Gas & Electric Company (SDG&E) per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures (GIDAP)

Carlsbad Energy Center LLC, the Interconnection Customer (IC), proposes to interconnect their 260 MW net output combined cycle Encina Repower Project (Project) to the California Independent System Operator (CAISO) Controlled Grid. The Project will replace the existing Encina Units 1, 2, and 3. In a letter dated December 9, 2011 and addressed to the CAISO and San Diego Gas & Electric Company (SDG&E), the IC delayed the Commercial Operation Date (COD) of the Project to July 1, 2015. However, on April 16, 2013, the Commercial Operation Date (COD) of the Project was extended to September 1, 2016. The Participating Transmission Owner (PTO) is SDG&E. The proposed Point of Interconnection is at SDG&E's 138kV bus at Encina Substation located in Carlsbad, San Diego County, California. The Project occupies Queue Position #189 in the CAISO Controlled Grid Generation Queue (Queue). The CAISO issued the final Interconnection Facilities Study (IFAS) Report for this Project on July 7, 2008 to NRG West (now assigned as Carlsbad Energy Center LLC), which provided an analysis of the system impacts and necessary mitigation measures.

The purpose of this reassessment report is to update the results of the IFAS based on a study performed in accordance with the CAISO Generator Interconnection and Deliverability Allocation Procedures (GIDAP) Tariff Appendix DD. Details of the study assumptions and results for the entire SDG&E area reassessment study can be found in the SDG&E Area Report. This individual report addresses only the results specific to the Project.

In situations where the reassessment identifies any Network Upgrades and/or Interconnection Facilities, the CAISO will use the results to amend the existing executed Large Generation Interconnection Agreements.

The reassessment study results identified the following Network Upgrade that is recommended for the Project:

- Implement an SPS to protect San Luis Rey 138/69 kV Transformer following the N-2 outage of Encina-San Luis Rey 230 kV and Encina-San Luis Rey-Palomar 230 kV lines

If this SPS is not implemented, the Project may have its annual Net Qualifying Capacity (NQC) substantially reduced as a result of this constraint. SDG&E and the CAISO would work with the project to incorporate the SPS, if it is determined to be needed based on actual generation development.

In order to interconnect at the new POI, the following Reliability Network Upgrade to Physically Interconnect was identified:

- Reconfigure bay positions at Encina 138kV Substation to accommodate the Project's interconnection

Table 1 shows the costs and scope of work for the PTO's Interconnection Facilities for the new POI and Reliability Network Upgrades. Table 1 replaces the cost tables identified in the final Interconnection Facilities Study Report dated June 4, 2008 and the Large Generator Interconnection Agreement dated September 4, 2009.

Table 1: Upgrades, Estimated Costs, and Estimated Time to Construct Summary

Type of Upgrade	Upgrade		Estimated Cost x 1,000 *(Note 1)*	Estimated Time to Construct *(Note 2)*
PTO's Interconnection Facilities	Extend gen-tie from POI at the 138kV Encina bus to the PTO property line	• Install 200' of OH conductors to the property line along the east side of the substation to Bay 1 dead-end structure • Install associated control and protection panels and communications for the new line position and add RTU points for control, monitoring, and alarming	[redacted]	12 Months
Reliability Network Upgrades to Physically Interconnect	Reconfigure bay positions at Encina 138kV switchyard to accommodate the Project's interconnection	• Remove Encina 1 Main Transformer OH conductors from Bay 2 • Relocate TL13801 from Bay 1 to Bay 2 • Install associate control and protection panels and communications to relocate TL13801 (Encina-Cannon) from Bay 1 to Bay 2. • Add RTU points for control, monitoring, and alarming • Upgrade (2) line disconnects and associated insulators in Bay 2 for TL13801	[redacted]	12 Months
Reliability Network Upgrades	Implement an SPS to trip generation at Encina following the N-2 outage of Encina-San Luis Rey 230 kV and Encina-San Luis Rey-Palomar 230 kV lines	SDG&E protection and communication equipment for Encina and San Luis Rey substations *(Note 3)*	[redacted]	12 Months
		Protection and communication equipment to interface between SDG&E and the Project *(Note 4)*	[redacted]	12 Months
		Total	[redacted]	**12 Months**

Note 1: Estimated costs in "as year spent" dollars and in thousands of dollars, excluding Allowance for Funds Used During Construction (AFUDC). Estimated costs do not include any land purchases or licensing/permitting costs.

Note 2: Time to construct estimates includes time for licensing/permitting, when appropriate. The estimated time to construct is for a typical project; construction duration may change due to the number of projects simultaneously in construction. Multiple projects impact resources, system outage availability, and environmental windows of construction. A key assumption is SDG&E will need to obtain CPUC licensing and regulatory approvals prior to design, procurement, and construction of the proposed facilities. The time to construct is not cumulative.

Note 3: The SPS cost assumes all the necessary communication and relaying equipment have already been installed at Encina Substation and funded by earlier serial Project Q137.

Note 4: The SPS cost includes project-specific equipment required on the PTO's system for interface with the Project, as well as equipment provided to the Project for installation at the Project's facility. Additional SPSs would require updated logic, but minimal/no cost.

Appendix 4A
SDG&E Will-Serve Letter

April 23, 2014

Mr. Vincent Menta
Sr. Director, Engineering and Construction
NRG Energy

Sent via Email

RE: NRG Carlsbad Energy Center ("Company") 650 MW Plant located in Carlsbad

Dear Mr. Menta,

Thank you for your request concerning gas transportation service to the Carlsbad Energy Center 650 MW electric generation facility in Carlsbad, California. As requested, Southern California Gas Company/San Diego Gas & Electric ("Utility") review was performed for maximum fuel flow rates of 140 MMcfd, 5.83 MMcfh, at 4600 Carlsbad Blvd in Carlsbad at the end of the existing 20-inch Transmission Line 2009 gas line located off Canon Road and a required delivery pressure at the maximum available pressure in Transmission Line 2009.

Transmission Line 2009 has sufficient capacity to serve the new load, assuming the existing Encina Power Plant load will be retired.

The Maximum Allowable Operating Pressure (MAOP) of Transmission Line 2009 is planned to be lowered to 330 psig. At the same time the Minimum Operating Pressure (MinOP) of this transmission line will be reduced to 250 psig.

With a 330 psig MAOP, regulation on Transmission Line 2009 from the upstream transmission system will result in approximately 315 psig in the pipeline. The pressure drop, under maximum flow conditions, across the existing 20-inch diameter pipeline is about 25 psi, or to 290 psig at the Meter Set Assembly inlet. During quick-start operation, pressure may rapidly drop approximately 50 psi or to 240 psig at the Meter Set Assembly inlet.

Subject to the execution of appropriate contracts and the applicable rules and regulations, including California Public Utility Commission (CPUC) approved rules and tariffs, the Utility is able to provide interruptible natural gas transportation service to this future location site. Customers in potentially capacity constrained areas, such as SDG&E territory, can only elect firm service through the Open Season process. The next Open Season is expected to occur in April/May 2015.

Because the transmission pipeline serving Transmission Line 2009 should always be greater than its 330 psig MAOP, any variation in pressure to the customer's Meter Set Assembly would be a result of the plant's operations. Therefore historical pressure data for Transmission Line 2009 or the upstream transmission system is not relevant.

Service pressure is provided on an as available basis, with no pressure level guarantees or warranties of any kind.

The availability of natural gas service, as set forth in this letter, is based on current conditions of supply and regulatory policies, is subject to change, and is not a guarantee of future operations.

This service offering has a sunset date of the earlier of six (6) months from the date of this letter or a change in the assumed customer supply sourcing, demand and pressures.

For an additional fee, the Utility can prepare a more detailed engineering construction estimate that will include costs that have been omitted from this preliminary estimate.

This preliminary cost estimate is for the construction cost of the pipeline facilities and is provided at your request. The Utility has not performed a detailed specific site or route evaluation for your project in the development of this estimate. Additionally, costs associated with permitting, paving, right-of-way, environmental, gas quality, measurement, regulatory, and land acquisition/development issues; and any unusual construction costs or facility requirements (e.g. freeway, river, railroad or channel crossings) are explicitly excluded from this preliminary cost estimate. These costs are the developer's responsibility and can be significant.

The Utility's construction costs also continue to rise with increasing costs of labor and materials. Since this preliminary cost estimate is developed using average historical project cost data, it is highly likely that the actual construction costs for your particular project could vary significantly from this preliminary estimate based on the actual design, permitting and construction variables associated with this specific project. The Utility urges you to retain the services of a third-party engineering construction firm, or enter into a design and engineering contract with the Utility to develop a more accurate construction cost estimate for your specific project. The Utility does not recommend any use of this preliminary cost estimate. Any use by you is at your own risk and should factor in the above risks and limitations.

Assuming normal planning and construction schedules for the service lateral needed to establish interruptible service, the Utility would require approximately eighteen (18) to twenty-four (24) months from the completion of contracts and the receipt of the requested deposit in order to complete the planning, design and construction of the service facilities needed for your project.

Thank you for your consideration.

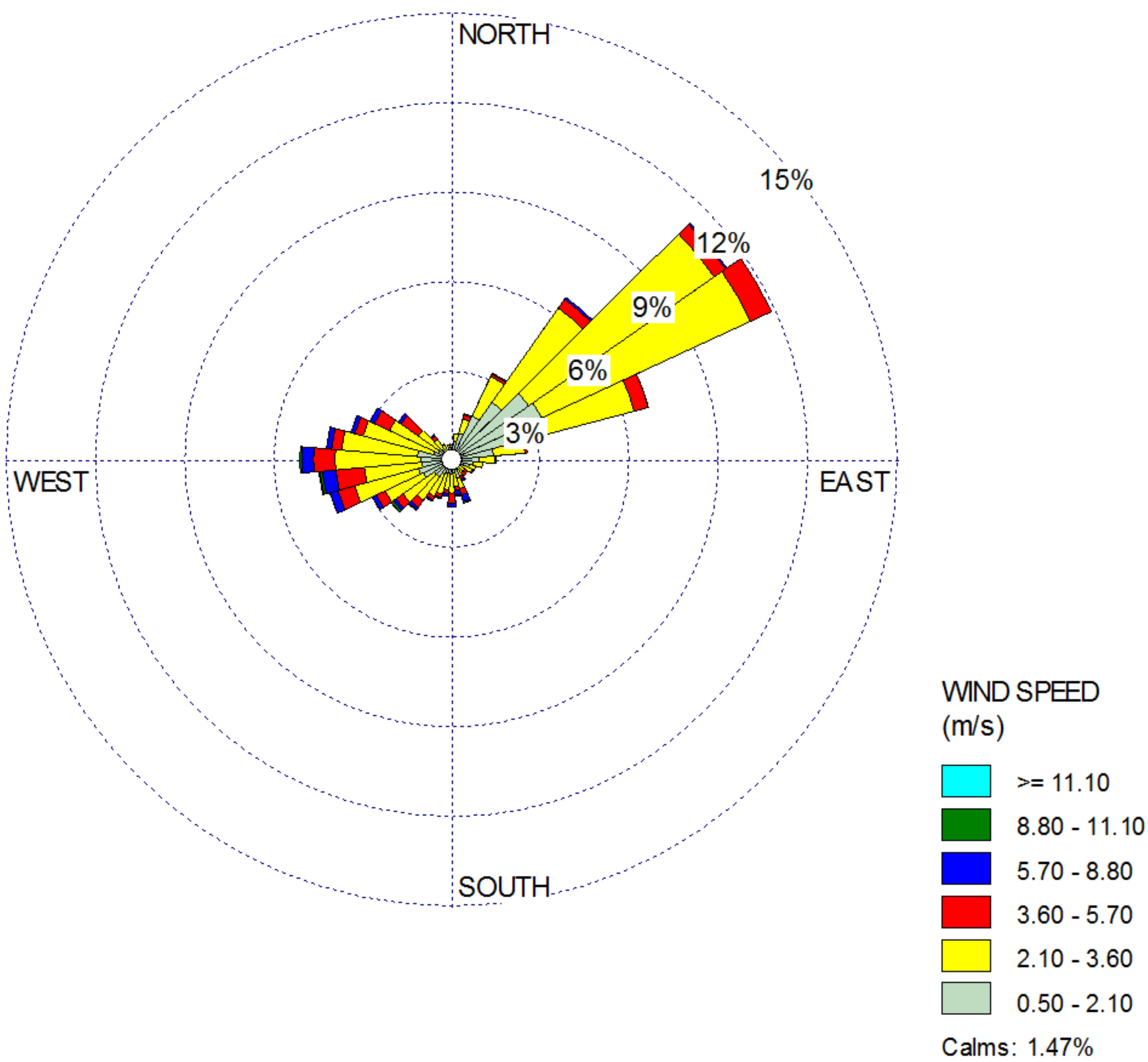
Sincerely,

Dinah Willier
Account Manager

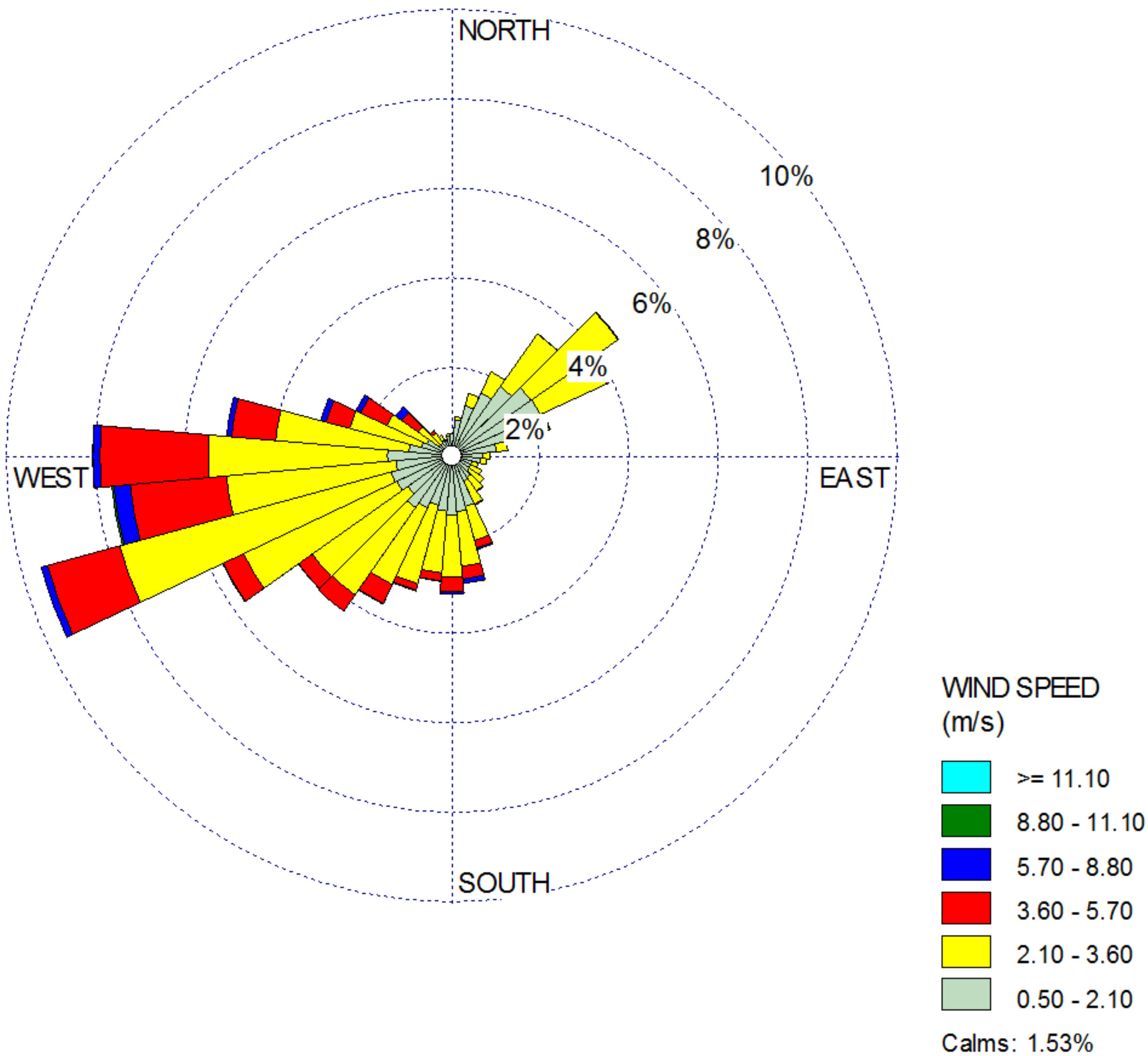
Appendix 5.1A
Wind Roses

Composite Quarterly and Annual Wind Roses for Camp Pendleton, CA
2008 – 2012

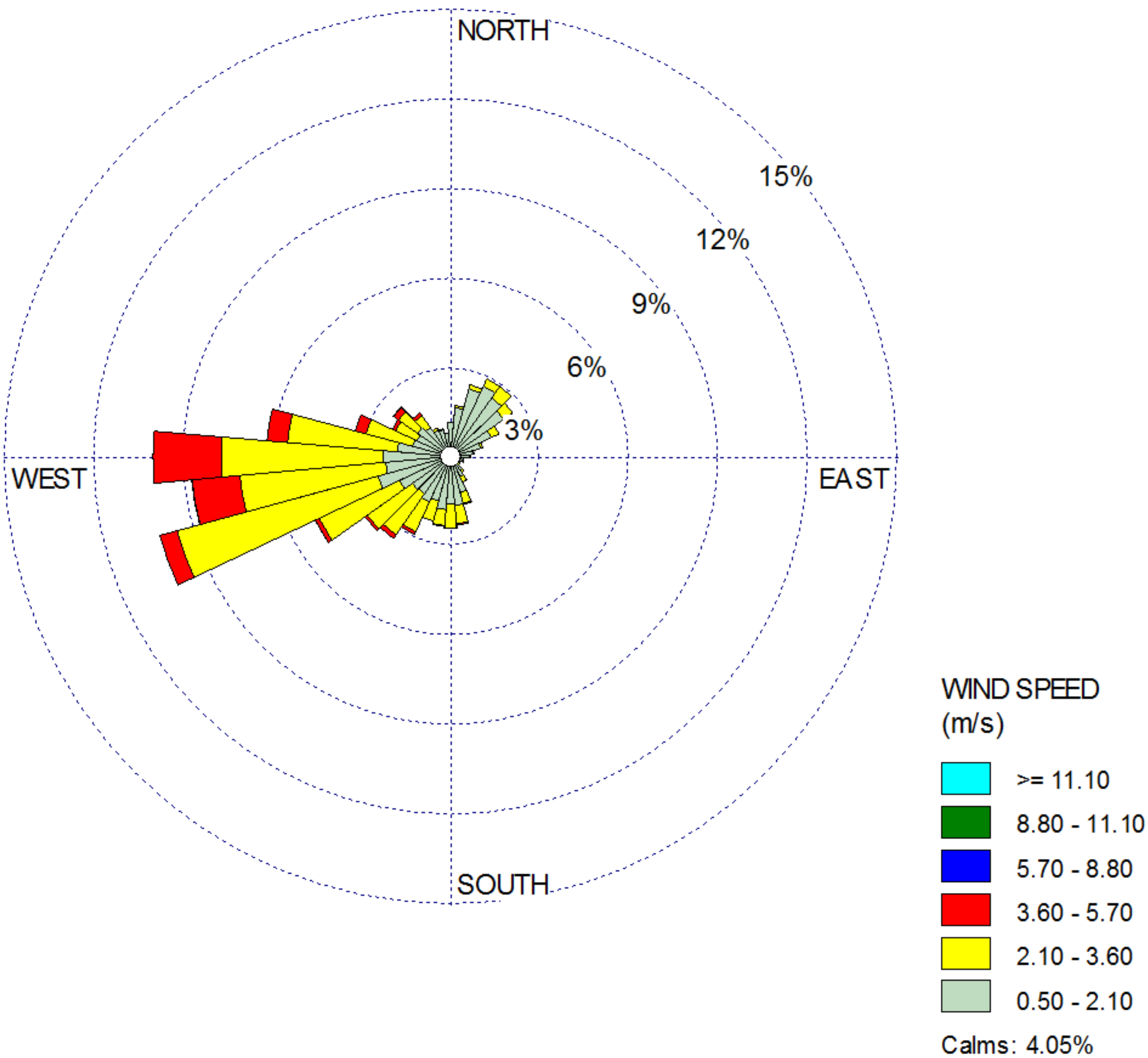
First Quarter, 2008 – 2012



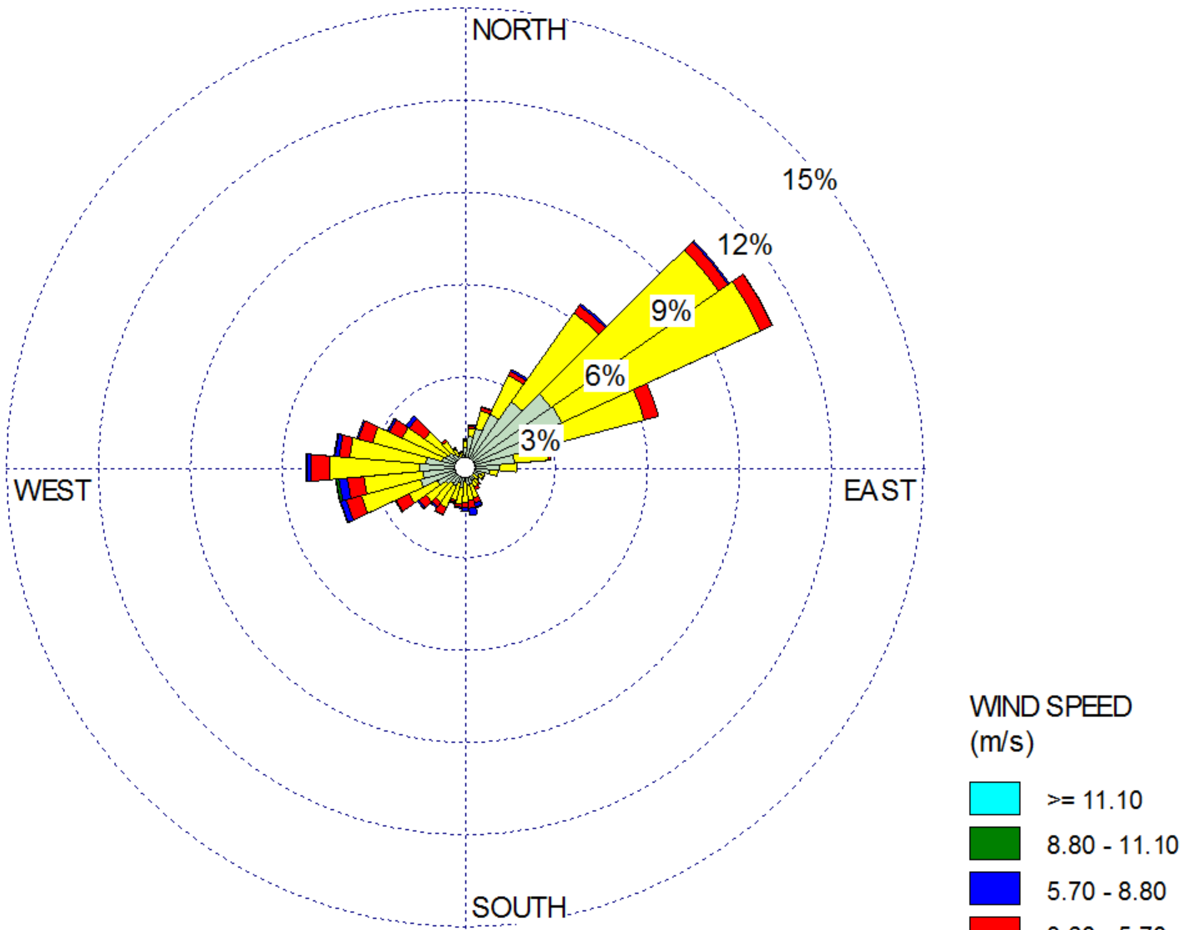
Second Quarter, 2008 – 2012



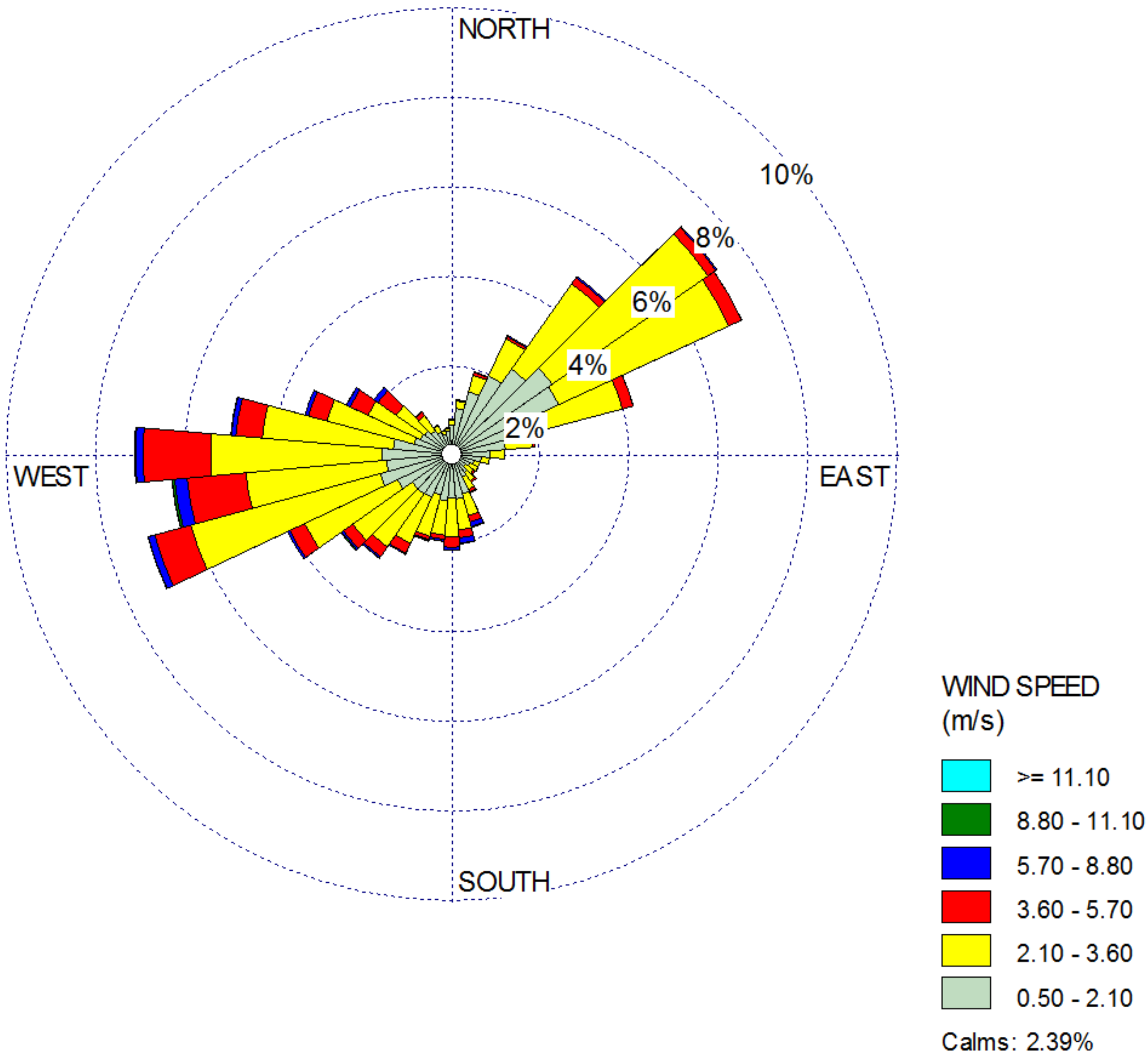
Third Quarter, 2008 – 2012



Fourth Quarter, 2008 – 2012



Annual, 2008 – 2012



Appendix 5.1B
Detailed Emission Calculations

Table 5.1B -1
CECP Amendment
Gas Turbine Emissions

			Standard Conditions:	68 F		29.92		
			Reference O2:	15.00%				
Case	Cold 100% Load	Cold 25% Load	Hot 100% Load w/Evap.	Hot 100% load w/o Evap.	Hot 25% Load	Avg. 100% Load w/Evap.	Avg. 100% Load w/o Evap.	Avg. 25% Load
Ambient Temperature (F)	44.5	44.5	96	96	96	60.3	60.3	60.3
Ambient Humidity (%)	86.1%	86.1%	36.0%	36.0%	36.0%	79.1%	79.1%	79.1%
Inlet Air Cooler	Off	Off	On	Off	Off	On	Off	Off
Water Injection (lbs/hr)	23723	5635	19625	19790	4559	23572	23671	5053
Turbine Fuel Flow Rates								
scfm (margined)	15,850	6,170	14,844	14,408	5,751	16,061	16,089	6,170
Heat Input (margined) (LHV)	874	340	819	795	317	886	887	340
Heat Input (margined) (HHV)	969	377	908	881	352	982	984	377
Gas Turbine Output (kw)	107,665	26,913	98,584	94,357	23,591	108,728	108,837	27,209
Exhaust Gas Parameters								
Exhaust Flow Rate (wacfm)	1,012,885	524,635	985,287	948,559	499,004	1,023,515	1,022,475	523,114
Exhaust Flow Rate (dscfm)	386,192	190,908	349,921	340,745	170,750	382,041	381,368	189,845
Stack Temperature (F)	763.7	856.7	813.1	821.1	920.2	779.1	781.7	854.2
Diluent Concentrations								
O2 (%), dry basis	13.39%	15.00%	13.14%	13.16%	14.75%	13.21%	13.18%	14.96%
CO2 (%), dry basis	4.32%	3.41%	4.47%	4.45%	3.55%	4.43%	4.44%	3.43%
Reference O2 (%), dry basis	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
Pollutant Concentrations at Ref. O2								
VOC as CH4, ppmvd	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
CO (short term), ppmvd	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
CO (long term), ppmvd	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
NOx (short term), ppmvd	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
NOx (long term), ppmvd	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
SOx (short term), ppmvd	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
SOx (long term), ppmvd	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
NH3, ppmvd	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Emission Rates (lbs/hour)								
VOC as CH4	2.50	1.00	2.30	2.20	0.90	2.50	2.50	1.00
CO	8.60	3.40	8.10	7.80	3.10	8.70	8.80	3.40
NOx	8.90	3.40	8.30	8.10	3.20	9.00	9.00	3.50
SOx (short term)	2.04	0.79	1.91	1.85	0.74	2.07	2.07	0.79
SOx (long term)	0.68	0.26	0.64	0.62	0.25	0.69	0.69	0.26
NH3	6.60	2.60	6.10	6.00	2.40	6.60	6.70	2.60
PM10	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

Table 5.1B-2
GE Performance Runs

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Kessler, Daniel**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/1/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**100**	**101**	**109**
Ambient Conditions			
Dry Bulb, °F	60.3	60.3	60.3
Wet Bulb, °F	56.4	56.4	56.4
RH, %	79.1	79.1	79.1
Altitude, ft	20.9	20.9	20.9
Ambient Pressure, psia	14.685	14.685	14.685
Engine Inlet			
Comp Inlet Temp, °F	57.0	60.3	60.3
RH, %	96.6	79.1	79.1
Conditioning	EVAP	NONE	NONE
Tons(Chilling) or kBtu/hr(Heating)	0	0	0
Pressure Losses			
Inlet Loss, inH20	5.00	5.00	2.90
Exhaust Loss, inH20	10.00	10.00	3.80
Partload %	**100**	**100**	**25**
kW, Gen Terms	**108728**	**108837**	**27209**
Est. Btu/kW-hr, LHV	**7947**	**7953**	**12200**
Guar. Btu/kW-hr, LHV	**7947**	**7953**	--
Fuel Flow			
MMBtu/hr, LHV	864.1	865.6	331.9
lb/hr	41949	42023	16116
Fuel Flow (Margined)			
MMBtu/hr, LHV	885.7	887.2	340.2
MMBtu/hr, HHV	981.9	983.6	377.2
lb/hr	42998	43073	16519
NOx Control	**Water**	**Water**	**Water**
Water Injection			
lb/hr	23572	23671	5053
Temperature, °F	100.0	100.0	100.0
Intercooler	**Dry Fin Fan Cooling**	**Dry Fin Fan**	**Dry Fin Fan**
Humidification	OFF	OFF	OFF
IC Heat Extraction, btu/s	31011	31068	8665
KOD Water Extraction, lb/s	0.9	0.5	0.0
Exhaust Parameters			
Temperature, °F	779.1	781.7	854.2
lb/sec	494.1	493.5	247.3
lb/hr	1778916	1776560	890332
Energy, Btu/s- Ref 0 °R	157619	157788	82872
Cp, Btu/lb-R	0.2742	0.2743	0.2726
Estimated Maximum Emissions (at GT Exhaust) *			
NOx ppmvd Ref 15% O2	25	25	25
NOx as NO2, lb/hr	90	90	35
CO ppmvd Ref 15% O2	113	113	139
CO, lb/hr	247	248	117
VOC, ppmvd Ref 15% O2	2.0	2.0	2.0
VOC, lb/hr	2.51	2.51	0.96
PM-10, lb/hr	3.5	3.5	NS
**** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf***			
Estimated Maximum Emissions (at Stack) *			
NOx ppmvd Ref 15% O2	2.5	2.5	2.5
NOx as NO2, lb/hr	9.0	9.0	3.5
CO ppmvd Ref 15% O2	4.0	4.0	4.0
CO, lb/hr	8.7	8.8	3.4
VOC, ppmvd Ref 15% O2	2.0	2.0	2.0
VOC, lb/hr	2.5	2.5	1.0
NH3, ppmvd Ref 15% O2	5.0	5.0	5.0
NH3, lb/hr	6.6	6.7	2.6
PM-10, lb/hr	3.5	3.5	NS
**** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf***			

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Kessler, Daniel**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/1/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**100**	**101**	**109**
Exh Wght % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	1.2320	1.2318	1.2464
N2	72.2646	72.2525	73.1044
O2	13.3917	13.3600	15.4929
CO2	6.1695	6.1891	4.8793
H20	6.9373	6.9618	5.2726
SO2	0.0000	0.0000	0.0000
CO	0.0014	0.0014	0.0016
HC	0.0002	0.0002	0.0001
NOX	0.0033	0.0033	0.0026
Exh Mole % Dry (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	0.9731	0.9732	0.9642
N2	81.3931	81.4047	80.6425
O2	13.2054	13.1782	14.9625
CO2	4.4233	4.4387	3.4262
H20	0.0000	0.0000	0.0000
SO2	0.0000	0.0000	0.0000
CO	0.0015	0.0015	0.0018
HC	0.0003	0.0003	0.0003
NOX	0.0033	0.0033	0.0025
Exh Mole % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	0.8677	0.8674	0.8842
N2	72.5749	72.5551	73.9537
O2	11.7747	11.7456	13.7215
CO2	3.9441	3.9562	3.1420
H20	10.8341	10.8711	8.2944
SO2	0.0000	0.0000	0.0000
CO	0.0014	0.0014	0.0017
HC	0.0003	0.0003	0.0002
NOX	0.0029	0.0029	0.0023

Aero Energy Fuel Number	**900-4103 (Steve Rose Sample 59F)**	
	Volume %	**Weight %**
Hydrogen	0.0000	0.0000
Methane	95.8700	91.1296
Ethane	1.8080	3.2212
Ethylene	0.0000	0.0000
Propane	0.3360	0.8779
Propylene	0.0000	0.0000
Butane	0.1220	0.4201
Butylene	0.0000	0.0000
Butadiene	0.0000	0.0000
Pentane	0.0430	0.1838
Cyclopentane	0.0000	0.0000
Hexane	0.0260	0.1328
Heptane	0.0000	0.0000
Carbon Monoxide	0.0000	0.0000
Carbon Dioxide	1.1130	2.9025
Nitrogen	0.6820	1.1321
Water Vapor	0.0000	0.0000
Oxygen	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000
Ammonia	0.0000	0.0000

Btu/lb, LHV	20598
Btu/scf, LHV	918.4
Btu/scf, HHV	1018.2
Btu/lb, HHV	22836
Fuel Temp, °F	59.0
NOx Scalar	0.978
Specific Gravity	0.58
Wobbe	52.834

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Vu, Christopher**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/6/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**300**	**308**
Ambient Conditions		
Dry Bulb, °F	44.5	44.5
Wet Bulb, °F	42.6	42.6
RH, %	86.1	86.1
Altitude, ft	20.9	20.9
Ambient Pressure, psia	14.685	14.685
Engine Inlet		
Comp Inlet Temp, °F	44.5	44.5
RH, %	86.1	86.1
Conditioning	NONE	NONE
Tons(Chilling) or kBtu/hr(Heating)	0	0
Pressure Losses		
Inlet Loss, inH20	5.00	5.00
Exhaust Loss, inH20	10.00	10.00
Partload %	**100**	**25**
kW, Gen Terms	**107665**	**26913**
Est. Btu/kW-hr, LHV	**7920**	**12334**
Guar. Btu/kW-hr, LHV	**7920**	--
Fuel Flow		
MMBtu/hr, LHV	852.7	331.9
lb/hr	41398	16115
Fuel Flow (Margined)		
MMBtu/hr, LHV	874.0	340.2
MMBtu/hr, HHV	969.0	377.2
lb/hr	42432	16518
NOx Control	**Water**	**Water**
Water Injection		
lb/hr	23723	5635
Temperature, °F	100.0	100.0
Intercooler	**Dry Fin Fan Cooling**	**Dry Fin Fan**
Humidification	OFF	OFF
IC Heat Extraction, btu/s	28202	7474
KOD Water Extraction, lb/s	0.0	0.0
Exhaust Parameters		
Temperature, °F	763.7	856.7
lb/sec	497.5	248.0
lb/hr	1791150	892660
Energy, Btu/s- Ref 0 °R	156191	83059
Cp, Btu/lb-R	0.2728	0.2720
Estimated Maximum Emissions (at GT Exhaust) *		
NOx ppmvd Ref 15% O2	25	25
NOx as NO2, lb/hr	89	34
CO ppmvd Ref 15% O2	113	139
CO, lb/hr	244	117
VOC, ppmvd Ref 15% O2	2.0	2.0
VOC, lb/hr	2.47	0.96
PM-10, lb/hr	3.5	NS
** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf*		
Estimated Maximum Emissions (at Stack) *		
NOx ppmvd Ref 15% O2	2.5	2.5
NOx as NO2, lb/hr	8.9	3.4
CO ppmvd Ref 15% O2	4.0	4.0
CO, lb/hr	8.6	3.4
VOC, ppmvd Ref 15% O2	2.0	2.0
VOC, lb/hr	2.5	1.0
NH3, ppmvd Ref 15% O2	5.0	5.0
NH3, lb/hr	6.6	2.6
PM-10, lb/hr	3.5	NS
** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf*		

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Vu, Christopher**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/6/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**300**	**308**
Exh Wght % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)		
AR	1.2355	1.2500
N2	72.4649	73.3121
O2	13.6292	15.5746
CO2	6.0464	4.8667
H20	6.6193	4.9923
SO2	0.0000	0.0000
CO	0.0013	0.0016
HC	0.0001	0.0001
NOX	0.0032	0.0026
Exh Mole % Dry (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)		
AR	0.9722	0.9640
N2	81.3145	80.6281
O2	13.3895	14.9962
CO2	4.3189	3.4071
H20	0.0000	0.0000
SO2	0.0000	0.0000
CO	0.0015	0.0018
HC	0.0003	0.0002
NOX	0.0032	0.0025
Exh Mole % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)		
AR	0.8715	0.8882
N2	72.8949	74.2857
O2	12.0031	13.8166
CO2	3.8717	3.1391
H20	10.3544	7.8663
SO2	0.0000	0.0000
CO	0.0013	0.0017
HC	0.0003	0.0002
NOX	0.0029	0.0023

Aero Energy Fuel Number	**900-4103 (Steve Rose Sample 59F)**	
	Volume %	**Weight %**
Hydrogen	0.0000	0.0000
Methane	95.8700	91.1296
Ethane	1.8080	3.2212
Ethylene	0.0000	0.0000
Propane	0.3360	0.8779
Propylene	0.0000	0.0000
Butane	0.1220	0.4201
Butylene	0.0000	0.0000
Butadiene	0.0000	0.0000
Pentane	0.0430	0.1838
Cyclopentane	0.0000	0.0000
Hexane	0.0260	0.1328
Heptane	0.0000	0.0000
Carbon Monoxide	0.0000	0.0000
Carbon Dioxide	1.1130	2.9025
Nitrogen	0.6820	1.1321
Water Vapor	0.0000	0.0000
Oxygen	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000
Ammonia	0.0000	0.0000

Btu/lb, LHV	20598
Btu/scf, LHV	918.4
Btu/scf, HHV	1018.2
Btu/lb, HHV	22836
Fuel Temp, °F	59.0
NOx Scalar	0.978
Specific Gravity	0.58
Wobbe	52.834

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Vu, Christopher**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/6/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**400**	**401**	**409**
Ambient Conditions			
Dry Bulb, °F	96.0	96.0	96.0
Wet Bulb, °F	74.1	74.1	74.1
RH, %	36.0	36.0	36.0
Altitude, ft	20.9	20.9	20.9
Ambient Pressure, psia	14.685	14.685	14.685
Engine Inlet			
Comp Inlet Temp, °F	77.4	96.0	96.0
RH, %	86.0	36.0	36.0
Conditioning	EVAP	NONE	NONE
Tons(Chilling) or kBtu/hr(Heating)	0	0	0
Pressure Losses			
Inlet Loss, inH20	5.00	5.00	5.00
Exhaust Loss, inH20	10.00	10.00	10.00
Partload %	**100**	**100**	**25**
kW, Gen Terms	**98584**	**94357**	**23591**
Est. Btu/kW-hr, LHV	**8101**	**8215**	**13115**
Guar. Btu/kW-hr, LHV	**8101**	**8215**	--
Fuel Flow			
MMBtu/hr, LHV	798.6	775.1	309.4
lb/hr	38772	37632	15021
Fuel Flow (Margined)			
MMBtu/hr, LHV	818.6	794.5	317.1
MMBtu/hr, HHV	907.5	880.8	351.6
lb/hr	39741	38573	15396
NOx Control	**Water**	**Water**	**Water**
Water Injection			
lb/hr	19625	19790	4559
Temperature, °F	100.0	100.0	100.0
Intercooler	**Dry Fin Fan Cooling**	**Dry Fin Fan**	**Dry Fin Fan**
Humidification	OFF	OFF	OFF
IC Heat Extraction, btu/s	28292	28726	8649
KOD Water Extraction, lb/s	0.7	0.0	0.0
Exhaust Parameters			
Temperature, °F	813.1	821.1	920.2
lb/sec	454.6	441.0	223.8
lb/hr	1636482	1587556	805535
Energy, Btu/s- Ref 0 °R	150043	146286	79368
Cp, Btu/lb-R	0.2770	0.2768	0.2763
Estimated Maximum Emissions (at GT Exhaust) *			
NOx ppmvd Ref 15% O2	25	25	25
NOx as NO2, lb/hr	83	81	32
CO ppmvd Ref 15% O2	113	113	113
CO, lb/hr	228	222	88
VOC, ppmvd Ref 15% O2	2.0	2.0	2.0
VOC, lb/hr	2.32	2.25	0.90
PM-10, lb/hr	3.5	3.5	NS
**** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf***			
Estimated Maximum Emissions (at Stack) *			
NOx ppmvd Ref 15% O2	2.5	2.5	2.5
NOx as NO2, lb/hr	8.3	8.1	3.2
CO ppmvd Ref 15% O2	4.0	4.0	4.0
CO, lb/hr	8.1	7.8	3.1
VOC, ppmvd Ref 15% O2	2.0	2.0	2.0
VOC, lb/hr	2.3	2.2	0.9
NH3, ppmvd Ref 15% O2	5.0	5.0	5.0
NH3, lb/hr	6.1	6.0	2.4
PM-10, lb/hr	3.5	3.5	NS
**** Gas Fuel Sulfur contents of </+ 0.25 grains/ 100 scf***			

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN
Predicted Intercooler Performance not to be utilized for Balance of Plant design. Please contact GE.

GE Power & Water

Performance By: **Vu, Christopher**
Project Info: **NRG Carlsbad - Avg. Ambient Load Sweep R0**

Engine: **LMS100 PA**
Deck Info: **G0179E - 8k1.scp**
Generator: **BDAX 82-445ER 60Hz, 13.8kV, 0.9PF (EffCurve#: 35404; CapCurve#: 35407)**
Fuel: **Site Gas Fuel#900-4103, 20598 Btu/lb,LHV**

Date: **2/6/2014**
Time: **3:44:53 PM**
Version: **3.9.8**

Case #	**400**	**401**	**409**
Exh Wght % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	1.2237	1.2264	1.2405
N2	71.7735	71.9324	72.7561
O2	13.2250	13.2816	15.1780
CO2	6.1804	6.1750	5.0245
H20	7.5926	7.3798	5.7963
SO2	0.0000	0.0000	0.0000
CO	0.0015	0.0015	0.0019
HC	0.0002	0.0002	0.0001
NOX	0.0033	0.0033	0.0027
Exh Mole % Dry (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	0.9735	0.9733	0.9653
N2	81.4231	81.4123	80.7351
O2	13.1350	13.1604	14.7455
CO2	4.4631	4.4487	3.5491
H20	0.0000	0.0000	0.0000
SO2	0.0000	0.0000	0.0000
CO	0.0017	0.0017	0.0021
HC	0.0003	0.0003	0.0003
NOX	0.0033	0.0033	0.0026
Exh Mole % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS) (GT Exhaust)			
AR	0.8585	0.8615	0.8775
N2	71.8054	72.0538	73.3943
O2	11.5835	11.6476	13.4048
CO2	3.9359	3.9373	3.2264
H20	11.8120	11.4952	9.0925
SO2	0.0000	0.0000	0.0000
CO	0.0015	0.0015	0.0019
HC	0.0003	0.0003	0.0003
NOX	0.0029	0.0029	0.0024

Aero Energy Fuel Number	**900-4103 (Steve Rose Sample 59F)**	
	Volume %	**Weight %**
Hydrogen	0.0000	0.0000
Methane	95.8700	91.1296
Ethane	1.8080	3.2212
Ethylene	0.0000	0.0000
Propane	0.3360	0.8779
Propylene	0.0000	0.0000
Butane	0.1220	0.4201
Butylene	0.0000	0.0000
Butadiene	0.0000	0.0000
Pentane	0.0430	0.1838
Cyclopentane	0.0000	0.0000
Hexane	0.0260	0.1328
Heptane	0.0000	0.0000
Carbon Monoxide	0.0000	0.0000
Carbon Dioxide	1.1130	2.9025
Nitrogen	0.6820	1.1321
Water Vapor	0.0000	0.0000
Oxygen	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000
Ammonia	0.0000	0.0000

Btu/lb, LHV	20598
Btu/scf, LHV	918.4
Btu/scf, HHV	1018.2
Btu/lb, HHV	22836
Fuel Temp, °F	59.0
NOx Scalar	0.978
Specific Gravity	0.58
Wobbe	52.834

Table 5.1B-3
CECP Amendment
Gas Turbine Hourly Emissions - Startup/Shutdown Emissions

Gas Turbine - Hourly Startup Emissions (per GT)

	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions	25	N/A	N/A	N/A	3.5	0.8	14.7	7.4	2.0	1.5	0.3
Maximum Normal Operation Emissions	35	9.0	8.8	2.5	3.5	2.1	5.3	5.1	1.5	2.0	1.2
Total =	60						20.0	12.5	3.5	3.5	1.5

Gas Turbine - Hourly Shutdown Emissions (per GT)

	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Shutdown Emissions	13	N/A	N/A	N/A	3.5	0.8	0.6	3.4	2.4	0.8	0.2
Maximum Normal Operation Emissions	47	9.0	8.8	2.5	3.5	2.1	7.1	6.9	2.0	2.7	1.6
Total =	60						7.7	10.3	4.4	3.5	1.8

Gas Turbine - Hourly Startup/Shutdown/Restart Emissions (per GT)

	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	VOC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions	25	N/A	N/A	N/A	3.5	0.8	14.7	7.4	2.0	1.5	0.3
Maximum Shutdown Emissions	13	N/A	N/A	N/A	3.5	0.8	0.6	3.4	2.4	0.8	0.2
Maximum Restart Emissions*	22	N/A	N/A	N/A	3.5	0.8	12.9	6.5	1.8	1.3	0.3
Total =	60						28.2	17.3	6.2	3.5	0.8

Note: * Calculated based on maximum startup emissions reduced for 22 minute period.

Table 5.1B-4
GE Startup/Shutdown Information

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN

GE Power & Water

LMS100 PA Estimated Startup Stack Emissions - Gas Fuel Operation

Event	Duration (min)	Heat Input (MMBTU - HHV)	NOx (lb)	CO (lb)	VOC (lb)
Startup	25	293.57	14.7	7.4	2.0

** Fuel Must Meet GE Gas Fuel Spec (MID-TD-0000-1 LATEST REVISION)

Based on a Ramp to 100% Load. 60.3°F, 79.1%RH, No Inlet Conditioning, Inlet/Exhaust Loss (inH2O) 5.0/10.0, at 20.9ft. AMSL, Gas Fuel900-4103 (Steve Rose Sample 59F) Btu/lb (LHV/HHV) (20,598/22,836), Water Injected to 0 ppmvdc, Dry Secondary Cooler, G0179

VOC's are defined as non-methane, non-ethane, 50% saturated. VOC mass rates reported as methane.

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN

GE Power & Water

LMS100 PA Estimated Shutdown STACK Emissions - Gas Fuel Operation

Event	Duration (min)	Heat Input (MMBTU - HHV)	NOx (lb)	CO (lb)	VOC (lb)
Shutdown	13	48.63	0.6	3.4	2.4

*Fuel Must Meet GE Gas Fuel Spec (MID-TD-0000-1 LATEST REVISION)

Based on a Ramp to 100% Load. 60.3°F, 79.1%RH, No Inlet Conditioning, Inlet/Exhaust Loss (inH2O) 5.0/10.0, at 20.9ft. AMSL, Gas Fuel900-4103 (Steve Rose Sample 59F) Btu/lb (LHV/HHV) (20,598/22,836), Water Injected to 25 ppmvdc, Dry Secondary Cooler, G017

VOC's are defined as non-methane, non-ethane, 50% saturated. VOC mass rates reported as methane.

Table 5.1B-5
CECP Amendment
Gas Turbine Commissioning Schedule

	Description	Power Level	Operating Hours	% Output	Fuel Rate MMBtu/hr	Fuel Use MMBtu	Total Estimated Emissions NOx lbs	CO lbs	VOC lbs	PM10 lbs	Calculated Hourly Emission Rates NOx lbs/hr	CO lbs/hr	VOC lbs/hr	PM10 lbs/hr
	Estimated Non-Fired Hours During Commissioning													
(1)	Dry fire GTG	Non-Fired	12	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Estimated Fired Hours During Commissioning													
(2)	**First Fire the unit & then shutdown to check for leaks, etc**													
	First fire the unit & then shutdown to check for leaks, etc	Core / Sync Idle	16	CI	128.7	2059	753.0	1834.0	126.0	56.0	47.1	114.6	7.9	3.5
	Sub-Total													
(3)	**Synch & Check E-Stop**													
	Fire the unit and bring to synchronous load…	Sync Idle	12	SI	128.7	1544	565.0	1375.0	95.0	42.0	47.1	114.6	7.9	3.5
	… do a system check out (check E-stop, etc)													
(4)	**Additional AVR Commissioning**													
	Sync to the grid… continue commissioning of the AVR		12	10%	243.8	2926	428.0	1303.0	90.0	42.0	35.7	108.6	7.5	3.5
(5)	**Break-In Run**													
	Controlled "Break-In Run"		8	10%	243.8	1951	285.0	869.0	60.0	28.0	35.6	108.6	7.5	3.5
(6)	**Dynamic Commissioning of AVR & Water Injection**													
	Bring back up to synchronous speed…													
	… begin dynamic commissioning of the AVR													
	Load Step 1		3	10%	243.8	732	107.0	326.0	22.0	11.0	35.7	108.7	7.3	3.5
	Load Step 2		3	20%	339.3	1018	93.0	315.0	2.6	11.0	31.0	105.0	0.9	3.5
	Load Step 3		3	30%	431.8	1296	118.0	326.0	3.3	11.0	39.3	108.7	1.1	3.5
	Load Step 4		3	40%	516.6	1550	142.0	390.0	4.0	11.0	47.3	130.0	1.3	3.5
	Load Step 5		3	50%	583.5	1751	160.0	441.0	4.5	11.0	53.3	147.0	1.5	3.5
	Load Step 6		3	60%	661.6	1985	182.0	500.0	5.1	11.0	60.7	166.7	1.7	3.5
	Load Step 7		3	70%	736.3	2209	202.0	556.0	5.6	11.0	67.3	185.3	1.9	3.5
	Load Step 8		3	80%	812.2	2437	223.0	613.0	6.2	11.0	74.3	204.3	2.1	3.5
	Load Step 9		3	90%	894.9	2685	246.0	676.0	6.8	11.0	82.0	225.3	2.3	3.5
	Load Step 10		3	100%	983.6	2951	270.0	743.0	7.5	11.0	90.0	247.7	2.5	3.5

Table 5.1B-5
CECP Amendment
Gas Turbine Commissioning Schedule (cont.)

(7) **Base load AVR Commissioning / Burnout for Exhaust Prior to Catalyst Installation**													
Once at base load, complete AVR commissioning		12	100%	983.6	11804	1080.0	2971.0	30.0	42.0	90.0	247.6	2.5	3.5
(8) **Emissions Control System (ECS) Tuning (m)**													
Controlled “Break-In Run” (n)	100%	2	100%	983.6	1968	36.0	99.0	4.0	7.0	18.0	49.5	2.0	3.5
Control System initial Start-up & Troubleshooting (o)	50%	4	50%	583.5	2335	43.0	117.0	5.0	14.0	10.8	29.3	1.3	3.5
Control System Tuning	0-100%												
Load Step 1	0%	1.5	0%	128.7	193	14.0	5.0	4.7	5.0	9.3	3.3	3.1	3.3
Load Step 2	10%	1.5	10%	243.8	366	11.0	5.0	4.5	5.0	7.3	3.3	3.0	3.3
Load Step 3	20%	1.5	20%	339.3	509	9.0	5.0	1.0	5.0	6.0	3.3	0.7	3.3
Load Step 4	30%	1.5	30%	431.8	648	12.0	6.0	1.3	5.0	8.0	4.0	0.9	3.3
Load Step 5	40%	1.5	40%	516.6	775	14.0	7.0	1.6	5.0	9.3	4.7	1.1	3.3
Load Step 6	50%	1.5	50%	583.5	876	16.0	8.0	1.8	5.0	10.7	5.3	1.2	3.3
Load Step 7	60%	1.5	60%	661.6	993	18.0	9.0	2.0	5.0	12.0	6.0	1.3	3.3
Load Step 8	70%	1.5	70%	736.3	1105	20.0	10.0	2.3	5.0	13.3	6.7	1.5	3.3
Load Step 9	80%	1.5	80%	812.2	1219	22.0	11.0	2.5	5.0	14.7	7.3	1.7	3.3
Load Step 10	90%	1.5	90%	894.9	1343	25.0	12.0	2.7	5.0	16.7	8.0	1.8	3.3
Load Step 11	100%	1.5	100%	983.6	1476	27.0	13.0	3.0	5.0	18.0	8.7	2.0	3.3
(9) **GE Performance Test**													
Baseload: installation, preliminary testing, and official test.		8	100%	983.6	7869	72.0	70.0	20.0	28.0	9.0	8.8	2.5	3.5
(10) **PPA Performance Test**													
Baseload: installation, preliminary testing, and official test.		8	100%	983.6	7869	72.0	70.0	20.0	28.0	9.0	8.8	2.5	3.5
(11) **Reliability Test**													
Once at base load, complete Reliability Test		72	100%	983.6	70821	648.0	631.0	181.0	252.0	9.0	8.8	2.5	3.5
Total =		213				5913	14316	726	704				
					max =	1080.0	2971.0	181.0	252.0	90.0	247.7	7.9	3.5

Table 5.1B-6
GE Commissioning Schedule

ESTIMATED Fired Hours, Fuel Usage, Emissions and Exhaust Parameters - NOT FOR GUARANTEE - NOT FOR PERMIT USE

for Commissioning Estimates (a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o)

GAS FUEL LMS100 PA Water Injected, 60HZ

	Description	Power Level	Estimated Operating Hours	% Output	Estimated kW Output	Estimated Fuel Rate MMBtu/hr HHV	Estimated Fuel Usage MMBtu's	NOx lbs (Total Estimated Emission per Event)	CO lbs	VOC lbs	PM10 lbs
	Estimated Non-Fired Hours During Commissioning										
(1)	Dry fire GTG	Non-Fired	12	0	NA	NA	NA	NA	NA	NA	NA
	Estimated Fired Hours During Commissioning										
(2)	**First Fire the unit & then shutdown to check for leaks, etc**										
	First fire the unit & then shutdown to check for leaks, etc	Core / Sync Idle	16	CI	0	128.7	2059	753	1834	126	56
	Sub-Total		**16**								
(3)	**Synch & Check E-Stop**										
	Fire the unit and bring to synchronous load…	Sync Idle	12	SI	0	128.7	1544	565	1375	95	42
	… do a system check out (check E-stop, etc)										
	Sub-Total		**12**								
(4)	**Additional AVR Commissioning**										
	Sync to the grid… continue commissioning of the AVR		12	10%	10884	243.8	2926	428	1303	90	42
	Sub-Total		**12**								
(5)	**Break-In Run**										
	Controlled "Break-In Run"		8	10%	10884	243.8	1951	285	869	60	28
	Sub-Total		**8**								
(6)	**Dynamic Commissioning of AVR & Water Injection**										
	Bring back up to synchronous speed…										
	… begin dynamic commissioning of the AVR										
	Load Step 1		3.0	10%	10884	243.8	732	107	326	22	11
	Load Step 2		3.0	20%	21766	339.3	1018	93	315	2.6	11
	Load Step 3		3.0	30%	32651	431.8	1296	118	326	3.3	11
	Load Step 4		3.0	40%	43535	516.6	1550	142	390	4.0	11
	Load Step 5		3.0	50%	54420	583.5	1751	160	441	4.5	11
	Load Step 6		3.0	60%	65302	661.6	1985	182	500	5.1	11
	Load Step 7		3.0	70%	76186	736.3	2209	202	556	5.6	11
	Load Step 8		3.0	80%	87070	812.2	2437	223	613	6.2	11
	Load Step 9		3.0	90%	97953	894.9	2685	246	676	6.8	11
	Load Step 10		3.0	100%	108837	983.6	2951	270	743	7.5	11
	Sub-Total		**30**								
(7)	**Base load AVR Commissioning / Burnout for Exhaust Prior to Catalyst Installation**										
	Once at base load, complete AVR commissioning		12	100%	108837	983.6	11804	1080	2971	30	42
	Sub-Total		**12**								

ESTIMATED Fired Hours, Fuel Usage, Emissions and Exhaust Parameters - NOT FOR GUARANTEE - NOT FOR PERMIT USE

for Commissioning Estimates [(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o)]

GAS FUEL LMS100 PA Water Injected, 60HZ

	Description	Power Level	Estimated Operating Hours	% Output	Estimated kW Output	Estimated Fuel Rate MMBtu/hr HHV	Estimated Fuel Usage MMBtu's	NOx lbs (Total Estimated Emission per Event)	CO lbs	VOC lbs	PM10 lbs
(8)	**Emissions Control System (ECS) Tuning** [(m)]										
	Controlled "Break-In Run" [(n)]	100%	**2**	100%	108837	983.6	1968	36	99	4	7
	Control System initial Start-up & Troubleshooting [(o)]	50%	**4**	50%	54420	583.5	2335	43	117	5	14
	Control System Tuning	0-100%									
	Load Step 1	0%	1.5	0%	0	128.7	193	14	5	4.7	5
	Load Step 2	10%	1.5	10%	10884	243.8	366	11	5	4.5	5
	Load Step 3	20%	1.5	20%	21766	339.3	509	9	5	1.0	5
	Load Step 4	30%	1.5	30%	32651	431.8	648	12	6	1.3	5
	Load Step 5	40%	1.5	40%	43535	516.6	775	14	7	1.6	5
	Load Step 6	50%	1.5	50%	54420	583.5	876	16	8	1.8	5
	Load Step 7	60%	1.5	60%	65302	661.6	993	18	9	2.0	5
	Load Step 8	70%	1.5	70%	76186	736.3	1105	20	10	2.3	5
	Load Step 9	80%	1.5	80%	87070	812.2	1219	22	11	2.5	5
	Load Step 10	90%	1.5	90%	97953	894.9	1343	25	12	2.7	5
	Load Step 11	100%	1.5	100%	108837	983.6	1476	27	13	3.0	5
	Sub-Total		**17**								
	Sub-Total		**23**								
(9)	**GE Performance Test**										
	Baseload: installation, preliminary testing, and official test.		8	100%	108837	983.6	7869	72	70	20	28
	Sub-Total		**8**								
(10)	**PPA Performance Test**										
	Baseload: installation, preliminary testing, and official test.		8	100%	108837	983.6	7869	72	70	20	28
	Sub-Total		**8**								
(11)	**Reliability Test**										
	Once at base load, complete Reliability Test		72	100%	108837	983.6	70821	648	631	181	252
	Sub-Total		**72**								

	Hours
Estimated Fired Hours without Catalyst in Operation	**125**
Estimated Fired Hours with Catalyst in Operation	**88**
Total Estimated Comissioning Hours	**213**

	Estimated Fuel Usage MMBtu HHV	NOx lbs	CO lbs	VOC lbs	PM10 lbs
Without Catalyst in Operation	**38898**	**4853**	**13237**	**468**	**315**
With Catalyst in Operation	**100365**	**1059**	**1077**	**257**	**387**
Total	**139263**	**5912**	**14314**	**725**	**702**

Assumptions:

a) Site Conditions are 60.3F, 79.1% RH, Sea Level, 5/12 Inch H20 Losses, Dry Secondary Cooler, Gas Fuel as stated below
b) All commissioning activities except (9)(10)(11) take place without exhaust treatment in operation
c) Core idle (CI) and sync idle (SI) are assumed to have same mass rates
d) All data is based on this estimated commissioning schedule, which will vary between sites and engines. Schedule and data is estimated only.
e) VOC's are defined as non-methane, non-ethane, 50% saturated. Mass rate reported as Methane.
f) Calculations executed using the gas below with GCV = 22836 Btu/lb and margined heat input
g) Fuel composition <5% C3+
h) Sulfur < 0.25 grains/100 SCF
i) Assumes water is used to maintain 25 ppmvdc NOX
j) Not for guarantee and not for permit use
k) Other commissioning activities not stated here are not included in this estimate
l) It is assumed that NOX water tuning and AVR tuning can be concurent
m) After the break-in period - during ECS tuning - the CO catalyst is assumed to be fully function and an average reduction of 80% from the SCR
n) The "controlled break in" run after catalyst installation is to check seals and installation - assume 80% NOX reduction, 80% CO reduction, 20% VOC reduction
o) Assumed 80% NOX and CO reduction; 20% VOC reduction.

Table 5.1B-7
CECP Amendment
Emergency Firepump Engine

Rating (bhp) =	327				
Fuel =	Diesel				
Fuel Consumption (gal/hr) =	14.8				
Exhaust Temperature (F) =	842				
Exhaust Diameter (inches) =	6				
Exhaust Flow Rate (acfm) =	1,867				
Exhaust Velocity (ft/sec) =	158				
	NOx	**CO**	**VOC**	**PM10**	**SOx**
Emission Factor (g/bhp-hr) =	2.60	0.70	0.10	0.11	0.00
Hourly Emissions (lbs/hr)(1) =	9.37E-01	2.52E-01	3.60E-02	3.96E-02	1.77E-03

Notes:
(1) Assumes testing at 50% load.

Table 5.1B-8
CECP Amendment
Emergency Generator Engine

Rating (bhp) =	779				
Fuel =	Diesel				
Fuel Consumption (gal/hr) =	35.9				
Exhaust Temperature (F) =	1263				
Exhaust Diameter (inches) =	5.5				
Exhaust Flow Rate (acfm) =	3,185				
Exhaust Velocity (ft/sec) =	322				
	NOx	**CO**	**VOC**	**PM10**	**SOx**
Emission Factor (g/bhp-hr) =	2.70	0.39	0.03	0.03	0.00
Hourly Emissions (lbs/hr)(1) =	2.32E+00	3.35E-01	2.58E-02	2.58E-02	4.21E-03

Notes:
(1) Assumes testing at 50% load.

TABLE 5.1B-9
EMERGENCY FIREPUMP VENDOR INFORMATION

Rating Specific Emissions Data - John Deere Power Systems

JOHN DEERE

Nameplate Rating Information

Clarke Model	JW6H-UFADF0
Power Rating (BHP / kW)	327 / 244
Certified Speed (RPM)	1760

Rating Data

Rating	6090HFC47A
Certified Power (kW)	315
Rated Speed	1760
Vehicle Model Number	Clarke Fire Pump

Units	g/kW-hr	g/hp-hr
NOx	3.5	2.6
HC	0.1	0.1
NOx + HC	3.7	2.7
Pm	0.14	0.11
CO	0.9	0.7

Certificate Data

Engine Model Year	2013
EPA Family Name	DJDXL09.0114
EPA JD Name	450HAB
EPA Certificate Number	DJDXL09.0114-005
CARB Executive Order	Not Applicable
Parent of Family	6090HFG84A

Units	g/kW-hr
NOx	3.8
HC	0.1
NOx + HC	3.9
Pm	0.13
CO	0.9

* The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and we do not guarantee that every production engine will have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, or other conditions beyond our control.

CLARKE Fire Protection Products, Inc.

JW6H-UFADF0
INSTALLATION & OPERATION DATA (I&O Data)
USA Produced

Basic Engine Description

Engine Manufacturer	John Deere Co.
Ignition Type	Compression (Diesel)
Number of Cylinders	6
Bore and Stroke - in (mm)	4.66 (118) X 5.35 (136)
Displacement - in³ (L)	549 (9)
Compression Ratio	16.0:1
Valves per cylinder	
Intake	2
Exhaust	2
Combustion System	Direct Injection
Engine Type	In-Line, 4 Stroke Cycle
Fuel Management Control	Electronic, High Pressure Common Rail
Firing Order (CW Rotation)	1-5-3-6-2-4
Aspiration	Turbocharged
Charge Air Cooling Type	Raw Water Cooled
Rotation, viewed from front of engine, Clockwise (CW)	Standard
Engine Crankcase Vent System	Open
Installation Drawing	D627
Weight - lb (kg)	2094 (950)

Power Rating	1760	2100
Nameplate Power - HP (kW)	327 (244)	311 (232)

Cooling System - [C051387]	1760	2100
Engine Coolant Heat - Btu/sec (kW)	73 (77)	80 (84.4)
Engine Radiated Heat - Btu/sec (kW)	74 (78.1)	70 (73.9)
Heat Exchanger Minimum Flow		
60°F (15°C) Raw H_20 - gal/min (L/min)	38 (144)	40 (151)
95°F (35°C) Raw H_20 - gal/min (L/min)	47 (178)	50 (189)
Heat Exchanger Maximum Cooling Raw Water		
Inlet Pressure - psi (bar)	60 (4.1)	
Flow - gal/min (L/min)	80 (303)	
Typical Engine H_20 Operating Temp - °F (°C)[1]	180 (82.2) - 195 (90.6)	
Thermostat		
Start to Open - °F (°C)	180 (82.2)	
Fully Opened - °F (°C)	201 (93.9)	
Engine Coolant Capacity - qt (L)	27 (25.6)	
Coolant Pressure Cap - lb/in² (kPa)	15 (103)	
Maximum Engine Coolant Temperature - °F (°C)	221 (105)	
Minimum Engine Coolant Temperature - °F (°C)	160 (71.1)	
High Coolant Temp Alarm Switch - °F (°C)[2]	235 (113) - 241 (116)	

Electric System - DC	Standard		Optional	
System Voltage (Nominal)	12		24	
Battery Capacity for Ambients Above 32°F (0°C)				
Voltage (Nominal)	12	[C07633]	24	[C07633]
Qty. Per Battery Bank	1		2	
SAE size per J537	8D		8D	
CCA @ 0°F (-18°C)	1400		1400	
Reserve Capacity - Minutes	430		430	
Battery Cable Circuit, Max Resistance - ohm	0.0017		0.0017	
Battery Cable Minimum Size				
0-120 in. Circuit Length[3]	00		00	
121-160 in. Circuit Length[3]	000		000	
161-200 in. Circuit Length[3]	0000		0000	
Charging Alternator Maximum Output - Amp,	40	[C071363]	55	[C071365]
Starter Cranking Amps, Rolling - @60°F (15°C)	440	[RE520634]	326	[C07820]

NOTE: This engine is intended for indoor installation or in a weatherproof enclosure. [1]Engine H_2O temperature is dependent on raw water temperature and flow. [2]High Coolant Switch threshold varies with engine load. [3]Positive and Negative Cables Combined Length.

CLARKE
Fire Protection Products, Inc.

JW6H-UFADF0
INSTALLATION & OPERATION DATA (I&O Data)
USA Produced

Exhaust System	**1760**	**2100**	
Exhaust Flow - ft.³/min (m³/min)	1867 (52.9)	2214 (62.7)	
Exhaust Temperature - °F (°C)	842 (450)	826 (441)	
Maximum Allowable Back Pressure - in H_2O (kPa)	30 (7.5)	30 (7.5)	
Minimum Exhaust Pipe Dia. - in (mm) [4]	6 (152)	6 (152)	

Fuel System	**1760**	**2100**
Fuel Consumption - gal/hr (L/hr)	14.8 (56)	16.8 (63.6)
Fuel Return - gal/hr (L/hr)	50.2 (190)	48.2 (182)
Fuel Supply - gal/hr (L/hr)	65 (246)	65 (246)
Fuel Pressure - lb/in² (kPa)	2 (13.8) - 9 (62.1)	
Minimum Line Size - Supply - in.	.50 Schedule 40 Steel Pipe	
Pipe Outer Diameter - in (mm)	0.848 (21.5)	
Minimum Line Size - Return - in.	.375 Schedule 40 Steel Pipe	
Pipe Outer Diameter - in (mm)	0.675 (17.1)	
Maximum Allowable Fuel Pump Suction Lift with clean Filter - in H_2O (mH_2O)	80 (2)	
Maximum Allowable Fuel Head above Fuel pump, Supply or Return - ft (m)	6.6 (2)	
Fuel Filter Micron Size	2 (Secondary)	

Heater System	**Standard**	**Optional**
Engine Coolant Heater		
Wattage (Nominal)	2500	2500
Voltage - AC, 1 Phase	115 (+5%, -10%)	230 (+5%, -10%)
Part Number	[C122191]	[C122195]

Air System	**1760**	**2100**	
Combustion Air Flow - ft.³/min (m³/min)	698 (19.8)	949 (26.9)	
Air Cleaner	**Standard**		**Optional**
Part Number	[C03244]		[C03330]
Type	Indoor Service Only, with Shield		Canister, Single-Stage
Cleaning method	Washable		Disposable
Air Intake Restriction Maximum Limit			
Dirty Air Cleaner - in H_2O (kPa)	14 (3.5)		14 (3.5)
Clean Air Cleaner - in H_2O (kPa)	7 (1.7)		7 (1.7)
Maximum Allowable Temperature (Air To Engine Inlet) - °F (°C)[5]	130 (54.4)		

Lubrication System	
Oil Pressure - normal - lb/in² (kPa)	37 (255) - 41 (283)
Low Oil Pressure Alarm Switch - lb/in² (kPa)[6]	21 (145) to 41 (283)
In Pan Oil Temperature - °F (°C)	190 (87.8) - 220 (104)
Total Oil Capacity with Filter - qt (L)	30.1 (28.5)

Lube Oil Heater	**Optional**	**Optional**
Wattage (Nominal)	150	150
Voltage	120V (+5%, -10%)	240V (+5%, -10%)
Part Number	C04430	C04431

Performance	**1760**	**2100**
BMEP - lb/in² (kPa)	268 (1850)	214 (1480)
Piston Speed - ft/min (m/min)	1569 (478)	1873 (571)
Mechanical Noise - dB(A) @ 1m	C133383	
Power Curve	C132971	

[4]Based on Nominal System. Back pressure flow analysis must be done to assure maximum allowable back pressure is not exceeded. (Note: minimum exhaust Pipe diameter is based on: 15 feet of pipe, one 90° elbow, and a silencer pressure drop no greater than one half of the maximum allowable back pressure.) [5]Review for horsepower derate if ambient air entering engine exceeds 77°F (25°C). [6]Low Oil Pressure Switch threshold varies w/engine speed. [ ] indicates component reference part number.

TABLE 5.1B-10
EMERGENCY GENERATOR ENGINE VENDOR INFORMATION

DIESEL GENERATOR SET

Image shown may not reflect actual package

Standby
500 ekW 625 kVA
60 Hz 1800 rpm 480 Volts

Caterpillar is leading the power generation Market place with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FUEL/EMISSIONS STRATEGY
- EPA Tier 4 Interim

DESIGN CRITERIA
- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200
- UL 2200 packages available. Certain restrictions may apply. Consult with your Cat® dealer.

FULL RANGE OF ATTACHMENTS
- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER
- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT
- Cat dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries.
- The Caterpillar S•O•S℠ program effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by products.

CAT® C15 ATAAC DIESEL ENGINE
- Reliable, rugged, durable design
- Field proven in thousands of applications worldwide
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight

CAT GENERATOR
- Matched to the performance and output characteristics of Cat engines
- Single point access to accessory connections
- UL 1446 Recognized Class H insulation

CAT EMCP 4 CONTROL PANELS
- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

SPECIFICATIONS

CAT GENERATOR

Frame …………………..…………………….. 6124F
Excitation ……………………………………..….IE
Pitch…………………………………………….0.6667
Number of poles……………………………………4
Number of leads…………………………………..12
Number of bearings ………………….…………Single
Insulation ……………………………………..Class H
IP rating ………………………………..Drip proof IP23
Over speed capability - % of rated………………125%
Wave form deviation……………………………...2 %
Voltage regulator…………. 3 phase sensing with load adjustable module
Voltage regulation….Less than ±1/2% (steady state)
Less than ±1/2% (3% speed change)
Telephone Influence Factor …………….Less than 50
Harmonic Distortion ……………………..Less than 5%

CAT DIESEL ENGINE

C15 ATAAC, L-6, 4 stroke, water-cooled diesel

Bore …………………………… ...137.20 mm (5.4 in)
Stroke ……………………………171.4 mm (6.75 in)
Displacement …………………...15.20 L (927.56 in^3)
Compression ratio……………..………………..16:1
Aspiration…………………….….….…….…ATAAC
Fuel system…………………………….………..MEUI
Governor Type………………………….. ADEM™ A4

CAT EMCP 4 CONTROL PANELS

EMCP 4 controls including:
- Run / Auto / Stop Control
- Speed & Voltage Adjust
- Engine Cycle Crank
- Emergency stop pushbutton

EMCP 4.2 controller features:
- 24-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:
- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- Power Factor (per phase & average)
- kW (per phase, average & percent)
- kVA (per phase, average & percent)
- kVAr (per phase, average & percent)
- kW-hr & kVAr-hr (total)

Warning/shutdown with common LED indication of shutdowns for:
- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

Programmable protective relaying functions:
- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (kW) (32)
- Reverse Reactive Power (kVAr) (32RV)
- Overcurrent (50/51)

Communications
- Customer data link (Modbus RTU)
- Accessory module data link
- Serial annunciator module data link

- 6 programmable digital inputs
- 4 programmable relay outputs (Form A)
- 2 programmable relay outputs (Form C)
- 2 programmable digital outputs

Compatible with the following optional modules:
- Digital I/O module
- Local Annunciator
- Remote annunciator
- RTD module
- Thermocouple module

TECHNICAL DATA

Open Generator Set - 1800 rpm/60 Hz/480 Volts	STANDBY EM0177	
Genset Package Performance		
Power rating @ 0.8 pf	625 kVA	
Power rating w/fan	500 ekW	
Fuel Consumption[1]		
100% load with fan	136.6 L/hr	35.9 Gal/hr
75% load with fan	108.0 L/hr	28.6 Gal/hr
50% load with fan	78.0 L/hr	20.5 Gal/hr
Cooling System[2]		
Ambient air temperature	51°C	123 °F
Air flow restriction (system)	0.12 kPa	0.5 in water
Air flow (max @rated speed)	819.6 m^3/min	28958 cfm
Engine coolant Capacity with radiator arrangement)	68 L	18.0 US Gal
Engine coolant capacity	27 L	7.1 US Gal
Radiator coolant capacity	41 L	10.9 US Gal
Inlet Air		
Combustion air inlet flow rate	35.2 m^3/min	1243 cfm
Exhaust System		
Exhaust stack gas temperature	683.8 °C	1263 °F
Exhaust gas flow rate	90.2 m^3/min	3185 cfm
Exhaust flange size (internal diameter)	139 mm	5.5 in
Exhaust system backpressure (minimum allowable) [3]	1 kPa	4 in. water
Exhaust system backpressure (maximum allowable) [3]	10 kPa	40 in. water
Heat Rejection		
Heat rejection to coolant (total)	253 kW	14375 Btu/min
Heat rejection to exhaust (total)	430 kW	24457 Btu/min
Heat rejection to atmosphere from engine	95.6 kW	5436 Btu/min
Heat rejection to atmosphere from generator	29.1 kW	1655 Btu/min
Alternator[4]		
Motor starting capability @ 30% voltage dip	1712 skVA	
Frame	LC6124F	
Temperature Rise	130°C	234°F
Lube System [5]		
Lube oil refill with filter change for standard sump	60 L	15.9 US Gal
Emissions (Nominal)[6]		
NO_x	3.6 g/kW-hr	2.7 g/hp-hr
CO	0.52 g/kW-hr	.39 g/hp-hr
HC	0.04 g/kW-hr	0.03 g/hp-hr
PM	0.04 g/kW-hr	0.03 g/hp-hr

[1] EPA Tier 4 Interim diesel engines required the use of Ultra Low Sulfur Diesel (ULSD) fuel in order to protect emissions control systems, help comply with emissions standards, and meet published maintenance intervals. ULSD fuel will have ≤ 15 ppm (0.0015%) sulfur using the ASTM D5453, ASTM 2622, or SIN 51400 test methods.

[2] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[3] Backpressure allowance is total backpressure available for the customer.

[4] Generator temperature rise is based on a 40 degree C ambient per NEMA MG1-32.
Some packages may have oversized generators with a different temperature rise and motor starting characteristics.

[5] Requires the use of CJ4 oil in order to meet published maintenance intervals.

[6] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NO_x. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

Table 5.1B-11
CECP Amendment
Natural Gas Compressor Fugitive Emissions (three fuel compressors)

Fitting	Number	Emission factor (kg/hr/unit)(1)	Organic Compound Emissions (kg/hr)	Organic Compound Emissions (lb/day)	VOC Emissions(2) (lb/day)	CH4 Emissions(3) (lb/day)
Valves	50	4.50E-03	0.225	2.45	0.23	2.23
Connectors	112	2.00E-04	0.0224	0.24	0.02	0.22
Compressor Seals	3	8.80E-03	0.0264	0.29	0.03	0.26
TOTAL =				2.98	0.28	2.72

Notes:
(1) EPA's Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-4 (Oil and Gas Production Operations).
(2) Based on a VOC fraction of total organic compound of 9.46%wt (based on gas composition specified by SDAPCD for Pio Pico Energy Center with high VOC due to LNG).
(3) Based on CH4 fraction (91.2%wt) of site specific gas composition.

Table 5.1B-12
CECP Amendment
Hourly Emissions

Hourly Mass Emission Rates, lbs/hr (Commissioning Period)	NOx	CO	VOC	PM10	SOx	NH3(1)
Single GT Normal Operation	9.00	8.80	2.50	3.50	2.07	6.70
Single GT Startups	19.95	12.53	3.46	3.50	1.54	6.70
Single GT Shutdowns	7.65	10.29	4.36	3.50	1.79	6.70
Single GT Startup/Shutdown/Restart	28.24	17.31	6.16	3.50	0.79	6.70
Single GT Commissioning	90.00	247.67	7.92	3.50	2.07	6.70
Single GT Maximum =	90.00	247.67	7.92	3.50	2.07	6.70
Six GTs Maximum =	**540.00**	**1486.00**	**47.50**	**21.00**	**12.42**	**40.20**
Emergency Firepump Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Emergency Generator Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Natural Gas Compressors	N/A	N/A	0.01	N/A	N/A	N/A
Total New Equipment =	**540.00**	**1486.00**	**47.51**	**21.00**	**12.42**	**40.20**
Total Emergency Engines =	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A

Hourly Mass Emission Rates, lbs/hr (Non-Commissioning Period)	NOx	CO	VOC	PM10	SOx	NH3(1)
Single GT Normal Operation	9.00	8.80	2.50	3.50	2.07	6.70
Single GT Startups	19.95	12.53	3.46	3.50	1.54	6.70
Single GT Shutdowns	7.65	10.29	4.36	3.50	1.79	6.70
Single GT Startup/Shutdown/Restart	28.24	17.31	6.16	3.50	0.79	6.70
Single GT Maximum =	28.24	17.31	6.16	3.50	2.07	6.70
Six GTs Maximum =	**169.42**	**103.87**	**36.96**	**21.00**	**12.42**	**40.20**
Emergency Firepump Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Emergency Generator Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Natural Gas Compressors	N/A	N/A	0.01	N/A	N/A	N/A
Total New Equipment =	**169.42**	**103.87**	**36.97**	**21.00**	**12.42**	**40.20**
Total Emergency Engines =	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case daily emissions for AQ modeling purposes.
(2) Emergency engines will not be operated during commissioning testing of new gas turbines and/or during startups/shutdowns of gas turbines.

Table 5.1B-13
CECP Amendment
Daily Emissions

Daily Emission Rates, lbs/day (Commissioning Period)													
	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	VOC	PM10	SOx	NH3	NOx	CO	VOC	PM10	SOx	NH3
GT Normal Operation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GT Startups	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GT Shutdowns	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GT Commissioning	various	various	various	various	various	various	various	1,080.0	2,971.0	181.0	84.0	49.7	160.8
Single GT Total =								**1,080.0**	**2,971.0**	**181.0**	**84.0**	**49.7**	**160.8**
Six GT Total =								**6,480.0**	**17,826.0**	**1,086.0**	**504.0**	**298.2**	**964.8**
Emergency Firepump Engine	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Emergency Generator Engine	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Natural Gas Compressors	24									0.3			
Total New Equipment =								**6,480.0**	**17,826.0**	**1,086.3**	**504.0**	**298.2**	**964.8**
Total Emergency Engines =								**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Daily Emission Rates, lbs/day (Non-Commissioning Period)													
	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	VOC	PM10	SOx(1)	NH3(1)	NOx	CO	VOC	PM10	SOx	NH3
GT Normal Operation	16	9.00	8.80	2.50	3.50	2.07	6.70	144.0	140.8	40.0	56.0	33.1	107.2
GT Startups	4	19.95	12.53	3.46	3.50	2.07	6.70	79.8	50.1	13.8	14.0	8.3	26.8
GT Shutdowns	4	7.65	10.29	4.36	3.50	2.07	6.70	30.6	41.2	17.4	14.0	8.3	26.8
Single GT Total =								**254.4**	**232.1**	**71.3**	**84.0**	**49.7**	**160.8**
Six GT Total =								**1,526.4**	**1,392.6**	**427.6**	**504.0**	**298.2**	**964.8**
Emergency Firepump Engine	0.5	0.94	0.25	0.04	0.04	0.00		0.5	0.1	0.0	0.0	0.0	
Emergency Generator Engine	0.5	2.32	0.33	0.03	0.03	0.00		1.2	0.2	0.0	0.0	0.0	
Natural Gas Compressors	24									0.3			
Total New Equipment =								**1,528.0**	**1,392.9**	**427.9**	**504.0**	**298.2**	**964.8**
Total Emergency Engines =								**1.6**	**0.3**	**0.0**	**0.0**	**0.0**	

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case daily emissions for AQ modeling purposes.

Table 5.1B-14
CECP Amendment
Annual Emissions - Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	PM10 (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	VOC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
Single GT Commissioning	213	various	various	various	various	various	various	5,913	14,316	726	704	147	1,424
Single GT Start-Up	400	19.95	12.53	3.46	3.50	0.69	2.60	7,980	5,013	1,383	1,400	276	1,040
Single GT Normal Operation	1,200	9.00	8.80	2.50	3.50	0.69	6.70	10,800	10,560	3,000	4,200	828	8,040
Single GT Shutdown	400	7.65	10.29	4.36	3.50	0.69	2.60	3,060	4,117	1,743	1,400	276	1,040
Single GT Total =	**2,213**							**27,753**	**34,007**	**6,853**	**7,704**	**1,527**	**11,544**
Six GT Total =								**166,518**	**204,040**	**41,116**	**46,224**	**9,162**	**69,263**
Emergency Firepump Engine	200	0.94	0.25	0.04	0.04	0.00	0.00	187	50	7	8	0	
Emergency Generator Engine	200	2.32	0.33	0.03	0.03	0.00	0.00	464	67	5	5	1	
Natural Gas Compressors										103			
Total New Equipment Annual Emissions (lb/year) =								**167,169**	**204,157**	**41,231**	**46,237**	**9,164**	**69,263**
Total New Equipment Annual Emissions (tons/year) =								**83.6**	**102.1**	**20.6**	**23.1**	**4.6**	**34.6**
Total Gas Turbines Annual Emissions (tons/year) =								**83.3**	**102.0**	**20.6**	**23.1**	**4.6**	**34.6**
Total Emergency Engines Annual Emissions (tons/year) =								**0.3**	**0.1**	**0.0**	**0.0**	**0.0**	
Total Gas Compressors Annual Emissions (tons/year) =										**0.1**			

Notes:

(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.

Table 5.1B-15
CECP Amendment
Annual Emissions - Non-Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	VOC (lbs/hr)	PM10 (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	VOC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
Single GT Start-Up	400	19.95	12.53	3.46	3.50	0.69	2.60	7,980	5,013	1,383	1,400	276	1,040
Single GT Normal Operation	1,900	9.00	8.80	2.50	3.50	0.69	6.70	17,100	16,720	4,750	6,650	1,311	12,730
Single GT Shutdown	400	7.65	10.29	4.36	3.50	0.69	2.60	3,060	4,117	1,743	1,400	276	1,040
Single GT Total =	**2,700**							**28,140**	**25,851**	**7,877**	**9,450**	**1,864**	**14,810**
Six GT Total =								**168,840**	**155,104**	**47,260**	**56,700**	**11,181**	**88,860**
Emergency Firepump Engine	200	0.94	0.25	0.04	0.04	0.00		187	50	7	8	0	
Emergency Generator Engine	200	2.32	0.33	0.03	0.03	0.00		464	67	5	5	1	
Natural Gas Compressors										103			
Total New Equipment Annual Emissions (lb/year) =								**169,491**	**155,221**	**47,375**	**56,713**	**11,182**	**88,860**
Total New Equipment Annual Emissions (tons/year) =								**84.7**	**77.6**	**23.7**	**28.4**	**5.6**	**44.4**
Total Gas Turbines Annual Emissions (tons/year) =								**84.4**	**77.6**	**23.6**	**28.4**	**5.6**	**44.4**
Total Emergency Engines Annual Emissions (tons/year) =								**0.3**	**0.1**	**0.0**	**0.0**	**0.0**	
Total Gas Compressors Annual Emissions (tons/year) =										**0.1**			

Notes:
(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.

Table 5.1B-16
CECP Amendment
Hourly Emissions for Existing Units 1 - 5 and Peaking Gas Turbine

Device	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Gas Turbine
Fuel	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Maximum Power Rating (MW)	113	109	115	323	342	15
Maximum Heat Input (MMBtu/hr)	1013	1013	1128	3245	3475	317
Natural Gas F-factor (dscf/MMBtu)	8710	8710	8710	8710	8710	8710
Natural Gas F-factor (wscf/MMBtu)	10610	10610	10610	10610	10610	10610
Reference O2	3.0%	3.0%	3.0%	3.0%	3.0%	15.0%
Actual O2	7.9%	4.8%	4.5%	3.3%	2.1%	15.7%
Exhaust Temperature (F)	310	310	310	310	310	981
Exhaust Rate (dscfm @ ref. O2)	171,700	171,700	191,192	550,015	589,000	163,012
Exhaust Rate (wacfm @ actual O2)	418,696	339,751	370,708	992,604	996,771	609,032

	Emission Factors					
	NOx	CO	VOC	PM10	SOx	NH3
Pollutant	(lb/MMscf)[1]	(lb/MMscf)[1]	(lb/MMscf)[2]	(lb/MMscf)[2]	(lb/MMscf)[4]	(lb/MMscf)[3]
Unit 1	9.13	55.96	5.50	7.60	2.14	4.58E+00
Unit 2	10.24	62.19	5.50	7.60	2.14	4.58E+00
Unit 3	8.99	25.99	5.50	7.60	2.14	4.58E+00
Unit 4	10.34	7.14	5.50	7.60	2.14	4.58E+00
Unit 5	10.99	34.87	5.50	7.60	2.14	4.58E+00
Gas Turbine[5]	24.14	30.60	2.14	7.60	2.14	0

	Hourly Emissions					
	NOx	CO	VOC	PM10	SOx	NH3
Unit	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)
Unit 1	9.07	55.58	5.46	7.55	2.13	4.55
Unit 2	10.17	61.77	5.46	7.55	2.13	4.55
Unit 3	9.94	28.75	6.08	8.41	2.37	5.07
Unit 4	32.91	22.71	17.50	24.18	6.82	14.57
Unit 5	37.44	118.80	18.74	25.90	7.30	15.60
Gas Turbine	7.50	9.51	0.67	2.36	0.67	0.00

Notes:
1. For NOx , based on a 2-Year average of CEMS data 2011 to 2012. For CO, based on a 2-Year average of stack test reports 2011 and 2012.
2. Based on emission factors from AP-42, Table 1.4-2, 7/98.
3. Based on SDACPD permit limit of 10 ppm @ 3% O2 ammonia slip.
4. Based on maximum natural gas sulfur content of 0.75 gr/100 scf.
5. NOx based emission factor from 4/10/13 source test data, other factors from AP-42, Table 3.1-1, water-injected natural gas turbine.

Table 5.1B-17-1
Encina Power Station - Baseline NOx emissions (tons/year)

Unit	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012+	2013+	5-Yr Avg	10-Yr Avg.	12-Yr Avg.
U1	39.99	27.70	46.00	31.73	16.17	10.20	0.70	3.41	2.13	3.45	7.56	2.10			
U2						7.70	3.60	2.15	0.64	4.24	8.83	1.88			
U3						13.00	5.90	3.72	1.33	3.73	9.20	2.88			
U4	101.90	75.70	86.50	53.20	35.50	38.60	28.50	14.60	4.85	7.05	24.24	8.83			
U5	113.70	87.40	80.90	37.20	37.50	59.20	57.20	22.68	12.27	13.50	34.27	15.21			
Peaker GT++								0.08	0.18	0.07	0.55	0.45			
Total =	255.59	190.80	213.40	122.13	89.17	128.70	95.90	46.64	21.39	32.04	84.65	31.36	43.22	86.54	109.31
2-Year Average =									34.02	26.72	58.34	58.00			

Notes:
* From SDAPCD approved inventory reports.
**, + Based on hourly CEMS data.
++ Based emission factor from 4/10/13 source test data and annual fuel use.

Table 5.1B-17-2
Encina Power Station - Baseline CO emissions (tons/year)

Unit	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012**	2013+	5-Yr Avg	10-Yr Avg.	12-Yr Avg.
U1	494.59	344.03	266.73	144.25	94.43	14.40	1.80	24.41	36.16	47.25	20.20	5.82			
U2						32.80	28.40	9.14	2.57	60.23	19.18	4.45			
U3						19.10	16.80	14.42	3.52	15.48	21.93	6.25			
U4	804.50	416.60	570.90	384.10	108.40	53.90	74.50	29.99	2.11	5.78	15.81	6.47			
U5	922.10	481.00	533.80	268.70	67.80	45.90	83.00	58.51	4.47	151.53	0.05	0.02			
Peaker GT++								0.10	0.23	0.09	0.70	0.57			
Total =	2221.19	1241.63	1371.43	797.05	270.63	166.10	204.50	136.57	49.06	280.35	77.86	23.58	113.48	337.71	570.00
2-Year Average =									92.81	164.71	179.11	50.72			

Notes:
* From SDAPCD approved inventory reports.
** Emissions Calculated using emission factor from source test for each year and actual fuel use from CEMS.
+ Units 1, 2, and 5 Emissions calculated based on 2012 source test and actual fuel use. Units 3 and 4 based on 2013 source tests.
++Based on emission factor (from AP-42 Table 3.1-1, water-injected natural gas turbine) and annual fuel use.

Table 5.1B-17-3
Encina Power Station - Baseline VOC emissions (tons/year)

Unit	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012**	2013**	5-Yr Avg	10-Yr Avg.	12-Yr Avg.
U1	16.18	14.83	22.14	15.41	8.11	1.90	0.20	1.80	1.15	2.17	4.46	1.29			
U2						1.40	1.20	1.23	0.38	2.36	4.66	1.08			
U3						2.40	2.00	1.95	0.80	2.40	5.51	1.90			
U4	26.40	27.30	37.40	25.10	16.30	7.20	9.90	7.81	2.57	3.83	12.81	4.71			
U5	30.20	31.50	35.00	17.60	17.40	11.00	19.80	11.53	6.52	6.39	17.52	7.43			
Peaker GT++								0.01	0.02	0.01	0.05	0.04			
Total =	72.78	73.63	94.54	58.11	41.81	23.90	33.10	24.33	11.42	17.15	45.02	16.45	22.87	36.58	42.69
2-Year Average =									17.87	14.29	31.09	30.73			

Notes:
* From SDAPCD approved inventory reports.
** Emissions calculated based on AP-42 table 1.4-1 (5.5 lb/MMScf) and annual fuel usage from CEMS (table 3-5)
++Based on emission factor (from AP-42 Table 3.1-1, water-injected natural gas turbine) and annual fuel use.

Table 5.1B-17-4
Encina Power Station - Baseline PM10 emissions (tons/year)

Unit	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012**	2013**	5-Yr Avg	10-Yr Avg.	12-Yr Avg.
U1	34.97	27.66	45.28	33.58	15.97	3.70	0.50	2.48	1.59	2.99	6.17	1.78			
U2						2.80	2.50	1.70	0.52	3.26	6.44	1.49			
U3						4.20	3.90	2.69	1.11	3.32	7.62	2.62			
U4	58.20	53.50	70.50	47.70	31.10	11.70	16.40	10.79	3.55	5.29	17.70	6.51			
U5	66.00	46.70	54.00	28.40	28.20	21.30	38.60	15.93	9.00	8.83	24.22	10.27			
Peaker GT++								0.02	0.05	0.02	0.15	0.13			
Total =	159.17	127.86	169.78	109.68	75.27	43.70	61.90	33.63	15.81	23.71	62.30	22.80	31.65	61.86	75.47
2-Year Average =									24.72	19.76	43.00	42.55			

Notes:
* From SDAPCD approved inventory reports.
** Calculated based on AP42, Table 1.4-2, 7/98 PM emission factor and actual fuel use from CEMS.
++Based on emission factor (from AP-42 Table 3.1-1, water-injected natural gas turbine) and annual fuel use.

Table 5.1B-17-5
Encina Power Station - Baseline SOx emissions (tons/year)

Unit	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012**	2013**	5-Yr Avg	10-Yr Avg.	12-Yr Avg.
U1	9.53	12.51	2.41	3.69	2.59	0.20	0.10	0.20	0.13	0.24	0.49	0.14			
U2						0.20	0.10	0.13	0.04	0.26	0.51	0.12			
U3						0.30	0.20	0.21	0.09	0.26	0.60	0.21			
U4	5.40	3.00	4.10	2.70	4.40	0.80	1.10	0.85	0.28	0.42	1.40	0.51			
U5	5.60	3.40	3.80	1.90	3.80	1.20	2.20	1.26	0.71	0.70	1.91	0.81			
Peaker GT++								0.01	0.03	0.01	0.08	0.07			
Total =	20.53	18.91	10.31	8.29	10.79	2.70	3.70	2.66	1.27	1.88	4.99	1.86	2.53	4.84	7.32
2-Year Average =									1.97	1.58	3.43	3.42			

Notes:
* From SDAPCD approved inventory reports.
** Emissions calculated based on AP-42 table 1.4-1 (0.6 lb/MMScf) and annual fuel usage from CEMS.
++Based on emission factor (from AP-42 Table 3.1-1, water-injected natural gas turbine) and annual fuel use.

Table 5.1B-17-6
Encina Power Station - GHG Emissions CO2e (MT)

Unit	Fuel	2002*	2003*	2004*	2005*	2006*	2007*	2008*	2009**	2010**	2011**	2012**	2013**	5-Yr Avg	10-Yr Avg	12-Yr Avg.
U1	natural gas	315,791	295,421	443,422	308,148	161,081	111,632	69,162	35,388	22,584	42,648	87,835	25,304			
U1	fuel oil								0	0	0	0	0			
U2	natural gas								24,281	7,386	46,468	91,739	21,276			
U2	fuel oil								0	0	0	0	0			
U3	natural gas								38,321	15,767	47,268	108,503	37,365			
U3	fuel oil								0	0	0	0	0			
U4	natural gas	514,177	536,871	735,711	494,941	319,055	520,222	210,377	153,684	50,546	75,353	252,108	92,789			
U4	fuel oil	8,436	0	0	0	844	744	0	0	0	0	0	0			
U5	natural gas	589,580	619,833	687,945	346,268	340,694	689,514	361,481	226,950	128,248	125,699	344,905	146,218			
U5	fuel oil	7,467	0	0	0	627	971	0	0	0	0	0	0			
Peaker GT	natural gas								352	800	304	2,488	2,032			
Total =		1,435,451	1,452,125	1,867,078	1,149,356	822,302	1,323,082	641,021	478,975	225,332	337,740	887,578	324,984	450,922	805,745	912,085
2-Year Average =										352,154	281,536	612,659	606,281			

Notes:

* For Units 1-3 for 2002 to 2008, based on annual GHG emissions shown in CEC FSA for CECP project. For Units 4 and 5 for 2002 to 2008 calculated based on fuel use (converted to MMBtu based on natural gas HHV of 1,019 Btu/scf and fuel oil HHV of 152,400 Btu/gal) and following emission factors:

For natural gas - CO2 emission factor of 53.06 kg/MMBtu, CH4 emission factor of 1 x 10-3 kg/MMBtu with GWP of 25, N2O emission factor of 1 x 10-4 kg/MMBtu with GWP of 298 per 40 CFR 98, Subparts A/C, Tables A-1 an

For fuel oil - CO2 emission factor of 75.10 kg/MMBtu, CH4 emission factor of 3 x 10-3 kg/MMBtu with GWP of 25, N2O emission factor of 6 x 10-4 kg/MMBtu with GWP of 298 per 40 CFR 98, Subparts A/C, Tables A-1, C-1, C

** calculated based on fuel use (converted to MMBtu based on natural gas HHV of 1,019 Btu/scf and fuel oil HHV of 152,400 Btu/gal) and following emission factors:

For natural gas - CO2 emission factor of 53.06 kg/MMBtu, CH4 emission factor of 1 x 10-3 kg/MMBtu with GWP of 25, N2O emission factor of 1 x 10-4 kg/MMBtu with GWP of 298 per 40 CFR 98, Subparts A/C, Tables A-1 an

For fuel oil - CO2 emission factor of 75.10 kg/MMBtu, CH4 emission factor of 3 x 10-3 kg/MMBtu with GWP of 25, N2O emission factor of 6 x 10-4 kg/MMBtu with GWP of 298 per 40 CFR 98, Subparts A/C, Tables A-1, C-1, C

Table 5.1B-18
CECP Amendment
Net Emission Changes and Required ERCs
Based on Maximum 2-year Average during Past 5 Years

	Emissions (tons/year)						
	NOx Emissions	CO Emissions	VOC Emissions	PM10 Emissions	SOx Emissions	GHG CO2e, metric tonnes	GHG CO2e, short tons
Emissions New Equipment =	84.7	77.6	23.7	28.4	5.6	846,574	933,178
Emission Reductions Units 1-5 and Peaker GT =	58.3	179.1	31.1	43.0	3.4	612,659	675,334
Net Emission Change =	26.4	-101.5	-7.4	-14.6	2.2	233,915	257,844
Major Modification Thresholds[1] =	25	100	25	15	40	N/A	75,000
Major Modification?	yes	no	no	no	no	N/A	yes
ERC Requirement Triggered?	yes	N/A	no	N/A	N/A	N/A	N/A
Offset Ratio[2] =	1.2	N/A	1.2	N/A	N/A	N/A	N/A
ERCs Required =	31.7	N/A	0.0	N/A	N/A	N/A	N/A
ERCs Purchased[3]=	49.6	0	0	0	0	N/A	N/A
Surplus/Shortfall =	-17.9	N/A	0	N/A	N/A	N/A	N/A

Notes:
1. Based on SDAPCD Rule 20.1.c.33.
2. Based on SDAPCD Rule 20.3.d.8.i.B.
3. Based on ERCs listed in 8/4/2009 FDOC for CECP, page 43 of 63.

Table 5.1B-19
CECP Amendment
Greenhouse Gas Emissions Calculations New Equipment

Unit	Total Number of Units	Per Unit Heat Input (MMBtu/hr)	Per Unit Gross Output (MW)	Operating Hours per year	Annual Fuel Use (MMBtu/yr)	Estimated Annual Gross MWh	Maximum Emissions, metric tonnes/yr				Facility-Wide Emissions, MT/yr CO2e	Facility-Wide Emissions, tons/yr CO2e	Facility-Wide CO2 MT/MWh
							CO2	CH4	N2O	SF6			
Gas Turbines	6	984	108.8	2,700	15,934,320	1,763,159	845,475	16	2	--			
Emergency Firepump Engine	1	2.0		200	403	n/a	30	0	0	--			
Emergency Generator Engine	1	4.9		200	976	n/a	72	0	0	--			
Circuit breakers	8	--		8760	0	n/a	--	--	--	5.4E-03			
Total =				--	15,935,699	1,763,159	845,577	16	2	5.4E-03			
CO2-Equivalent =							845,577	398	475	123	846,574	933,178	0.48

Fuel	Emission Factors, kg/MMBtu			Emission
	CO2 (1)	CH4 (2)	N2O (2)	SF6 (4)
Natural Gas	*53.060*	*1.00E-03*	1.00E-04	n/a
Diesel Fuel	*73.960*	3.00E-03	6.00E-04	n/a
Global Warming Potential (3)	1	25	298	22,800

Notes:
1. 40 CFR 98, Table C-1 (revised 11/29/13).
2. 40 CFR 98, Table C-2 (revised 11/29/13).
3. 40 CFR 98, Table A-1 (revised 11/29/13).

4. Sulfur hexafluoride (SF6) will be used as an insulating medium in eight circuit breakers. The SF6 contained in six of the circuit breakers is approximately 230 lbs/breaker and the remaining two breakers will contain approximately 500 lbs/breaker. The IEC standard for SF6 leakage is less than 0.5%; the NEMA leakage standard for new circuit breakers is 0.1%. A maximum leakage rate of 0.5% per year is assumed.

Table 5.1B-20
CECP Amendment
Nitrogen Emission Rates - New Equipment

Gas Turbines		
NOx emission rate =	14.07	tpy per turbine
N/NO2 molecular weight ratio (14/46) =	0.3043478	
N emission rate from NOx =	4.28	tpy per turbine
	0.12	g/s per turbine
NH3 emission rate =	7.41	tpy per turbine
N/NH3 molecular weight ratio (14/17) =	0.8235294	
N emission rate from NH3 =	6.10	tpy per turbine
	0.18	g/s per turbine
Total N emission rate for each CTG (N from NOx plus N from ammonia) =	10.38	tpy per turbine
Total N emission rate for each CTG (N from NOx plus N from ammonia) =	0.30	g/s per turbine
Emergency Engines		
NOx emission rate =	0.33	tpy both units
N/NO2 molecular weight ratio (14/46) =	0.3043478	
N emission rate from NOx =	0.10	tpy both units
Total N emission rate for six CTGs and engines (N from NOx plus N from ammonia) =	62.38	tpy

Table 5.1B-21
CECP Amendment
Nitrogen Emission Rates - Existing Units 1-5 and Peaker GT

NOx emission rate for Units 1-5/Peaker GT, 5-year avg. (tpy)=	43.22	tpy
NOx emission rate for Units 1-5/Peaker GT, 10-year avg. (tpy)=	86.54	tpy
NOx emission rate for Units 1-5/Peaker GT, 12-year avg. (tpy) =	109.31	tpy
N/NO2 molecular weight ratio (14/46) =		0.3043478
N emission rate from NOx, 5-year avg. (tpy) =	13.15	tpy
N emission rate from NOx, 10-year avg. (tpy) =	26.34	tpy
N emission rate from NOx, 12-year avg. (tpy) =	33.27	tpy
NH3 emission rate for Units 1-5/Peaker GT, 5-year avg. (tpy) =	19.03	tpy
NH3 emission rate for Units 1-5/Peaker GT, 10-year avg. (tpy) =	29.03	tpy
NH3 emission rate for Units 1-5/Peaker GT, 12-year avg. (tpy) =	38.44	tpy
N/NH3 molecular weight ratio (14/17) =		0.8235294
N emission rate from NH3, 5-year avg. (tpy) =	15.67	tpy
N emission rate from NH3, 10-year avg. (tpy) =	23.91	tpy
N emission rate from NH3, 12-year avg (tpy) =	31.66	
Total N emission rate for Units 1-5/GT (N from NOx plus N from ammonia), 5-yr avg. =	28.82	tpy
Total N emission rate for Units 1-5/GT (N from NOx plus N from ammonia), 10-yr avg. =	50.24	tpy
Total N emission rate for Units 1-5/GT (N from NOx plus N from ammonia), 12-yr avg. =	64.93	tpy

Appendix 5.1C
BACT Analysis

APPENDIX 5.1C

Evaluation of Best Available Control Technology

The gas turbines proposed for the Amended CECP are required to use best available control technology (BACT) in accordance with the requirements of San Diego Air Pollution Control District (SDAPCD, or District) rules and the federal Prevention of Significant Deterioration (PSD) regulations. BACT is defined in SDAPCD Rule 20-1:

> *(11) "**Best Available Control Technology (BACT)**" means and is applied as follows:*
>
> *(i) The lowest emitting of any of the following:*
>
> *(A) the most stringent emission limitation, or the most effective emission control device or control technique, which has been proven in field application and which is cost-effective for such class or category of emission unit, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation, device or control technique is not technologically feasible, or*
>
> *(B) any emission control device, emission limitation or control technique which has been demonstrated but not necessarily proven in field application and which is cost-effective for such class or category of emission unit, as determined by the Air Pollution Control Officer, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation, device or control technique is not technologically feasible, or*
>
> *(C) any control equipment, process modifications, changes in raw material including alternate fuels, and substitution of equipment or processes with any equipment or processes, or any combination of these, determined by the Air Pollution Control Officer on a case-by-case basis to be technologically feasible and cost-effective, including transfers of technology from another category of source, or*
>
> *(D) the most stringent emission limitation, or the most effective emission control device or control technique, contained in any State Implementation Plan (SIP) approved by the federal EPA for such emission unit category, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such limitation or technique has not been proven in field application, that it is not technologically feasible or that it is not cost-effective for such class or category of emission unit.*

LAER must be applied to any federal nonattainment pollutants (or their precursors) at new major sources or major modifications exceeding any emission threshold shown in Table 5.1-11. LAER is more stringent than BACT because it does not contain restrictions for cost-effectiveness. Only NOx and VOCs are federal nonattainment precursors in SDAPCD and, therefore, potentially subject to LAER. The SDAPCD defines LAER as:

> *(32) "**Lowest Achievable Emission Rate (LAER)**" means and is applied as follows:*
>
> *(i) The lowest emitting of any of the following:*
>
> *(A) the most stringent emission limitation, or most effective emission control device or control technique, contained in any SIP approved by the federal EPA for such emission unit class or category, unless the applicant demonstrates to the satisfaction of the Air Pollution Control Officer that such emission limitation, device or technique is not achievable, or*
>
> *(B) the most stringent emission limitation which is achieved in practice by such class or category of emission unit, or*
>
> *(C) Best Available Control Technology (BACT).*

As discussed in Section 5.1.3, the CECP gas turbines will trigger PSD BACT requirements for greenhouse gases (GHG). In addition, as discussed in Section 5.1.4, the District NSR rules require BACT for NOx; sulfur oxides (SO_x); CO; volatile organic compounds (VOC); particulate (PM_{10} and $PM_{2.5}$); and ammonia. The BACT/LAER analyses required under both New Source Review (NSR) and PSD programs are similar, and are presented here. The emission rates and control technologies determined to be BACT for this project are discussed in detail in the following sections. For the CTGs, separate determinations are provided for normal operation and startup/shutdown operation.

5.1 Steps in a Top-Down BACT Analysis

5.1.1 Step 1 – Identify All Possible Control Technologies

The first step in a top-down analysis is to identify, for the emissions unit and pollutant in question, all available control options. Available control options are those air pollution control technologies or techniques, including alternate basic equipment or processes, with a practical potential for application to the emissions unit in question. The control alternatives should include not only existing controls for the source category in question, but also, through technology transfer, controls applied to similar source categories and gas streams.

BACT must be at least as stringent as what has been achieved in practice (AIP) for a category or class of source. Additionally, EPA guidelines require that a technology that is determined to be AIP for one category of source be considered for transfer to other source categories. There are two types of potentially transferable control technologies: (1) exhaust stream controls, and (2) process controls and modifications. For the first type, technology transfer must be considered between source categories that produce similar exhaust streams. For the second type, technology transfer must be considered between source categories with similar processes.

Candidate control options that do not meet basic project requirements (i.e., alternative basic designs that “redefine the source”) are eliminated at this step.

5.1.2 Step 2 – Eliminate Technologically Infeasible Options

To be considered, the candidate control option must be technologically feasible for the application being reviewed.

5.1.3 Step 3 – Rank Remaining Control Options by Control Effectiveness

All feasible options are ranked in the order of decreasing control effectiveness for the pollutant under consideration. In some cases, a given control technology may be listed more than once, representing different levels of control (e.g., the use of SCR for control of NOx may be evaluated at 2 and 2.5 parts per million by volume, dry [ppmvd]). Any control option less stringent than what has been already achieved in practice for the category of source under review must also be eliminated at this step.

5.1.4 Step 4 – Evaluate Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

To be required as BACT, the candidate control option must be cost effective, considering energy, environmental, economic, and other costs. The most stringent control technology for control of one pollutant may have other undesirable environmental or economic impacts. The purpose of Step 4 is to either validate the suitability of the top control option or provide a clear justification as to why that option should not be selected as BACT.

Once all of the candidate control technologies have been ranked, and other impacts have been evaluated, the most stringent candidate control technology is deemed to be BACT, unless the other impacts are unacceptable.

5.1.5 Step 5 – Determine BACT/Present Conclusions

BACT is determined to be the most effective control technology subject to evaluation, and not rejected as infeasible or having unacceptable energy, environmental, or cost impacts.

5.2 BACT for the Simple-Cycle CTGs: Normal Operations

5.3 NOx Emissions

5.3.1 Step 1 – Identify All Possible Control Technologies

The emissions unit for which BACT is being considered is a nominal 109 MW simple-cycle gas turbine.

Potential control technologies were identified by searching the following sources for determinations pertaining to combustion gas turbines:

- SDAPCD BACT Guidance;
- SCAQMD BACT Guidelines;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT Clearinghouse;
- Bay Area Air Quality Management District (BAAQMD) BACT Guidelines;
- EPA Reasonably Available Control Technology (RACT)/BACT/ Lowest Achievable Emission Rate (LAER) Clearinghouse;
- Other district and state BACT Guidelines; and
- BACT/LAER requirements in New Source Review permits issued by a local air district[1] or other air pollution control agency.

Outlined below are the technologies for control of NOx that were identified.

- A Selective Catalytic Reduction (SCR) system capable of continuously complying with a limit of 2.5 ppmvd at15% oxygen (O_2) (1-hour average).
- An EMx (formerly SCONOx) system capable of continuously complying with a limit of 2.5 ppmvd at15% O_2 (1-hour average).
- Alternative Basic Equipment:
  - Renewable Energy Source (e.g., solar, wind, etc.)
  - Combined-Cycle Turbine

It should be noted that the use of renewable energy in lieu of a simple-cycle gas turbine would “redefine the source.” Renewable energy facilities require significantly more land to construct, and need to be located in areas with very specific characteristics. Wind and solar facilities have power generation profiles that cannot match demand; conventional power plants are needed in order to follow demand. The capital costs for wind or solar facilities are substantially higher than for a comparable conventional facility, making financing of such a project significantly different. Because these technologies would redefine the source, they are eliminated in this step of the analysis. Even if they were not eliminated in Step 1, solar and wind facilities require much more land than is available at the project site, and renewable energy alternatives would be eliminated in Step 2 as technologically infeasible.

The remaining technologies—combined cycle turbines, SCR and EMx—are further considered in Step 2 below.

---

[1] Any Air Quality Management District or Air Pollution Control District in California.

5.3.2 Step 2 – Eliminate Technologically Infeasible Options

5.3.2.1 Alternate Equipment

The use of a combined-cycle turbine instead of the proposed simple-cycle turbines would be technically infeasible for the project. The simple-cycle turbines are needed to effectively handle variable loads and perform multiple startups/shutdowns per day. While advanced combined-cycle turbines can start relatively quickly (within approximately 12 minutes to reach 100% rated capacity of the gas turbine generator), they may need as much as 2 hours to reach full combined cycle output (combined output of gas turbine and steam turbine generators). [2] While operating in simple cycle mode (while waiting for the steam system to warm up), fast-start combined cycle units will have efficiencies that are no better than, and are likely worse than, those achieved with advanced simple cycle turbines such as the LMS100. Further, such units cannot perform up to four starts per day – as required for this project – without substantially shortening the life of the unit. Therefore, combined-cycle turbines are eliminated because they do not meet the basic project requirements.

5.3.2.2 Exhaust Stream Controls

The most recent NOx BACT listings for aeroderivative simple-cycle combustion turbines in this size range are summarized in Table 5.1C-1. The most stringent NOx limit in these recent BACT determinations is a 2.5 ppm[3] limit averaged over a 1-hour averaging period, excluding startups and shutdowns. This level is achieved using water injection and SCR.

EMx is a NOx reduction system distributed by EmeraChem. This system uses a single catalyst to oxidize both NO and CO, a second catalyst system to absorb NO_2, and then a regeneration system to convert the NO_2 to N_2 and water vapor. The EMx system does not use ammonia as a reagent. The EMx process has been demonstrated in practice on smaller gas turbines, including Redding Electric Utility's (REU) Units 5 and 6 which are comprised of a 43-MW Alstom GTX100 and a 45 MW Siemens SGT 800 combined-cycle gas turbine, respectively. While the technology has never been demonstrated on a gas turbine the size of the GE LMS 100 or on a simple-cycle gas turbine, the technology is considered by the manufacturer to be scalable.

The SCR system uses ammonia injection to reduce NOx emissions. SCR systems have been widely used in simple-cycle gas turbine applications of all sizes. The SCR process involves the injection of ammonia into the flue gas stream via an ammonia injection grid upstream of a reducing catalyst. The ammonia reacts with the NOx in the exhaust stream to form N_2 and water vapor. The catalyst does not require regeneration, but must be replaced periodically; typical SCR catalyst lifetimes are in excess of three years.

Either SCR or EMx technology is capable of achieving a NOx emission level of 2.5 ppmvd at 15% O_2. Neither has been demonstrated to consistently achieve lower emission levels in simple-cycle turbines in demand-response service. Both technologies are evaluated further in Step 3.

5.3.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Both SCR and EMx technologies, each in combination with combustion controls, are capable of achieving a NOx emission level of 2.5 ppmvd at 15% O_2. They are therefore ranked together in terms of control effectiveness, and the evaluation of these technologies continues in Step 4.

[2] El Segundo Energy Center LLC, 00-AFC-014C: Petition to Amend, 4/23/13, Section 2.2.7

[3] All turbine/HRSG exhaust emissions concentrations shown are by volume, dry corrected to 15% O_2.

TABLE 5.1C-1
Recent NOx BACT Determinations for Simple-Cycle Combustion Turbines[a]

Facility	District	NOx Limit[b]	Averaging Period	Control Method Used	Date Permit Issued	Source
El Colton	SCAQMD	3.5 ppmvd	3 hrs	Water injection and SCR	1/10/03	SCAQMD website
MID Ripon	SJVAPCD	2.5 ppmvd	3 hrs	Water injection and SCR	2004	ATC
San Francisco Electric Reliability Project	BAAQMD	2.5 ppmvd	1 hr	Water injection and SCR	2/8/06 (FDOC)	CEC Siting Div website
EIF Panoche	SJVAPCD	2.5 ppmvd	1 hr	Water injection and SCR	7/13/07 (FDOC)	CEC Siting Div website
Starwood Midway Firebaugh/Panoche	SJVAPCD	2.5 ppmvd	1 hr	Water injection and SCR	9/5/07 (FDOC)	CEC Siting Div website
Walnut Creek Energy	SCAQMD	2.5 ppmvd	1 hr	Water injection and SCR	2/27/08	FDOC
Miramar Energy Facility II	SDCAPCD	2.5 ppmvd	3 hrs	Water injection and SCR	11/4/08	ATC
Orange Grove Energy, LLP	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	12/4/08	CEC Siting Div website
El Cajon Energy, LLC	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	12/11/09	ATC
TID Almond 2 Power Plant	SJVAPCD	2.5 ppmvd	1 hr	Water injection and SCR	2/16/2010	FDOC
CPV Sentinel	SCAQMD	2.5 ppmvd	1 hr	Water injection and SCR	12/1/2010	FDOC
Pio Pico Energy Center	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	9/12/2012	FDOC

Notes:

[a] All projects listed here utilize GE LM6000-model units except Starwood Midway, which utilizes P&W FT8-3 SwiftPacs; and EIF Panoche, CPV Sentinel, Walnut Creek Energy, and Pio Pico Energy Center, which use GE LMS 100 CTGs.

[b] All concentrations expressed as parts per million by volume dry, corrected to 15% O_2.

5.3.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The use of SCR will result in ammonia emissions due to an allowable ammonia slip limit of 5 ppmvd at 15% O_2. A health risk screening analysis of the proposed project using air dispersion modeling will be prepared to demonstrate that both the acute health hazard index and the chronic health hazard index are much less than 1, based on an ammonia slip limit of 5 ppmv at 15% O_2. In accordance with the District's Toxics program and currently accepted practice, a hazard index below 1.0 is not considered significant. Therefore, the toxic impact of the ammonia slip resulting from the use of SCR is deemed to be not significant, and is not a sufficient reason to eliminate SCR as a control alternative.

A second potential environmental impact that may result from the use of SCR involves the storage and transport of aqueous or anhydrous ammonia.[4] Although ammonia is toxic if swallowed or inhaled and can irritate or burn the skin, eyes, nose, or throat, it is a commonly used material that is typically handled safely and without incident. The project operator will be required to develop and maintain a Risk Management Plan (RMP) and to implement a Risk Management Program to prevent accidental releases of ammonia. The RMP provides information on the hazards of the substance handled at the facility and the programs in place to prevent and respond to accidental releases. The accident prevention and emergency response requirements reflect existing safety regulations and proven industry safety codes and standards. Thus, the potential environmental impact due to aqueous ammonia use at the Project is minimal and does not justify the elimination of SCR as a control alternative.

Regeneration of the EMx catalyst is accomplished by passing hydrogen gas over an isolated catalyst module. The hydrogen gas is generated by reforming steam, so steam would be required. This would require installation of an auxiliary boiler, which is not currently proposed for this project. There would also be additional natural gas consumption, and increased emissions, per megawatt hour of electricity produced.

5.3.4.1 "Achieved in Practice" Criteria

In general, the method for determining when emission control technologies are achieved in practice (AIP) is similar in each District. SCAQMD has established formal criteria for determining when emission control technologies should be considered AIP for the purposes of BACT determinations. The criteria include the elements outlined below.

- Commercial Availability: At least one vendor must offer this equipment for regular or full-scale operation in the United States. A performance warranty or guarantee must be available with the purchase of the control technology, as well as parts and service.
- Reliability: All control technologies must have been installed and operated reliably for at least six months. If the operator did not require the basic equipment to operate daily, then the equipment must have at least 183 cumulative days of operation. During this period, the basic equipment must have operated: (1) at a minimum of 50% design capacity; or (2) in a manner that is typical of the equipment in order to provide an expectation of continued reliability of the control technology.
- Effectiveness: The control technology must be verified to perform effectively over the range of operation expected for that type of equipment. If the control technology will be allowed to operate at lesser effectiveness during certain modes of operation, then those modes of operation must be identified. The verification shall be based on a performance test or tests, when possible, or other performance data.

Each of these criteria is discussed separately below for SCR and for EMx.

[4] The project proposes to use the less concentrated, safer aqueous form of ammonia.

SCR Technology – SCR has been achieved in practice at numerous combustion turbine installations throughout the world. There are numerous aeroderivative simple-cycle gas turbine projects that limit NOx emissions to 2.5 ppmc using SCR technology, as shown in Table 5.1C-1. An evaluation of the proposed AIP criteria as applied to the achievement of 2.5 ppmc, and to extremely low NOx levels (below 2.5 ppmc) using SCR technology, is summarized below.

- Commercial Availability: Turbine-out NOx from aeroderivative gas turbines is generally guaranteed at 25 ppmc. Achieving a controlled NOx limit below 2.5 ppmc would require SCR technology to achieve reductions greater than 90 percent. Furthermore, because of the relatively high temperature of exhaust from simple-cycle turbines compared with combined-cycle units, there is a more limited selection of SCR technology available. Consequently, it is not clear that this criterion is satisfied for limits below 2.5 ppmc for aeroderivative gas turbines. As shown in Table 5.1C-1 above, this criterion is satisfied for aeroderivative gas turbines at a 2.5 ppmc permit level.
- Reliability: SCR technology has been shown to be capable of achieving NOx levels consistent with a 2.5 ppmc permit limit during extended, routine operations at several commercial power plants. There are no reported adverse effects of operation of the SCR system at these levels on overall plant operation or reliability. There has been no demonstration of operation at levels below 2.5 ppmc during extended, routine operation of simple-cycle aeroderivative gas turbines; consequently, this criterion is not satisfied for NOx limits below 2.5 ppmc.
- Effectiveness: SCR technology has been demonstrated to achieve NOx levels of 2.5 ppmc with aeroderivative turbines, but not at lower limits for this generating technology. Short-term excursions have resulted in NOx concentrations above the permitted level of 2.5 ppmc; however, these excursions are not frequent, and have not been associated with diminished effectiveness of the SCR system. Rather, these excursions typically have been associated with SCR inlet NOx levels in excess of those for which the SCR system was designed, or with malfunctions of the ammonia injection system. Consequently, this criterion is satisfied at a NOx limit of 2.5 ppmc, but not at lower NOx limits.
- Conclusion: SCR technology capable of achieving NOx levels of 2.5 ppmc is considered to be achieved in practice. The permit limits for the proposed project CTGs include a NOx limit of 2.5 ppmc. This proposed limit is consistent with the available data. The AIP criteria are not met for SCR on simple-cycle aeroderivative gas turbines at NOx limits lower than 2.5 ppmc.

EMx Technology – EMx has been demonstrated in service in five applications: the Sunlaw Federal cogeneration plant, the Wyeth BioPharma cogeneration facility, the Montefiore Medical Center cogeneration facility, the University of California San Diego facility, and the City of Redding Power Plant. The combustion turbines at these facilities are much smaller than for the proposed project turbine, and none of the existing installations are simple-cycle turbines. The largest installation of the EMx system is at the Redding Power Plant. The Redding Power Plant includes two combined-cycle combustion turbines—a 43 MW Alstom GTX100 with a permitted NOx emission rate of 2.5 ppmc (Unit 5), and a 45 MW Siemens SGT 800 with a permitted NOx emission rate of 2.0 ppmc (Unit 6).

A review of NOx continuous emissions monitoring (CEM) data obtained from the EPA's Acid Rain program website[5] indicates a <u>mean</u> NOx level for the Redding Unit 5 of less than 1.0 ppm during the period from 2002 to 2007, but not continuous compliance with a 2.5 ppmc limit. After the first year of operation, Unit 5 experienced only a few hours of non-compliance per year (fewer than 0.1% of the annual operating hours exceed that plant's NOx permit limit of 2.5 ppmc). The experience at the City of Redding Plant indicates the ability of the EMx system to control NOx emissions to levels of 2.5 ppmc. These data do not indicate the ability to consistently achieve NOx levels below 2.0 ppm, notwithstanding the lower annual average emission rate. This is due to the cyclical nature of EMx NOx levels between plant shutdowns and scheduled

[5] Available at *http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=prepackaged.results*.

catalyst cleanings. Redding Unit 6 started up on October 2011 and has had an average of 1,476 hours per year of operation since startup.

Based on this information, the following paragraphs evaluate the proposed AIP criteria as applied to the achievement of low NOx levels (2.5 ppmc) using EMx technology.

- Commercial Availability: While a proposal has not been sought, presumably EmeraChem would offer standard commercial guarantees for the proposed project. Consequently, this criterion is expected to be satisfied. However, no EMx units are currently in operation on simple-cycle units.
- Reliability: Redding Unit 5 was originally permitted with a 2.0 ppmc permit limit. It was subsequently found that the unit could not maintain compliance with a 2.0 ppmc limit on a consistent basis, and the limit was eventually changed to 2.5 ppmc. As discussed above, based on a review of the CEM data for Redding Unit 5, the EMx system complied with the 2.5 ppmc NOx permit limit but with a few hours each year of excess emissions (approximately 3% of annual operating hours following the first year, and approximately 2% following the second year, dropping to approximately 0.1% after 4 years). This level of performance was also associated with some significant operating and reliability issues. According to a June 23, 2005 letter from the Shasta County Air Quality Management District,[6] repairs to the EMx system began shortly after initial startup and have continued during several years of operation. Redesign of the EMx system was required due to a problem with the reformer reactor combustion production unit that led to sulfur poisoning of the catalyst, despite the sole use of low-sulfur, pipeline quality natural gas as the turbine fuel. In addition, the EMx system catalyst washings had to occur at a frequency several times higher than anticipated during the first three years of operation, which resulted in substantial downtime of the combustion turbine. Redding Unit 6 began operation in October 2011 and had very limited operation in 2012. Since the REU installation is the most representative of all of the EMx-equipped combustion turbine facilities for comparison to the proposed Project, the problems encountered at REU bring into question the reliability of the EMx system for the proposed project. In addition, the EMx unit has not been demonstrated in use in a simple cycle application.
- Effectiveness: The EMx system at REU Unit 5 has recently been able to demonstrate compliance with a NOx level of 2.0 ppmc, and the new REU Unit 6 has been permitted with a 2.0 ppmc NOx limit. As discussed above, there have been no known excursions beyond the permit limit for Unit 6 in the recent limited operation; however, there are no EMx-equipped facilities on simple-cycle facilities in demand-response service. In addition, this is a combined-cycle unit. Consequently, due to the lack of actual performance data in a comparable installation, there is some question regarding the effectiveness of the EMx systems on simple-cycle, demand-response combustion turbine projects.
- Conclusion: EMx systems are capable of achieving NOx levels of 2.5 ppmc and less. However, the operating history at the Redding Power Plant does not support a conclusion that this technology is achieved in practice for simple-cycle, demand-response turbines, based on the above guidelines.

5.3.4.2 Summary of Achieved in Practice Evaluation

SCR's capability to consistently achieve 2.5 ppmc NOx (1-hour average) in large turbines has been demonstrated by numerous installations. EMx's ability to consistently achieve 2.5 ppmc in large turbines has not been demonstrated, nor has the technology been demonstrated in simple-cycle, demand-response service. An emission level of 2.5 ppmc NOx has therefore been achieved in practice, and any BACT determination must be at least as stringent as that.

5.3.4.3 Technologically Feasible/Cost Effective Criterion

No candidate technology with lower emission levels than those achieved in practice has been identified.

[6] Letter dated June 23, 2005, from Shasta County Air Quality Management District to the Redding Electric Utility regarding Unit 5 demonstration of compliance with its NOx permit limit.

5.3.5 Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the NOx BACT determinations of 2.5 ppmc on a 1-hour average basis made for recently permitted simple-cycle turbine projects in SCAQMD and SDAPCD reflect the most stringent NOx emission limit that has been achieved in practice. No more stringent level has been suggested as being technologically feasible. Therefore, BACT/LAER for NOx for this application is any technology capable of achieving 2.5 ppmc on a 1-hour average basis.

Both SCR and EMx are expected to achieve the proposed BACT NOx emission limit of 2.5 ppmc averaged over one hour. However, concerns remain regarding the long-term effectiveness of EMx as a control technology because the technology has not been demonstrated on the type of turbine used in this project—a simple-cycle demand-response application. For this reason, SCR has been selected as the NOx control technology to be used for the Project.

The project facility will be designed to meet a NOx level of 2.5 ppmc on a 1-hour average basis using SCR.

5.4 CO Emissions

While BACT for CO is not required by the District NSR regulations and/or federal PSD requirements, the following discussion was included for informational purposes to show that the CECP gas turbines will also meet BACT for CO.

5.4.1 Step 1 – Identify All Possible Control Technologies

CO emitted from natural gas-fired turbines is the result of incomplete combustion of fuel. Use of an oxidation catalyst is generally considered BACT for CO; however, combined-cycle turbines are also a possible control technology and are discussed further in step 2, along with oxidation catalysts. Other alternative basic equipment—including renewable energy sources, such as solar and wind—was already discussed above (Step 1 for NOx BACT on the CTGs). For the same reasons, solar, wind and other renewable energy sources are rejected as CO BACT for this application.

5.4.2 Step 2 – Eliminate Technologically Infeasible Options

5.4.2.1 Alternate Equipment

The use of a combined-cycle turbine instead of the proposed simple-cycle turbines would be technically infeasible for the project. The simple-cycle turbines are needed to effectively handle variable loads and perform multiple startups/shutdowns per day. While advanced combined-cycle turbines can start relatively quickly (within approximately 12 minutes to reach 100% rated capacity of the gas turbine generator), they may need as much as 2 hours to reach full combined cycle output (combined output of gas turbine and steam turbine generators).[7] While operating in simple cycle mode (while waiting for the steam system to warm up), fast-start combined cycle units will have efficiencies that are no better than, and are likely worse than, those achieved with advanced simple cycle turbines such as the LMS100. Further, such units cannot perform up to four starts per day – as required for this project – without substantially shortening the life of the unit. Therefore, combined-cycle turbines are eliminated because they do not meet the basic project requirements.

5.4.2.2 Exhaust Stream Controls

The only technology remaining under consideration is use of an oxidation catalyst in combination with combustion controls. This combination of technologies has been demonstrated to be feasible in many applications. No other technologies have been identified that are capable of achieving the same level of

[7] El Segundo Energy Center LLC, 00-AFC-014C: Petition to Amend, 4/23/13, Section 2.2.7

control. As a result, the goal of the rest of this analysis is to determine the appropriate emission limit that constitutes BACT for this application.

The California Air Resources Board's (CARB's) BACT guidance document for electric generating units rated at greater than 50 MW[8] indicates that BACT for the control of CO emissions for simple-cycle power plants is 6 ppmvd at 15% O_2.

The BAAQMD's BACT guidelines specify that, for natural gas-fired simple-cycle combustion gas turbines larger than 40 MW, a CO limit of 6 ppmvd at 15% O_2 has been "achieved in practice."

The SJVAPCD's BACT guidelines contain a determination for gas turbines rated at larger than 47 MW with variable load and without heat recovery. The SJVAPCD concluded that a CO exhaust concentration of 0.024 lb/MMBtu (11 ppmvd at 15% O_2) constituted BACT that is considered technologically feasible.

A summary of recent CO BACT determinations is shown in Table 5.1C-2. Published prohibitory rules from the BAAQMD, Sacramento Metropolitan Air Quality Management District (SMAQMD), San Diego County Air Pollution Control District (SDCAPCD), SJVAPCD, and SCAQMD were reviewed to identify the CO standards that govern existing natural gas-fired simple-cycle combustion gas turbines. The SJVAPCD prohibitory rule is the only one that includes an emission limit for CO (200 ppmv at 15% O_2). The applicable NSPS (40 CFR 60 Subpart KKKK) does not include a CO limit.

TABLE 5.1C-2
Recent CO BACT Determinations for Simple-Cycle Combustion Turbines[a]

Facility	District	CO Limit[b]	Averaging Period	Control Method Used	Date Permit Issued	Source
San Francisco Electric Reliability Project	BAAQMD	4.0 ppmc	3 hr	Oxidation Catalyst	2/8/06 (FDOC)	CEC Siting Div website
EIF Panoche	SJVAPCD	6.0 ppmc	3 hr	Oxidation Catalyst	7/13/07 (FDOC)	CEC Siting Div website
Starwood Midway Firebaugh/Panoche	SJVAPCD	6.0 ppmc	3 hr	Oxidation Catalyst	9/5/07 (FDOC)	CEC Siting Div website
Walnut Creek Energy	SCAQMD	4.0 ppmc	1 hr	Oxidation Catalyst	2/27/08	FDOC
Orange Grove Energy, LLP	SDAPCD	6.0 ppmc	3 hr	Oxidation Catalyst	12/4/08	CEC Siting Div website
El Cajon Energy, LLC	SDAPCD	6.0 ppmc	3 hr	Oxidation Catalyst	12/11/09	ATC
TID Almond 2 Power Plant	SJVAPCD	4.0 ppmc	3 hr	Oxidation Catalyst	2/16/2010	FDOC
CPV Sentinel	SCAQMD	4.0 ppmc	1 hr	Oxidation Catalyst	12/1/2010	FDOC
Pio Pico Energy Center	SDAPCD	4.0 ppmc	1 hr	Oxidation Catalyst	9/12/2012	FDOC

Notes:

[a] All projects listed here utilize GE LM6000-model units except Starwood Midway, which utilizes P&W FT8-3 SwiftPacs; and EIF Panoche, Walnut Creek Energy, CPV Sentinel, and Pio Pico, all of which use GE LMS 100 CTGs.

[b] All concentrations expressed as parts per million by volume dry, corrected to 15% O_2 (ppmc).

[8] CARB, "Guidance for Power Plant Siting and Best Available Control Technology," September 1999.

5.4.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The control technologies under consideration are ranked as follows:

- Oxidation catalyst unit capable of achieving 4 ppmc
- Oxidation catalyst unit capable of achieving 6 ppmc

5.4.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

This step evaluates any source-specific environmental, energy, or economic impacts that demonstrate that the top alternative listed in the previous step is inappropriate as BACT.

The Applicant has proposed to meet a 4 ppmc limit on a 1-hour average basis. Because the Applicant has proposed to use the highest ranked technology under consideration, the analysis ends at this step.

5.4.5 Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent achieved in practice, required in a federal NSPS or district prohibitory rule, or considered technologically feasible. Based upon the results of this analysis, the CO emission limit of 4.0 ppmc is considered to be BACT for the proposed project.

5.5 VOC Emissions

5.5.1 Step 1 – Identify All Possible Control Technologies

Most VOCs emitted from natural gas-fired turbines are the result of incomplete combustion of fuel. Therefore, most of the VOCs are methane and ethane, which are not effectively controlled by an oxidation catalyst. However, oxidation catalyst technology designed to control CO can also provide some degree of control of VOC emissions, especially the more complex and toxic compounds formed in the combustion process. Therefore, the use of good combustion practices is generally considered BACT for VOC, with some additional benefit provided by an oxidation catalyst.

Alternative basic equipment—including renewable energy sources, such as solar and wind—was already discussed above (Step 1 for NOx BACT on the CTGs). For the same reasons, solar, wind and other renewable energy sources are rejected as VOC BACT for this application.

5.5.2 Step 2 – Eliminate Technologically Infeasible Options

The only technology under consideration is combustion controls, with some additional benefit provided by an oxidation catalyst. This combination of technologies has been demonstrated to be feasible in many applications. No other technologies have been identified that are capable of achieving the same level of control. As a result, the goal of the rest of this analysis is to determine the appropriate emission limit that constitutes BACT for this application.

As shown in Table 5.1C-3, CARB's BACT guidance document for electric generating units rated at greater than 50 MW indicates that BACT for the control of VOC emissions for simple-cycle power plants is 2 ppmvd at 15% O_2.

The BAAQMD's BACT guidelines do not include a BACT determination for simple-cycle turbines greater than 40 MW.

TABLE 5.1C-3
CARB BACT Guidance For Power Plants

Pollutant	BACT
Nitrogen Oxides	2.5 ppmv at 15% O2 (1-hour average) 2.0 ppmv at 15% O2 (3-hour average)
Sulfur Dioxide	Fuel sulfur limit of 1.0 grains/100 scf
Carbon Monoxide	Nonattainment areas: 6 ppmv at 15% O2 (3-hour average) Attainment areas: District discretion
VOC	2 ppmv at 15% O2 (3-hour average)
NH_3	5 ppmv at 15% O2 (3-hour average)
PM_{10}	Fuel sulfur limit of 1.0 grains/100 scf

The SJVAPCD's BACT guidelines contain a determination for gas turbines rated at larger than 50 MW with variable load and without heat recovery. The SJVAPCD concluded that a VOC exhaust concentration of 0.007 lb/MMBtu (6 ppmvd at 15% O_2) constituted BACT that had been achieved in practice.

Published prohibitory rules from the BAAQMD, SMAQMD, SDCAPCD, SJVAPCD, and SCAQMD were reviewed to identify the VOC standards that govern existing natural gas-fired simple-cycle combustion gas turbines. None of the prohibitory rules for combustion gas turbines specify an emission limit for VOC. The applicable NSPS (40 CFR 60 Subpart KKKK) does not include a VOC limit.

This "top-down" VOC BACT analysis will consider the following VOC emission limitations:

- 2 ppmvd at 15% O_2

A summary of recent VOC BACT determinations is shown in Table 5.1C-4.

TABLE 5.1C-4
Recent VOC BACT Determinations for Simple-Cycle Combustion Turbines[a]

Facility	District	VOC Limit[b]	Averaging Period	Control Method Used	Date Permit Issued	Source
San Francisco Electric Reliability Project	BAAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	2/8/06 (FDOC)	CEC Siting Div website
EIF Panoche	SJVAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	7/13/07 (FDOC)	CEC Siting Div website
Starwood Midway Firebaugh/Panoche	SJVAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	9/5/07 (FDOC)	CEC Siting Div website
Walnut Creek Energy	SCAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	2/27/08	FDOC
Orange Grove Energy, LLP	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	12/4/08	CEC Siting Div website
El Cajon Energy, LLC	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	12/11/09	ATC
TID Almond 2 Power	SJVAPCD	2.0	1 hr	Oxidation	2/16/2010	FDOC

TABLE 5.1C-4
Recent VOC BACT Determinations for Simple-Cycle Combustion Turbines[a]

Facility	District	VOC Limit[b]	Averaging Period	Control Method Used	Date Permit Issued	Source
Plant		ppmc		Catalyst		
CPV Sentinel	SCAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	12/1/2010	FDOC
Pio Pico Energy Center	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	9/12/2012	FDOC

Notes:

[a] All projects listed here utilize GE LM6000-model units except Starwood Midway, which utilizes P&W FT8-3 SwiftPacs; and EIF Panoche, Walnut Creek Energy, CPV Sentinel, and Pio Pico, all of which use GE LMS 100 CTGs.

[b] All concentrations expressed as parts per million by volume dry, corrected to 15% O_2 (ppmc).

5.5.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The control technologies under consideration are ranked as follows:

- 2 ppmvd at 15% O_2

5.5.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

This step evaluates any source-specific environmental, energy, or economic impacts that demonstrate that the top alternative listed in the previous step is inappropriate as BACT.

The Applicant has proposed to meet a 2 ppmvd limit on a 1-hour average basis. This level meets BACT.

5.5.5 Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent achieved in practice, required in a federal NSPS or district prohibitory rule, or considered technologically feasible. Based upon the results of this analysis, the VOC emission limit of 2.0 ppmc is considered to be BACT for the proposed project.

5.6 Sulfur Oxide Emissions

5.6.1 Step 1 – Identify All Possible Control Technologies

Natural gas fired combustion turbines have inherently low SOx emissions due to the small amount of sulfur present in the fuel. With typical pipeline quality natural gas sulfur content well below 1 grain/100 scf, the SOx emissions for natural gas fired combustion turbines are orders of magnitude less than oil-fired turbines. Firing by natural gas, and the resulting control of SOx emissions, has been used by numerous combustion turbines throughout the world. Due to the prevalence of the use of natural gas to control SOx emissions from combustion turbines, only an abbreviated discussion of post-combustion controls will be addressed in this section.

Post-combustion SOx control systems include dry and wet scrubber systems. These types of systems are typically installed on high SOx emitting sources such as coal-fired power plants. Post-combustion control systems for combustion turbines also include ESx catalyst systems. These systems trap the sulfur in the exhaust stream on an ESx catalyst. During a regeneration process, the sulfur is removed from the ESx catalyst and is either reintroduced back into the exhaust stream or sent to a sulfur scrubbing system. If the sulfur removed from the ESx catalyst is reintroduced back into the exhaust stream, there is no SOx control associated with the system.

5.6.2 Step 2 – Eliminate Technically Infeasible Options

All of the control options discussed above are technically feasible.

5.6.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The typical SOx control level for a well-designed wet or dry scrubber installed on a coal fired boiler ranges from approximately 70% to 90%,[9] with some installations achieving even higher control levels. According to EmeraChem literature,[10] the ESx system is capable of removing approximately 95% of the SOx emissions from the exhaust stream of natural gas fired combustion turbines. With the sulfur scrubber option, during the regeneration cycle of the ESx system the sulfur captured on the ESx catalyst is sent to a sulfur scrubbing unit. A high-efficiency sulfur scrubbing unit would achieve a control level similar to that of the wet/dry scrubbers discussed above.

5.6.4 Step 4 – Evaluate Most Effective Controls and Document Results

The use of low sulfur content pipeline natural gas has been achieved in practice at numerous combustion turbine installations throughout the world, and the use of this fuel minimizes SOx emissions. While it would be theoretically feasible to install some type of post-combustion control such as a dry/wet scrubber system or an ESx catalyst with a sulfur scrubber on a natural gas fired turbine, due to the inherently low SOx emissions associated with the use of natural gas, these systems are not cost effective and regulatory agencies do not require them. Consequently, no further discussion of post-combustion SOx control is necessary.

5.6.5 Step 5 – Determine BACT/Present Conclusions

BACT for this project is the use of pipeline-quality natural gas. The SOx control method for the proposed Amended CECP project is the use of pipeline-quality natural gas. Consequently, the proposed project is consistent with BACT requirements.

5.7 PM/PM_{10}/$PM_{2.5}$ Emissions

5.7.1 Step 1 – Identify All Possible Control Technologies

Alternative basic equipment—including renewable energy sources, such as solar and wind—has also been identified as a technology for the control of PM/PM_{10}/$PM_{2.5}$ emissions. Such alternative basic equipment was already discussed above (Step 1 for NOx BACT on the CTGs/HRSGs). For the same reasons, solar, wind and other renewable energy sources are rejected as PM_{10}/$PM_{2.5}$ BACT for this application.

5.7.2 Achievable Controlled Levels and Available Control Options

PM emissions from natural gas-fired turbines primarily result from carryover of noncombustible trace constituents in the fuel. PM emissions are minimized by using clean-burning pipeline quality natural gas with low sulfur content.

The CARB BACT Clearinghouse, as well as the BAAQMD and SJVAPCD BACT guidelines, identify the use of natural gas as the primary fuel as “achieved in practice” for the control of PM_{10}/$PM_{2.5}$ for combustion gas turbines.

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[9] Air Pollution Control Manual, Air and Waste Management Association, Second Edition, page 206.

[10] High Performance EMx Emissions Control Technology for Fine Particles, NOx, CO, and VOCs from Combustion Turbines and Stationary IC Engines, by Steven DeCicco and Thomas Girdlestone, EmeraChem Power, June 2008, page 19.

CARB's BACT guidance document for stationary gas turbines used for power plant configurations[11] indicates that BACT for the control of PM emissions is an emission limit corresponding to natural gas with a fuel sulfur content of no more than 1 grain/100 standard cubic foot.

Title 40 CFR Part 60 Subpart KKKK contains the applicable NSPS for combustion gas turbines. Subpart KKKK does not regulate $PM_{10}/PM_{2.5}$ emissions.

Published prohibitory rules from the SCAQMD, SJVAPCD, SMAQMD, and SDCAPCD were reviewed to identify the PM_{10} standards that govern natural gas-fired combustion gas turbines. These prohibitory rules do not regulate $PM_{10}/PM_{2.5}$ emissions.

In the recently issued PSD permit for the Pio Pico project, EPA performed an extensive BACT analysis for PM. This analysis included a review of data specifically for the GE LMS100 simple cycle turbines, the same model proposed for CECP. EPA considered what PM limit would be technically feasible to meet on an ongoing basis, in addition to reviewing source test data from GE LMS100 turbines installed at other locations and reviewing permit limits for other installations with the same model and size turbine, operated in simple-cycle mode. The most recent approved BACT $PM_{10}/PM_{2.5}$ limit for an LMS100 gas turbine is 5.0 lb/hr for Pio Pico Energy Center, as approved on February 28, 2014.[12] This is the lowest BACT $PM_{10}/PM_{2.5}$ limit approved for GE LMS100 simple-cycle turbines. CECP is proposing a limit lower than that approved for Pio Pico.

This "top-down" $PM_{10}/PM_{2.5}$ BACT analysis will consider the following emission limitations:

- 3.5 lb/hr

5.7.3 Step 2 – Eliminate Technologically Infeasible Options

As discussed above, solar, wind and other renewable energy alternatives are not considered technologically feasible for this application.

5.7.4 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

No control technology other than use of clean natural gas fuel has been identified for this application.

5.7.5 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

No control technology other than use of clean natural gas fuel has been identified for this application.

5.7.6 Step 5 – Determine BACT/Present Conclusions

Based upon the results of this analysis, the use of natural gas as the primary fuel source constitutes BACT for $PM_{10}/PM_{2.5}$ emissions from combustion gas turbines. Through the use of natural gas, the turbine is expected to be able to meet the proposed emission limit of 3.5 lbs/hr.

5.8 GHG Emissions

5.8.1 Step 1 – Identify All Possible Control Technologies

EPA has indicated in its guidance on BACT for GHGs[13] that the following types of controls must be considered in determining BACT for GHGs:

- Inherently lower-emitting processes/practices/designs;
- Add-on controls; and

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[11] Ibid, Table I-2.

[12] EPA PSD Permit for PPEC, http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2011-0978-0034

[13] EPA, *PSD and Title V Permitting Guidance for Greenhouse Gases*, March 2011, p. 28

- Combinations of inherently lower emitting processes/practices/designs and add-on controls.[14]

EPA further acknowledges that the requirement to consider inherently lower-emitting processes/practices/designs does not require a fundamental redesign of the nature of the source. This indicates that lower-emitting process/practices/designs that do not achieve the goals, objectives, or purposes of the project may be considered technologically infeasible as BACT for a project.

The following control technologies were identified as potentially "available" for CECP:

- Renewable energy technology (solar or wind);
- Alternative generating technologies;
- Alternative fuels;
- Energy efficiency; and
- Carbon capture and storage.

5.8.1.1 Alternative Basic Equipment: Renewable Energy Technology and Combined Cycle Turbines

Combined cycle gas turbines have the potential to produce fewer GHG emissions, and are carried forward to Step 2. The remaining alternative technologies, and the basis for eliminating them from the BACT analysis, are discussed above under the NOx BACT evaluation.

5.8.2 Step 2 – Eliminate Technologically Infeasible Options

EPA considers a technology to be technically feasible if it has been demonstrated in practice on a similar facility, or is available and applicable to the source type under review. EPA considers a technology to be "available" where it can be obtained through commercial channels or is otherwise available within the common meaning of the term (e.g., it has been demonstrated in practice on a comparable, but not necessarily similar, facility). A technology is applicable if it may reasonably be expected to be successfully applied to the source type under review.

5.8.2.1 Alternate Equipment – Combined-Cycle Turbines

The use of a combined-cycle turbine instead of the proposed simple-cycle turbines would be technically infeasible for the project. The simple-cycle turbines are needed to effectively handle variable loads and perform multiple startups/shutdowns per day. While advanced combined-cycle turbines can start relatively quickly (within approximately 12 minutes to reach 100% rated capacity of the gas turbine generator), they may need as much as 2 hours to reach full combined cycle output (combined output of gas turbine and steam turbine generators). [15] While operating in simple cycle mode (while waiting for the steam system to warm up), fast-start combined cycle units will have efficiencies that are no better than, and are likely worse than, those achieved with advanced simple cycle turbines such as the LMS 100. Further, such units cannot perform up to four starts per day – as required for this project – without substantially shortening the life of the unit. Therefore, combined-cycle turbines are eliminated because they do not meet the basic project requirements.

5.8.2.2 Alternative Fossil Fuel Generating Technologies

Alternative fossil fuel generating technologies such as reciprocating internal combustion engines and boilers may be considered as potentially technologically feasible alternatives to the proposed use of simple-cycle combustion turbine technology. Reciprocating engine technology is generally well-suited to demand-response applications such as the proposed project, so can be considered technologically feasible for this application; boilers, on the other hand, have very high thermal inertia, so are not quick-starting or fast

[14] Ibid, p.27.

[15] El Segundo Energy Center LLC, 00-AFC-014C: Petition to Amend, 4/23/13, Section 2.2.7

ramping. Boiler technology is generally used for baseload power and not for highly variable demand-response power applications. Because boiler technology cannot meet the objectives of the project, it is not considered a technologically feasible alternative.

5.8.2.3 Alternative Fuels

Biomass fuel can only be used with boiler technology and must be gasified for use in turbines. As discussed previously, boiler technology is not considered a technologically feasible alternative. Therefore, there are no alternative fuels that are considered technologically feasible without redefining the project.

5.8.2.4 Energy Efficiency

There are two potential applications of energy efficiency as potential BACT for the proposed project: (1) demand-side management and similar electric load reduction programs to minimize or eliminate the need for the proposed project altogether; and (2) use of the most efficient generating technology that meets the objectives of the project.

Implementation of energy efficiency programs is beyond the scope of this project. The purpose of this project is to help meet the energy demands that will remain after utility energy efficiency programs are implemented.

Utilization of the most efficient generating technology that meets the objectives of the project is technologically feasible.

5.8.2.5 Carbon Capture and Storage

Carbon capture and storage (CCS) technology may be considered to be “available” in the sense that commercial facilities have been built on a scale comparable to CECP (e.g., a natural gas processing operation[16] in Wyoming captures 3.6 million tons per year of CO_2, compared to the 0.9 million tons per year that would be emitted from CECP). However, the technology cannot yet be considered “applicable.” The Interagency Task Force on Carbon Capture and Storage (ITF) found the following:

> *It is unclear how transferable the experience with natural gas processing is to separation of power plant flue gases, given the significant differences in the chemical make-up of the two gas steams. In addition, integration of these technologies with the power cycle at generating plants present significant cost and operating issues that will need to be addressed.*[17]

CCS has not yet reached the licensing and commercial sales stage of development. It is an emerging technology that has had limited successful application on an industrial scale, and no successful applications on a comparably sized natural gas power plant. There are no CCS systems commercially available for natural gas power plants in the United States. The Department of Energy expects commercial deployment in 2025.[18] CCS does not appear to be commercially available for this application.

5.8.3 Step 3 – Rank Remaining Control Technologies

Absent post-combustion removal or sequestration, CO_2 and other GHG emissions are a direct function of the amount of natural gas fuel burned. GHG emissions will be minimized by minimizing heat rate and maximizing generating efficiency. The remaining technologies are ranked by their overall heat rate for consideration as BACT for this project, as shown in Table 5.1C-5.

CO_2 is not the byproduct of incomplete combustion or contaminants in the fuel supply. It is an essential product of the combustion of natural gas. Therefore, the only way to reduce the amount of CO_2 generated is

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[16] Interagency Task Force on Carbon Capture and Storage, *Report of the Interagency Task Force on Carbon Capture and Storage*¸ August 2010. p. 28.

[17] Ibid.

[18] 73 FR 44370

to minimize the amount of fuel combustion required to produce the desired amount of electricity. This is achieved by operating the unit efficiently and conducting regular maintenance to ensure continued good combustion. Good combustion practices are a well-established and widely used technique to minimize emissions from combustion sources. Good combustion operation and maintenance will maintain the thermal efficiency of the selected generating technology and therefore must also be considered a component of BACT to minimize GHG emissions.

TABLE 5.1C-5
Ranking of Potential Generating Technologies/Controls by Heat Rate

Technology	Heat Rate Range (HHV basis)	Technologically Feasible for This Project?
Renewable energy sources	n/a	No
Biomass and other biofuels	n/a	No
Demand-side management	n/a	No
CCS	n/a	Maybe
Reciprocating IC engines	~8,583 Btu/kWh[e]	Yes
Simple-cycle gas turbines	~8,770 to 10,000 Btu/kWh[a,b,c,d]	Yes
Boilers	>10,000 Btu/kWh[a,b,c]	No

Notes:

[a] CEC FSA, Sentinel Energy Project. *http://www.energy.ca.gov/sitingcases/sentinel/index.html*

[b] CEC FSA, TIC Almond 2 Power Plant Project. *http://www.energy.ca.gov/sitingcases/almond/index.html*

[c] CEC FSA, Walnut Creek Energy Project. *http://www.energy.ca.gov/sitingcases/walnutcreek/index.html*

[d] *CECP air quality analysis, Appendix 5.1B-2 (operating case 100) of PTA*

[e] *Quail Brush AFC, Table F.1-2, Case 8, August 2011 (Wartsila gas engine, model 20V34SG)*

5.8.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

5.8.4.1 Reciprocating IC Engines

Reciprocating IC engines are fast-starting, but the largest natural gas-fired IC engine currently available is the approximately 18 MW Wärtsilä18V50SG.[19] The 632 MW net output size of the proposed project would require about 36 of these engines, which would result in a more complex plant and control system. In addition, there is insufficient room at the CECP site for a 36-engine plant. The heat rate for an engine of this type is approximately 8,583 Btu/kWh (HHV), as provided in the most recent CEC AFC for the Quail Brush project.[20] In comparison, the heat rate for the CECP GE LMS 100 gas turbines is approximately 8,770 Btu/kWh (HHV), which is similar to the heat rate for the IC engines. Furthermore, BACT for NOx from engines of this type has been determined to be 4 ppm (technologically feasible)[21], so NOx emissions from a comparable reciprocating engine plant would be approximately 60% higher than the NOx emissions from the proposed simple-cycle gas turbine project. Reciprocating IC engines would result in a more complex plant, provide comparable heat rates, could result in higher NOx emissions, and would not be able to be

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19 *Wartsila "Power Plant Solutions 2013" 3rd Edition, pp.119, http://www.wartsila.com/file/Wartsila/en/1278518335887a1267106724867-Power-Plants-Solutions-2013---3rd-Edition.pdf*

20 *Quail Brush AFC, Table F.1-2, Case 8, August 2011 (Wartsila gas engine, model 20V34SG)*

21 BAAQMD BACT Guideline, Section 2, natural gas fired IC Engine-Spark Ignition >=50 HP

located within the project footprint; therefore, reciprocating IC engine technology is not considered BACT for this project.

5.8.4.2 Carbon Capture and Storage

CCS technology applicable to natural gas-fired projects refers to post-combustion capture. EPA's Interagency Task Force on Carbon Capture and Storage[22] found the following:

> *Post-combustion CO_2 capture … is challenging for the following reasons:*
>
> - *A high volume of gas must be treated because the CO_2 is dilute (13 to 15 percent by volume in coal-fired systems, three to four percent in natural-gas-fired systems);*
> - *The flue gas is at low pressure (near atmosphere);*
> - *trace impurities (particulate matter [PM], sulfur oxides [SOx], nitrogen oxides [NOx], etc.) can degrade the CO_2 capture materials; and*
> - *Compressing captured CO_2 from near atmospheric pressure to pipeline pressure (about 2,000 pounds per square inch absolute) requires a large auxiliary power load…Installing current amine post-combustion CO_2 capture technology on new conventional subcritical, supercritical, and ultra-supercritical coal-fired power plants would increase the COE by about 80 percent. Further, the large quantity of energy required to regenerate the amine solvent and compress the CO_2 to pipeline conditions would result in about a 30 percent energy penalty.*

The International Energy Agency estimates that "CCS can reduce CO_2 emissions from power plants…by more than 85%, and power plant efficiency by about 8-12 percentage points."[23] Although this energy penalty is for coal-fired plants and is not directly applicable to natural gas firing, it is expected to be reasonably representative of the energy penalty for a natural gas-fired system because the lower content of CO_2 in gas turbine exhaust would not necessarily result in an efficiency savings (separation is still required, and there are no data to suggest that the differences in CO_2 concentrations between coal exhaust and gas turbine exhaust would result in lower separation costs). Assuming a minimum 8% energy penalty for CCS, the project would have to generate 8% more electricity to provide energy for CCS without reducing the electricity supply provided by the facility. Criteria pollutant and GHG emissions would also be 8% higher. Considering the energy and emissions penalties, the cost, and the lack of commercial availability, CCS is not considered BACT for the proposed project.

5.8.5 Step 5 – Determine BACT/Present Conclusions

As shown in Table 5.1C-5, simple-cycle gas turbines typically have heat rates that range between approximately 8,770 and 10,000 Btu/kWh (HHV). CECP proposes to use a newer, more energy efficient simple-cycle turbine technology, the GE LMS100, which incorporates intercooling to promote enhanced energy efficiency. The heat rate of the GE LMS100 is approximately 8,770 Btu/kWh (HHV), at the low end of the range of heat rates shown above for typical simple-cycle gas turbines. The use of this highly efficient simple-cycle gas turbine technology, combined with good combustion operation and maintenance to maintain optimum efficiency, is determined to be BACT for GHG.

Recent BACT determinations for criteria pollutants from similar gas turbine projects are summarized in Tables 5.1C-6 through 5.1C-8.

[22] EPA, "Report of the Interagency Task Force on Carbon Capture and Storage," 2010, pp. 29-30, *http://www.epa.gov/climatechange/downloads/CCS-Task-Force-Report-2010.pdf.*

[23] IEA Energy Technology Essentials, December 2006. *http://www.iea.org/techno/essentials.htm.*

TABLE 5.1C-6
Simple-Cycle Gas Turbine BACT Determinations (EPA RBLC Clearinghouse)

Facility/Location	Date Permit Issued	Equipment/Rating	NOx Limit/Control Technology	CO Limit/Control Technology	VOC Limit/Control Technology
TEC/Polk Power Energy Station Polk Co., FL	October 2007	Unspecified 2 turbines, 330 MW total	9.0 ppm Dry low-NOx burners	No BACT determination	No BACT determination
Rawhide Energy Station Larimer Co., CA	June 2009	GE Frame 7FA 1 turbine, 150 MW total	9.0 ppm Dry low-NOx burners	No BACT determination	No BACT determination
Shady Hills Generating Station Pasco Co., FL	January 2010	GE Frame 7FA 2 turbines, 340 MW total	9.0 ppm Dry low-NOx burners and water injection	6.5 ppm (3 hour)	No BACT determination

TABLE 5.1C-7
Summary of BACT Determinations (CARB BACT Clearinghouse)

Facility/District	Permit No./Date	Equipment/Rating	NOx Limit/ Control Technology	CO Limit/Control Technology	VOC Limit/Control Technology
Los Angeles Dept. of Water and Power Los Angeles Co., CA	May 2001	GE LM6000 1 turbine, 47.4 MW total	5.0 ppm SCR	6.0 ppm Oxidation catalyst	2.0 ppm Oxidation catalyst
CalPeak Power El Cajon San Diego Co., CA	June 2001	Pratt & Whitney FT-8 DLN Twin Pac 2 turbines 49.5 MW total	3.5 ppm SCR	50 ppm Oxidation catalyst	2.0 ppm Oxidation catalyst
Indigo Energy Facility Los Angeles Co., CA	July 2001	LM6000 (Enhanced Sprint) 1 turbine, 45 MW total	5.0 ppm SCR	6.0 ppm Oxidation catalyst	2.0 ppm Oxidation catalyst
Lambie Energy Center Solano Co., CA	December 2002	GE LM6000 Sprint PC 1 turbine, 49.9 MW total	2.5 ppm SCR	6.0 ppm Oxidation catalyst	2.0 ppm Oxidation catalyst
El Colton, LLC San Bernardino Co., CA	January 2003	LM6000 (Enhanced Sprint) 1 turbine, 48.7 MW total	3.5 ppm SCR	6.0 ppm Oxidation catalyst	2.0 ppm Oxidation catalyst

TABLE 5.1C-8
Summary of BACT Determinations (CEC Decisions)

Facility/District	Decision Date	Equipment/Rating	NOx Limit/ Control Technology	CO Limit/Control Technology	VOC Limit/Control Technology
San Francisco Electric Reliability Project Power Plant San Francisco Co., CA	October 2006	GE LM6000 Sprint PC 3 turbines, 145 MW total	2.5 ppm Water injection & SCR	4.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Inland Empire Energy Center Imperial County, CA	October 2006	GE LM6000 Sprint PC 2 turbines, 93 MW total	2.5 ppm Dry low-NOx burners & SCR	6.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Panoche Energy Project Fresno Co., CA	December 2007	GE LMS100 4 turbines, 400 MW total	2.5 ppm Water injection & SCR	6.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Starwood Power-Midway Fresno Co., CA	January 2008	Pratt & Whitney FT8-3 SwiftPac 2 turbines, 120 MW total	2.5 ppm Water injection & SCR	6.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Walnut Creek Energy Los Angeles County, CA	February 2008	GE LMS100 5 turbines, 500 MW total	2.5 ppm Water injection & SCR	4.0 ppm (1 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Orange Grove Energy, LLP	December 2008	GE LM6000 Sprint PC 2 turbines, 96 MW total	2.5 ppm Water injection & SCR	6.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Canyon Power Plant Orange Co., CA	March 2010	GE LM6000 Sprint PC 4 turbines, 200 MW total	2.5 ppm Ultra-low NOx burners, water injection & SCR	4.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
CPV Sentinel Riverside County, CA	December 2010	GE LMS100 8 turbines, 850 MW total	2.5 ppm Water injection & SCR	4.0 ppm (1 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
TID Almond 2 Power Plant Ceres, CA	December 2010	GE LM6000 Sprint PG 3 turbines, 174 MW	2.5 ppm Ultra-low NOx burners, water injection & SCR	4.0 ppm (3 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst
Pio Pico Energy Center	September 2012	GE LMS100 3 turbines, 300 MW total	2.5 ppm Water injection & SCR	4.0 ppm (1 hour) Oxidation catalyst	2.0 ppm Oxidation catalyst

5.9 BACT for the Simple-Cycle CTGs: Startup/Shutdown

Startup and shutdown periods are a normal part of the operation of simple-cycle power plants such as CECP. BACT must also be applied during the startup and shutdown periods of gas turbine operation. The BACT limits discussed in the previous section apply to steady-state operation, when the turbines have reached stable operations and the emission control systems are fully operational.

5.10 NOx Emissions

5.10.1 Step 1 – Identify All Possible Control Technologies

The following technologies for control of NOx during startups and shutdowns have been identified:

- A Selective Catalytic Reduction (SCR) system capable of continuously complying with a limit of 2.5 ppmc (1-hour average);
- Fast-start technologies; and
- Operating practices to minimize the duration of startup and shutdown.

The LMS 100 turbine proposed for this project is controlled by SCR, which will operate at all times that the stack temperature is in the proper operating range.

5.10.2 Step 2 – Eliminate Technologically Infeasible Options

During gas turbine startup, there are equipment and process requirements that must be met in sequential order to protect the equipment.

For all turbine technologies, incomplete combustion at low loads results in higher CO and VOC emission rates. Furthermore, the post-combustion controls that are used to achieve additional emissions reductions (SCR and oxidation catalyst) require that specific exhaust temperature ranges be reached to be fully effective. The use of SCR to control NOx is not technically feasible when the surface of the SCR catalyst is below the manufacturer’s recommended operating range. When catalyst surface temperatures are low, ammonia will not react completely with the NOx, resulting in excess NOx emissions or excess ammonia slip or both. The oxidation catalyst is not effective at controlling CO emissions when exhaust temperature is below the optimal temperature range. Therefore, exhaust gas controls used to achieve BACT for normal operations are not feasible control techniques during startups and shutdowns.

This “top-down” BACT analysis will consider the following NOx emission limitations:

- Operating practices to minimize emissions during startup and shutdown; and
- Design features to minimize the duration of startup and shutdown.

5.10.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

5.10.3.1 Operating Practices to Minimize Emissions during Startup and Shutdown

There are basic principles of operation, or Best Management Practices, that minimize emissions during startups and shutdowns. These Best Management Practices are outlined below.

- During a startup, bring the gas turbine to the minimum load necessary to achieve compliance with the applicable NOx and CO emission limits as quickly as possible, consistent with the equipment manufacturers’ recommendations and safe operating practices.
- During a startup, initiate ammonia injection to the SCR system as soon as the SCR catalyst temperature and ammonia vaporization system have reached their minimum operating temperatures.

- During a shutdown, once the turbine reaches a load that is below the minimum load necessary to maintain compliance with the applicable NOx and CO emission limits, reduce the gas turbine load to zero as quickly as possible, consistent with the equipment manufacturers' recommendations and safe operating practices.
- During a shutdown, maintain ammonia injection to the SCR system as long as the SCR catalyst temperature and ammonia vaporization system remain above their minimum operating temperatures.

A key underlying consideration of these Best Management Practices is the overall safety of the plant staff by promoting operation within the limitations of the equipment and systems, and allowing for operator judgment and response times to respond to alarms and trips during the startup sequence.

5.10.3.2 Design Features to Minimize the Duration of Startup and Shutdown

An additional technique to reduce startup emissions is to minimize the amount of time the gas turbine spends in startup. The use of simple-cycle gas turbine technology inherently minimizes this time, in that simple-cycle gas turbines generally start up and shut down much more quickly than combined-cycle turbines.

5.10.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

Utilizing best operating practices to minimize emissions during startups and shutdowns has no adverse environmental or energy impacts, nor does it require additional capital expenditure.

The approach of reducing startup/shutdown duration has no adverse environmental or energy impacts, and the use of simple-cycle generating technology minimizes startup/shutdown duration.

5.10.5 Step 5 - Determine BACT/Present Conclusions

BACT for NOx during startups/shutdowns is the use of operating systems/practices that reduce the duration of startups and shutdowns to the greatest extent feasible, and the use of operational techniques to initiate ammonia injection as soon as possible during a startup. Therefore, BACT is determined to be the use of simple-cycle gas turbine technology and the application of operating systems/practices that minimize startup and shutdown durations, in combination with the use of operational techniques to initiate ammonia injection as soon as possible during a startup.

5.11 CO Emissions

5.11.1 Step 1 – Identify All Possible Control Technologies

The CO control technologies under consideration for startups and shutdowns are ranked as follows:

- Oxidation catalyst unit capable of achieving 4 ppmc
- Operating practices to minimize the duration of startup and shutdown

5.11.2 Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

5.11.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Ranking for the control technologies is as indicated in Step 1.

5.11.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

Similar to the discussion above for NOx, CO emissions during startup and shutdown are minimized by minimizing the length of time that the turbine fires while the oxidation catalyst is not in its operating temperature range.

5.11.5 Step 5 – Determine BACT/Present Conclusions

BACT for CO during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

5.12 VOC Emissions

5.12.1 Step 1 – Identify All Possible Control Technologies

The VOC control technologies under consideration for startups and shutdowns are ranked as follows:

- Operating practices to minimize the duration of startup and shutdown

5.12.2 Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

5.12.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The only proposed control technology is operating practices to minimize the duration of startups and shutdowns.

5.12.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

VOC emissions during startup and shutdown are minimized by minimizing the duration of startup and shutdown.

5.12.5 Step 5 – Determine BACT/Present Conclusions

BACT for VOC during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

5.13 Sulfur Oxide Emissions

5.13.1 Step 1 – Identify All Possible Control Technologies

The SOx control technologies under consideration for startups and shutdowns are ranked as follows:

- Use of natural gas as a fuel
- Operating practices to minimize the duration of startup and shutdown

5.13.2 Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

5.13.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Ranking for the control technologies is as indicated in Step 1.

5.13.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

SOx emissions during startup and shutdown are minimized by minimizing duration of startup and shutdown.

5.13.5 Step 5 – Determine BACT/Present Conclusions

BACT for SOx during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

5.14 PM/PM_{10}/$PM_{2.5}$ Emissions

5.14.1 Step 1 – Identify All Possible Control Technologies

The analysis for particulate is identical to the analysis for SOx.

5.14.2 Step 2 – Eliminate Technologically Infeasible Options

The analysis for particulate is identical to the analysis for SOx.

5.14.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The analysis for particulate is identical to the analysis for SOx.

5.14.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The analysis for particulate is identical to the analysis for SOx.

5.14.5 Step 5 – Determine BACT/Present Conclusions

BACT for particulate during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

5.15 GHG Emissions

5.15.1 Step 1 – Identify All Possible Control Technologies

The GHG control technologies under consideration for startups and shutdowns are ranked as follows:

- Operating practices to minimize the duration of startups and shutdowns

5.15.2 Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

5.15.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The only proposed control technology is operating practices to minimize the duration of startups and shutdowns.

5.15.4 Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

GHG emissions during startup and shutdown are minimized by minimizing the length of time during startup and shutdown.

5.15.5 Step 5 – Determine BACT/Present Conclusions

BACT for GHG during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

5.16 Summary

Proposed BACT determinations for the Amended CECP simple-cycle gas turbines are summarized in Table 5.1C-9.

TABLE 5.1C-9
Proposed BACT Determinations for Amended CECP Simple-Cycle Gas Turbines

Pollutant	Proposed BACT Determination
Nitrogen Oxides	Water injection and SCR system, 2.5 ppmc[a], 1-hour average, with exemptions for startup/shutdown conditions; no CCS
Sulfur Dioxide	Natural gas fuel (sulfur content not to exceed 0.75 grain/100 scf short-term average, 0.25 grains/100 scf long-term average)
Carbon Monoxide	Good combustion practices and oxidation catalyst, 4.0 ppmc, 1-hour average
VOC	Good combustion practices, 2.0 ppmc, 1-hour average
PM_{10}	Natural gas fuel, 3.5 PM_{10} lbs/hr
$PM_{2.5}$	Natural gas fuel, 3.5 $PM_{2.5}$ lbs/hr
GHGs	GE LMS100 simple-cycle gas turbine technology, good combustion practices
Ammonia	5 ppm ammonia slip
Startup/Shutdown	Best operating practices to minimize startup/shutdown times and emissions

Note:

[a] ppmc: parts per million by volume, corrected to 15% O_2.

Appendix 5.1D
Air Quality Modeling Protocol

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January 29, 2014

Ralph DeSiena
Modeling and Meteorology Group
San Diego County Air Pollution Control District
10124 Old Grove Road
San Diego, CA 92131

Subject: Modeling Protocol for Reconfigured CECP

Dear Mr. DeSiena:

On behalf of Carlsbad Energy Center LLC, Sierra Research is pleased to submit the enclosed modeling protocol for the proposed reconfigured Carlsbad Energy Center Project (CECP). This protocol includes the proposed approach for demonstrating compliance with the one-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (NAAQS).

If you have any questions or need any additional information, please do not hesitate to contact me at 916-273-5139.

Sincerely,

Tom Andrews
Principal Engineer

Enclosure

cc: Steve Moore, SDAPCD

sierra research

Air Dispersion Modeling and Health Risk Assessment Protocol

Reconfigured Carlsbad Energy Center Project

Carlsbad, California

Submitted to:

San Diego County Air Pollution Control District (for an Application for an Authority to Construct and PSD Permit)

California Energy Commission (for a Petition to Amend)

prepared for:

Carlsbad Energy Center LLC

January 2014

prepared by:

Sierra Research, Inc.
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Air Dispersion Modeling and Health Risk Assessment Protocol
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Air Dispersion Modeling and Health Risk Assessment Protocol
Reconfigured Carlsbad Energy Center Project

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1. INTRODUCTION

This protocol describes the modeling procedures that will be used to determine the ambient air impacts from the reconfigured Carlsbad Energy Center Project (also referred to herein as the Project). These procedures will be used in the ambient air quality impact assessment and screening health risk assessment that will be submitted to the San Diego County Air Pollution Control District (SDAPCD, or District) as part of an application for Final Determination of Compliance, Authority to Construct, and PSD permit, and to the California Energy Commission as part of a Petition to Amend.

2. FACILITY DESCRIPTION AND SOURCE INFORMATION

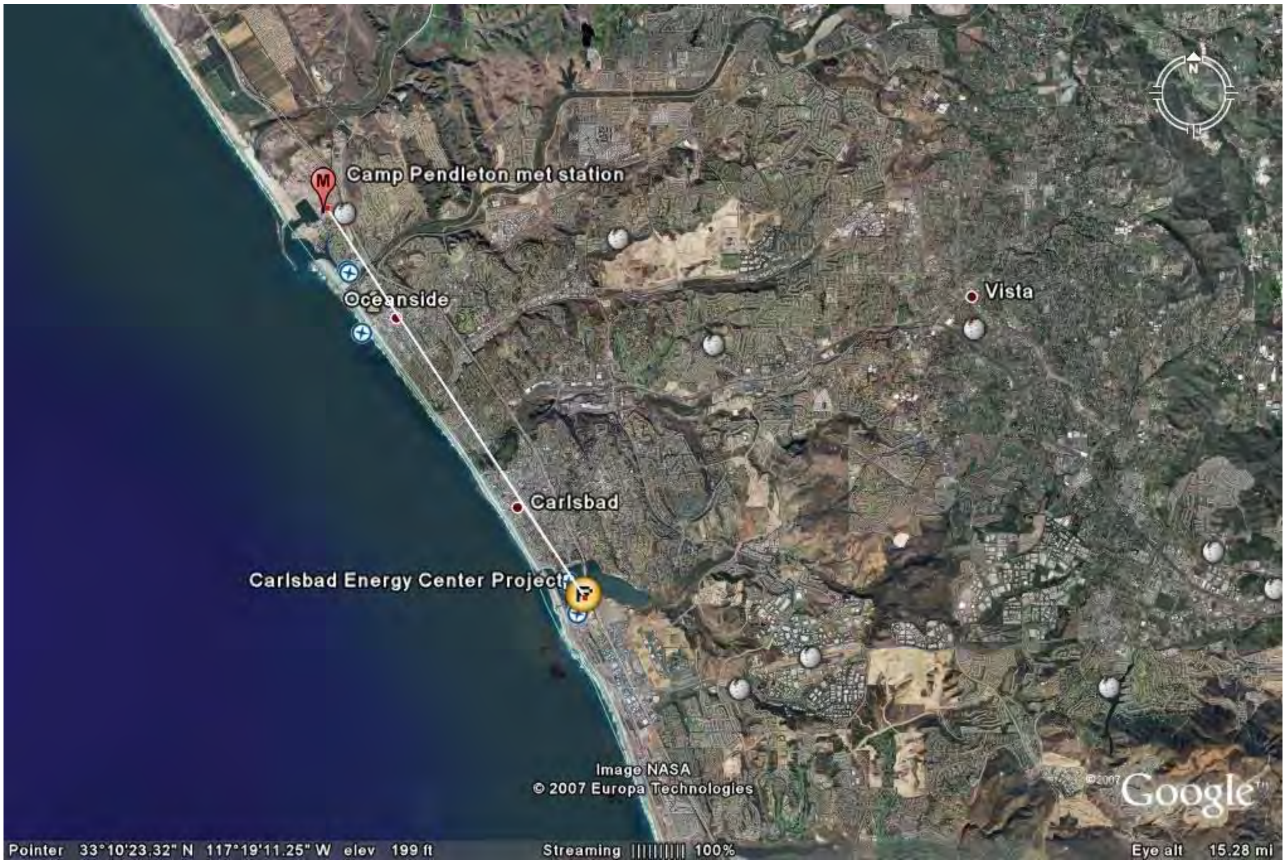
The reconfigured Carlsbad Energy Center Project will replace the existing Units 1-5 steam boiler plant with approximately 630 MW of new natural-gas fired turbine capacity at the existing Encina Power Station. The new gas turbine capacity will be comprised of six new GE LMS100 advanced simple-cycle units. The new equipment will also include a Diesel emergency firepump engine, and a Diesel emergency generator. Existing Boilers 1-5 and the existing 16 MW simple-cycle combustion gas turbine will be shut down. The new emitting units will be installed on the existing property of the Encina Power Station, located at 4600 Carlsbad Boulevard, Carlsbad, California. Figure 1 shows the general location of the power station.

The proposed new gas turbine units will be fitted with Best Available Control Technology (BACT). BACT will include water injection, selective catalytic reduction (SCR), an oxidation catalyst, and use of clean-burning natural gas fuel. The operating schedule of the new gas turbine units will vary and may range from no operation during the winter months to potentially 24 hours of operation per day during the summer months. The modeling analysis will be performed for the worst-case (maximum expected equipment operation) operating hour, operating day, and operating year. The modeling analysis will include a complete description of the new equipment, including the worst-case hourly, daily, and annual operating schedules used for the analysis.

The Proposed Project is not expected to trigger a Prevention of Significant Deterioration (PSD) review for any criteria pollutants. However, because of the relatively low applicability threshold for GHG emissions under the PSD program, the Proposed Project may be subject to PSD review for GHG emissions. The SDAPCD permit application will address applicable PSD modeling requirements based on the final determination of PSD applicability in the application documents.[1]

[1] The SDAPCD is in the process of obtaining delegation from EPA to implement PSD permitting for criteria air pollutants and GHG. Depending on the timing of this delegation, it may be necessary to file a separate PSD permit application for GHG to EPA Region 9.

Figure 1
Location of the Proposed Project



3. DISPERSION MODELING PROCEDURES

The air quality modeling analysis will follow the March 2009 U.S. Environmental Protection Agency (USEPA) AERMOD Implementation Guide, USEPA's "Guideline on Air Quality Models." (USEPA, 2005)

3.1 AERMOD Modeling

The following USEPA air dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources' operating parameters and their locations:

- American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) model, also known as AERMOD (Version 13350);
- Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME, Version 04274); and
- SCREEN3 (Version 96043).

The main air dispersion modeling will be conducted with the latest version (Version 13350) of AERMOD, USEPA's preferred/recommended dispersion model for new source review and PSD air quality impact assessments. AERMOD can account for building downwash effects on dispersing plumes. Stack locations and heights and building locations and dimensions will be input to BPIP-PRIME. The first part of BPIP-PRIME determines and reports on whether a stack is being subjected to wake effects from a structure or structures; the second part calculates direction-specific building dimensions for each structure, which are used by AERMOD to evaluate wake effects. The BPIP-PRIME output is formatted for use in AERMOD input files.

AERMOD requires hourly meteorological data consisting of wind direction and speed (with reference height), temperature (with reference height), Monin-Obukhov length, surface roughness length, heights of the mechanically and convectively generated boundary layers, surface friction velocity, convective velocity scale, and vertical potential temperature gradient in the 500-meter layer above the planetary boundary layer.

Standard AERMOD control parameters will be used, including stack tip downwash, non-screening mode, non-flat terrain, and sequential meteorological data check. The stack-tip downwash algorithm will be used to adjust the effective stack height downward following the methods of Briggs (1972) for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top. As approved by the District for the previous modeling performed for the CECP, the rural option will be used by not invoking the URBANOPT option.[2]

If more detailed evaluation of impacts at receptors in terrain above stack-top height is required, the screening version of the USEPA guideline Complex Terrain Dispersion Model PLUS (CTDMPLUS)—Complex Terrain Screening Model (CTSCREEN)—would be used. The CTSCREEN model is discussed in more detail in Appendix A.

3.1.1 Ambient Ratio Method and Ozone Limiting Method

Annual nitrogen dioxide (NO_2) concentrations will be calculated using the Ambient Ratio Method (ARM), originally adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1995) with a revision issued by EPA in March 2011[3] . The Guideline allows a nationwide default of 80% for the conversion of nitric oxide (NO) to NO_2 on an annual basis and the calculation of NO_2/NOx (nitrogen oxide) ratios.

If NO_2 concentrations need to be examined in more detail, the Ozone Limiting Method (OLM) (Cole and Summerhays, 1979), implemented through the "OLMGROUP ALL" option in AERMOD (USEPA, 2011a), will be used. AERMOD OLM will be used to calculate the NO_2 concentration based on the OLM method and hourly ozone data. Contemporaneous hourly ozone data collected at the nearby Camp Pendleton Marine Base monitoring station will be used in conjunction with OLM to calculate hourly NO_2 concentrations from modeled hourly NOx concentrations.

Part of the NOx in the exhaust is converted to NO_2 during and immediately after combustion. The remaining percentage of the NOx emissions is assumed to be NO. For the new gas turbines, and as required by the SDAPCD, we will use the same NO_2/NOx ratios as used during the SDAPCD permitting of the Pio Pico Project (13% during normal operating hours, 24% during startup/shutdown periods, and 24% during commissioning tests when SCR is not fully operational). For the Diesel emergency firepump engine and Diesel emergency generator, we will use a NO_2/NOx ratio of 10% (see Appendix B).

As the exhaust leaves the stack and mixes with the ambient air, the NO reacts with ambient ozone (O_3) to form NO_2 and molecular oxygen (O_2). The OLM assumes that at any given receptor location, the amount of NO that is converted to NO_2 by this oxidation reaction is proportional to the ambient O_3 concentration. If the O_3 concentration is less than the NO concentration, the amount of NO_2 formed by this reaction is limited. However, if the O_3

[2] The rural vs. urban option in AERMOD is primarily designed to set the fraction of incident heat flux that is transferred into the atmosphere. This fraction becomes important in urban areas having an appreciable "urban heat island" effect due to a large presence of land covered by concrete, asphalt, and buildings. This situation does not exist for the project site.
[3] "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS", Office of Air Quality Planning and Standards, Research Triangle Park, NC, March 1, 2011.

concentration is greater than or equal to the NO concentration, all of the NO is assumed to be converted to NO_2.

A detailed discussion of OLM modeling and how OLM modeling results and monitored background NO_2 will be combined is provided in Sections 3.6.1.3 and 3.6.1.4.

3.1.2 $PM_{2.5}$

$PM_{2.5}$ impacts will be modeled in accordance with USEPA guidance (USEPA, 2010a). A detailed discussion of how modeled $PM_{2.5}$ impacts will be evaluated is provided in Section 3.6.

3.2 Fumigation Modeling

The SCREEN3 model will be used to evaluate inversion breakup fumigation and shoreline fumigation impacts for short-term averaging periods (24 hours or less), as appropriate. The methodology in "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised" (USEPA, 1992b) will be followed for these analyses. Combined impacts for all sources under fumigation conditions will be evaluated, based on USEPA modeling guidelines.

3.3 Health Risk Assessment Modeling

A health risk assessment (HRA) will be performed according to California Air Resources Board (CARB) guidance. The HRA modeling will be prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.4f, May 2012 using the latest HARP Health Database table updated in November 2013) and AERMOD with the CARB "on-ramp."[4] HARP will be used to assess cancer risk as well as non-cancer chronic and acute health hazards.

3.4 Meteorological Data

The District will provide a five-year meteorological dataset (2008–2012) processed in AERMET to generate AERMOD-compatible meteorological data for air dispersion modeling. The surface meteorological data were recorded at the District's Camp Pendleton monitoring station, and the upper air data were recorded at the San Diego Miramar Station (No. 03190). Figure 1 above shows the relative locations of the project site and the meteorological monitoring station at Camp Pendleton.

EPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may

[4] HARP has not yet been revised to utilize AERMOD, but CARB has developed "on-ramp" software that allows HARP to incorporate AERMOD output files. Therefore, HARP is now compatible with AERMOD.

have a significant impact on air quality. Specifically, the meteorological data requirement originates in the Clean Air Act at Section 165(e)(1), which requires an analysis “of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility.”

This requirement and EPA’s guidance on the use of on-site monitoring data are also outlined in the “On-Site Meteorological Program Guidance for Regulatory Modeling Applications” (USEPA, 1987a). The representativeness of the data depends on (a) the proximity of the meteorological monitoring site to the area under consideration, (b) the complexity of the topography of the area, (c) the exposure of the meteorological sensors, and (d) the period of time during which the data are collected.

Representativeness has also been defined in “The Workshop on the Representativeness of Meteorological Observations” (Nappo et. al., 1982) as “the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application.” Representativeness is best evaluated when sites are climatologically similar, as are the project site and the Camp Pendleton meteorological monitoring station.

Representativeness has additionally been defined in the PSD Monitoring Guideline (USEPA, 1987b) as data that characterize the air quality for the general area in which the Proposed Project would be constructed and operated. Because of the close proximity of the Camp Pendleton meteorological data site to the project site (distance between the two locations is approximately 10 km, or 6.4 miles), the same large-scale topographic features that influence the meteorological data monitoring station also influence the project site in the same manner.

Based on all of the above, the District has determined that the meteorological data from this monitoring station are representative of conditions at the Project site.

3.5 Receptor Grids

Receptor and source base elevations will be determined from USGS National Elevation Dataset (NED) data in the GeoTIFF format at a horizontal resolution of 1 arc-second (approximately 30 meters). All coordinates will be referenced to UTM North American Datum 1983 (NAD83), Zone 11. The AERMOD receptor elevations will be interpolated among the DEM nodes according to standard AERMAP procedure. For determining concentrations in elevated terrain, the AERMAP terrain preprocessor receptor-output (ROU) file option will be chosen.

Cartesian coordinate receptor grids will be used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. A 250-meter resolution coarse receptor grid will be developed and will extend outwards at least 10 km (or more if necessary to establish the significant impact area).

For the full impact analyses, a nested grid will be developed to fully represent the maximum impact area(s). The receptor grid will be constructed as follows:

1. One row of receptors spaced 25 meters apart along the facility's fence line;
2. Four tiers of receptors spaced 25 meters apart, extending 100 meters from the fence line;
3. Additional tiers of receptors spaced 100 meters apart, extending from 100 meters to 1,000 meters from the fenceline; and
4. Additional tiers of receptors spaced 250 meters apart, out to at least 10 km from the most distant source modeled, not to exceed 50 km from the project site.

Additional refined receptor grids with 25-meter resolution will be placed around the maximum first-high or maximum second-high coarse grid impacts and extended out 1,000 meters in all directions. Concentrations within the facility fenceline will not be calculated.

The regions to be imported in Geographical Coordinates for the USGS National Elevation Dataset (NED) data are bounded as follows:

- South West corner: UTM Zone 11 (NAD 83) 465,500.0 m, 3,654,200.0 m; and
- North East corner: UTM Zone 11 (NAD 83) 483,000.0 m, 3,678,200.0 m.

3.6 Ambient Air Quality Impact Analyses (AQIA)

Emissions from the Proposed Project will result from combustion of fuel in the gas turbines and Diesel emergency firepump and emergency generator engines, and from the cooling system (if a wet cooling system is used for support systems such as intercooling of gas turbine combustion air and/or turbine lube oil cooling). These emission sources will be modeled as point sources. The expected emission rates will be based on vendor data and additional conservative assumptions of equipment performance.

The purpose of the ambient air quality impact analysis is to demonstrate compliance with applicable ambient air quality standards. Both USEPA and the District have regulations that prohibit construction of a project that will cause or contribute to violations of applicable standards.

According to EPA, if, for a given pollutant and averaging time, the project's impact is below the Significant Impact Levels (SILs) shown in Table 1, the project's impact is deemed to be *de minimis*, and no further analysis is required. However, if the modeled impacts exceed any of the significance thresholds displayed in Table 1, the project has the potential to cause or contribute to a violation of the ambient air quality standard at the times and locations where the threshold is exceeded. In that case, the analysis must consider the contribution of other sources to the ambient concentration. If the analysis indicates that there will be a violation of an ambient air quality standard, and the project's impact <u>at the time and place of the violation</u> is significant, then the project may not be approved unless the project's impact is reduced.

Table 1 Significant Impact Levels for Air Quality Impacts in Class II Areas (μg/m³)					
	Averaging Period				
Pollutant	Annual	24-hour	8-hour	3-hour	1-hour
NO_2	1	--	--	--	7.5[5]
SO_2	1	5	--	25	7.8[5]
CO	--	--	500	--	2000
PM_{10}	1	5	--	--	--
$PM_{2.5}$	0.3	1.2	--	--	--

An air quality impact analysis is required for certification by the CEC and to support the air quality impact analysis, PSD analysis, and screening health risk assessment that are required by the District. Each agency has its own criteria for preparation of the air quality impact analysis; however, the criteria used by the CEC and the District are similar enough that the same basic analysis, with some variations, will satisfy both.

3.6.1.1 Step 1: Project Impact

The first step in the compliance demonstration is to determine, for each pollutant and averaging period, whether the proposed new equipment for the project has the potential to cause a significant ambient impact at any location, under any operating or meteorological conditions. As indicated in the NSR Workshop Manual,[6] "[i]f the significant net emissions increase from a proposed source would not result in a significant ambient impact anywhere, the application is usually not required to go beyond a preliminary analysis in order to make the necessary showing of compliance for a particular pollutant." The EPA significance levels for air quality impacts are shown in Table 1. If the maximum modeled impact for any pollutant and averaging period is below the appropriate significance level in this table, no further analysis is necessary.

Based on the following USEPA (2010e) guidance, no further analysis is necessary for any location where the modeled impacts from the project alone are below the significance thresholds.

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[5] EPA has not yet defined significance levels (SILs) for one-hour NO_2 and SO_2 impacts. However, EPA has suggested that, until SILs have been promulgated, interim values of 4 ppb (7.5 μg/m³) for NO_2 and 3 ppb (7.8 μg/m³) for SO_2 may be used (USEPA (2010c); USEPA (2010d)). These values will be used in this analysis as interim SILs.
[6] USEPA (1990), p. C.51.

> *The primary purpose of the SILs is to identify a level of ambient impact that is sufficiently low relative to the NAAQS or increments that such impact can be considered trivial or de minimis. Hence, the EPA considers a source whose individual impact falls below a SIL to have a de minimis impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification.*[7]

For $PM_{2.5}$, the highest average of the maximum annual averages and of the 24-hour averages modeled over the five years of meteorological data will be compared with the SILs in Table 1 to determine whether the modeled $PM_{2.5}$ project impacts are significant.[8] For other pollutants, the highest modeled concentrations will be compared with the SILs. For pollutants with modeled project impacts below the significance thresholds, a summary table will show the maximum modeled project impacts plus background concentrations. Although this information is not required by federal modeling guidance, it will be provided as part of the CEQA analysis.

3.6.1.2 Step 2: Project Plus Background

Pollutants/averaging periods that are not screened out in Step 1 are required to undergo a full air quality impact analysis. In Step 2, the ambient impacts of the project are modeled and added to background concentrations. The results are compared to the relevant state and federal ambient standards.

The second step of the compliance demonstration is required to show that the proposed new project, in conjunction with existing sources, will not cause or contribute to a violation of any ambient air quality standard. As discussed in more detail below, the impacts of existing sources are represented by the existing ambient air quality data collected at the monitoring stations shown in Table 2. In accordance with Section 8.2.1 of Appendix W to 40 CFR Part 51,

[7] USEPA (2010e), p. 64891.
[8] USEPA (2010a), p. 6.

Background concentrations are an essential part of the total air quality concentration to be considered in determining source impacts. Background air quality includes pollutant concentrations due to: (1) Natural sources; (2) nearby sources other than the one(s) currently under consideration; and (3) unidentified sources. Typically, air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration.

If a Step 2 analysis is required, the modeled impacts from the Proposed Project will be added to the representative background concentration for comparison with the California and National Ambient Air Quality Standards (CAAQS and NAAQS). In accordance with USEPA guidelines,[9] the highest second-highest modeled concentrations will be used to demonstrate compliance with the short-term federal standards (except for the statistically based federal one-hour NO_2 and SO_2, and 24-hour $PM_{2.5}$, standards) and the highest modeled concentration will be used to demonstrate compliance with the federal annual standards and all state standards. If the predicted total ground-level concentration is below the state or federal ambient air quality standard for each pollutant and averaging period, no further analysis is required for that pollutant and averaging period.

3.6.1.3 Compliance with Statistically Based Standards

For the one-hour average federal NO_2 standard for the District and CEC analyses, the comparison of impacts with the new federal one-hour standard will be done in accordance with Appendix W of Part 51 of Title 40 of the CFR "Guideline on Air Quality Models" and the tiered process presented in "Modeling Compliance of the Federal 1-Hour NO_2 NAAQS" (CAPCOA guidance document, 2011).[10] Appendix W of Part 51 of Title 40 of the CFR "Guideline on Air Quality Models" has codified three methods that can be used to estimate NO_2 concentration (Tier 1 - Total Conversion, Tier 2 - Ambient Ratio Method or ARM, Tier 3 - Ozone Limiting Method or OLM). According to USEPA guidance (USEPA, 2011a),

While the limited scope of the available field study data imposes limits on the ability to generalize conclusions regarding model performance, these preliminary results of hourly NO_2 predictions for Palau and New Mexico show generally good performance for the PVMRM and OLM/OLMGROUP ALL options in AERMOD. We believe that these additional model evaluation results lend further credence to the use of these Tier 3 options in AERMOD for estimating hourly NO_2

[9] USEPA (2005), 11.2.3.2 and 11.2.3.3

[10] "This modeling protocol is meant to define the stepwise approach necessary to satisfy the requirements in General Guidance for Implementing the 1-Hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim NO_2 Significant Impact Level and the Applicability of Appendix W Modeling Guidance for 1-Hour NO_2 National Ambient Air Quality Standard. Nothing in this protocol should be taken as overriding guidance contained in those two memoranda, or Appendix W of Part 51 of Title 40 of the Code of Federal Regulations (40 CFR 51, Appendix W)." (SJVAPCD, 2010b)

concentrations, and we recommend that their use should be generally accepted provided some reasonable demonstration can be made of the appropriateness of the key inputs for these options, the in-stack NO_2/NOx ratio and the background ozone concentrations.[11]

As discussed above, for the new gas turbines the in-stack NO_2/NOx ratios will be consistent with the ratios used during the permitting of the Pio Pico Project and a NO_2/NOx ratio of 10% will be used for the Diesel emergency engines. Background ozone concentrations in the project area will be represented by five years of ozone data (2008–2012) collected at Camp Pendleton concurrently with the meteorological data. Based on these factors, we propose to use the Tier 3, "OLMGROUP ALL," option for modeling 1-hour NO_2 concentrations.

For demonstrating compliance with the statistically based federal one-hour NO_2 standard, CAPCOA's 2011 guidance document provides 11 progressively more sophisticated methods for combining modeled NO_2 concentrations with background (or monitored) NO_2. These methods, outlined below, were developed to allow demonstration of compliance using the lowest amount of resources necessary. Each tier is a progressively more sophisticated and comprehensive analysis that reduces the level of conservatism without reducing the level of assurance of compliance.

1. Significant Impact Level (SIL) – no background required
2. Max modeled value + max monitored value
3. Max modeled value + 98th pctl monitored value
4. 8th highest modeled value + max monitored value
5. 8th highest modeled value + 98th pctl monitored value
6. (5 yr avg of 98th pctl modeled value) + max monitored value
7. (5 yr avg of 98th pctl of modeled value) + 98th pctl monitored value
8. 5 yr avg of 98th pctl of (modeled value + monthly hour-of-day – 1st high)
9. 5 yr avg of 98th pctl of (modeled value + seasonal hour-of-day – 3rd high)
10. 5 yr average of 98th pctl of (modeled value + annual hour-of-day - 8th high)
11. Paired-Sum: 5 yr avg of 98th pctl of (modeled value + background)

Applicable definitions are provided below.

- *Significant Impact Level (SIL)* is defined as a de minimis impact level below which a source is presumed not to cause or contribute to an exceedance of a NAAQS (see Table 1 above).

- *Max modeled value* is defined as the maximum concentration predicted by the model at any given receptor in any given year modeled.

[11] The Plume Volume Molar Ratio Method (PVMRM) is considered by USEPA to be a Tier 3 screening method, similar to OLM. (USEPA,2011a)

- *8th highest modeled value* is defined as the highest 8th-highest concentration derived by the model at any given receptor in any given year modeled.

- *5 yr avg of the 98th pctl* is defined as the highest of the average 8th highest (98th percentile) concentrations derived by the model across all receptors based on the length of the meteorological data period or the X years average of 98th percentile of the annual distribution of daily maximum one-hour concentrations across all receptors, where X is the number of years modeled. (In Appendix W, EPA recommends using five years of meteorological data from a representative National Weather Service site or one year of on-site data.)

- *Monthly hour-of-day* is defined as the three-year average of the 1st highest concentrations (Maximum Hourly) for each hour of the day.

- *Seasonal Hour-Of-Day* is defined as the three-year average of the 3rd highest concentrations for each hour of the day and season

- *Annual hour-of-day* is defined as the three-year average of the 8th highest concentration for each hour of the day

- *Paired-Sum* **(**5 yr avg of the 98th pctl) is the merging of the modeled concentration with the monitored values paired together by month, day, and hour. The sum of the paired values is then processed to determine the X-year average of the 98th percentile of the annual distribution of daily maximum one-hour concentrations across all receptors, where X is the number of years modeled.

For the demonstration of compliance with the federal one-hour NO_2 standard, we will perform analyses at as many of the following tiers as are needed to demonstrate compliance with the state and federal ambient air quality standards: Tier 1, Tier 2, Tier 7, Tier 8, Tier 9, Tier 10, and Tier 11. Hourly NO_2 background data (for the same five years of meteorological data used for the modeling—2008 to 2012) may also be used in order to refine the NAAQS analysis both spatially and temporally. Hourly NO_2 data from the Camp Pendleton monitoring station will be provided by the District. In the event of missing hourly NO_2 data, the missing data procedures described in Section 3.7.1 will be followed to fill in gaps in the hourly NO_2 data. To account for recently permitted nearby stationary sources that are not reflected in the background NO_2 data, we will review the list of projects provided by the SDAPCD (the request for these projects is discussed in Section 3.10) and model the impacts from projects with a NOx net emission increase greater than 5 tons/year (excluding intermittently operated equipment per EPA guidance[12]).

The demonstration of compliance with the federal one-hour SO_2 standard will follow the same steps, except that it will utilize the 99th percentile predicted one-hour average SO_2 concentrations instead of the 98th percentile.

[12] USEPA (2011a), page 10.

For the 24-hour average federal $PM_{2.5}$ standard for the District and CEC analyses, the comparison of impacts with the federal 24-hour average standard will be done in accordance with USEPA March 23, 2010 guidance (USEPA, 2010a). This guidance calls for basing the initial determination of compliance with the standard on the five-year average of the highest modeled annual and 24-hour averages, combined with background concentrations based on the form of the standards (the three-year average of the annual $PM_{2.5}$ concentrations and the three-year average of the 98th percentile 24-hour averages).[13] If a more detailed assessment of $PM_{2.5}$ impacts is required, a Tier 2 analysis will be performed. USEPA's March 23, 2010 memo provides minimal guidance regarding this type of more detailed analysis, saying only "a Second Tier modeling analysis may be considered that would involve combining the monitored and modeled $PM_{2.5}$ concentrations on a seasonal or quarterly basis, and re-sorting the total impacts across the year to determine the cumulative design value."[14] As no additional guidance has been provided, such an analysis would be discussed with the District and CEC staff prior to implementation.

3.6.1.4 State One-Hour NO_2 Standard

Compliance with the state one-hour NO_2 standard will be demonstrated using OLM and the paired-sum approach described above, except that the analysis will use highest, rather than 98th percentile, concentrations, consistent with the form of the state standard.

3.7 Background Ambient Air Quality Data

Background ambient air quality data for the project area will be obtained from the monitoring sites most representative of the conditions that exist at the proposed project site. The Escondido monitoring site is the nearest with background data for PM_{10}, $PM_{2.5}$, and CO. Camp Pendleton is the nearest monitoring site for O_3 and NO_2 background data, and San Diego-Beardsley Street is the nearest monitoring site for SO_2 data. Modeled concentrations will be added to these representative background concentrations to demonstrate compliance with the CAAQS and NAAQS.

Table 2 shows the monitoring stations we propose to use as they provide the most representative ambient air quality background data.

[13] USEPA (2010a), p. 9.
[14] USEPA (2010a), p. 8.

Table 2 Representative Background Ambient Air Quality Monitoring Stations		
Pollutant(s)	**Monitoring Station**	**Distance to Project Site**
PM_{10}, $PM_{2.5}$, CO	Escondido	24 km
NO_2 and O_3	Camp Pendleton	10 km
SO_2	San Diego – Beardsley Street	50 km

For annual NO_2, 24-hour and annual SO_2, and all PM_{10} and CO averaging periods, the highest values monitored during the 2008–2012 period will be used to represent ambient background concentrations in the project area. The one-hour average NO_2 analyses will be performed as described above. Because the three-hour average statistic for SO_2 is no longer available from the USEPA or CARB's websites, one-hour average SO_2 concentrations will be used to represent three-hour average background concentrations for SO_2. For analyses of federal 24-hour and annual $PM_{2.5}$ impacts, the three-year average of the 98th percentile 24-hour monitored levels for the period between 2008 and 2012 will be used to represent project area background because these values correspond to the method used for determining compliance with the federal $PM_{2.5}$ standards and are consistent with the guidance cited above.

3.7.1 Missing Data Protocol

Using the OLM method to model project-generated one-hour NO_2 concentrations requires the use of ambient monitored O_3 concentrations. Because the OLM method uses the ambient ozone concentration for a particular hour to limit the conversion of NO to NO_2, it is important to have ozone concentrations for every hour. It is also important that any missing hourly ozone concentrations be filled in with a value that does not underestimate the ozone concentration for that hour, to avoid underestimating the resulting NO_2 concentration. In addition, computation of total hourly NO_2 concentrations requires use of the ambient monitored hourly NO_2 concentrations from the nearest monitoring station. As is the case for the hourly ozone data, it is important to have a background NO_2 value for every hour that does not underestimate actual background.

As discussed above, background ambient hourly O_3 and NO_2 concentrations for the project area will be provided by the District based on data collected at the monitoring station at Camp Pendleton. While these datasets are expected to exceed USEPA's 90% completeness criterion (that is, more than 90% of the data values are present for each month), there are still occasional missing values that must be filled in. As discussed above, the SDAPCD will be preparing the hourly O_3 and NO_2 background ambient databases. It is our understanding that the SDAPCD will perform the appropriate missing data substitutions based on guidance documents provided by the California Air Pollution Control Officers Association (CAPCOA, 2011).

3.8 Health Risk Assessment

A health risk assessment will be performed according to the Office of Environmental Health Hazard Analysis "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments" (OEHHA, 2003). The HRA modeling will be prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.4f, May 2012 using the latest HARP Health Database table updated in November 2013). The HARP model will be used to assess cancer risk as well as non-cancer chronic and acute health hazards.

The HARP model incorporates the ISCST3 model previously approved by USEPA. CARB offers a software program that allows AERMOD data to be imported into the HARP model, called HARP On-Ramp. The on-ramp will be used with the most recent versions of AERMOD and HARP for the screening risk assessment. As previously required by the SDAPCD, the following HARP options will be used for the health risk assessment:

- Home grown produce selected (0.15 for the fraction for leafy, exposed, protected, and root vegetables);
- Dermal absorption selected (0.05 m/s deposition rate);
- Soil ingestion selected (0.05 m/s deposition rate);
- Mother's milk selected (0.05 m/s deposition rate); and
- Fish ingestion selected (due to the lagoon near the project site).

3.9 Demolition/Construction Air Quality Impact Analysis

The potential ambient impacts from air pollutant emissions during the demolition/construction activities associated with the Proposed Project will be evaluated by air quality modeling that will account for the construction site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.

Types of Emission Sources − Construction of the Proposed Project can be viewed as three main sequential phases: site preparation; construction of foundations; and installation of the gas turbines and associated equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation includes site excavation, excavation of footings and foundations, and backfilling operations.

Fugitive dust emissions from the construction of the Proposed Project result from the following activities:

- Excavation and grading at the construction site;
- Onsite travel on paved and unpaved roads and across the unpaved construction site;

- Aggregate and soil loading and unloading operations;
- Raw material transfer to and from material stockpiles; and
- Wind erosion of areas disturbed during construction activities.

Engine exhaust will be emitted from the following sources:

- Heavy equipment used for excavation, grading, and construction of onsite structures;
- Water trucks used to control construction dust emissions;
- Diesel- and gasoline-fueled welding machines, generators, air compressors, and water pumps;
- Gasoline-fueled pickup trucks and Diesel-fueled flatbed trucks used onsite to transport workers and materials around the construction site;
- Transport of mechanical and electrical equipment to the project site;
- Transport of rubble and debris from the site to an appropriate landfill; and
- Transport of raw materials to and from stockpiles.

Similar to construction, the demolition activities associated with the removal of existing Units 1-5 will include both fugitive dust and exhaust emissions. The demolition of the existing structures will include the removal of the main power plant building, administration building, maintenance shop/warehouse, machine shop, paint shop, chemical storage building, intake and discharge tunnels, fuel storage tanks, and the stack. The fugitive dust emissions will be due to activities including demolition of existing structures, loading of debris into haul trucks, and vehicle travel on paved/unpaved surfaces. Engine exhaust emissions will be associated with heavy equipment used for demolition activities, water trucks used for dust control, truck hauling of demolition debris from the site, and worker vehicle travel.

Emissions from a peak activity day will be modeled. Annual average emissions over the demolition/construction period will also be calculated and modeled for comparison with annual standards.

Existing Ambient Levels – The background data discussed earlier will be used to represent existing ambient levels for the demolition/construction analysis as well as the analysis of the impacts of project operations.

Model Options – The AERMOD "OLMGROUP ALL" option will be used to estimate ambient impacts from demolition/construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis. A 10% NO_2/NOx fraction for Diesel demolition/construction equipment will be assumed (see Appendix B).

The demolition/construction sites will be represented as both a set of volume sources and a separate set of area sources in the modeling analysis. Emissions will be divided into three categories: exhaust emissions, mechanically generated fugitive dust emissions, and wind-blown fugitive dust emissions. Exhaust emissions and mechanically generated fugitive dust emissions (e.g., dust from wheels of a scraper) will be modeled as volume sources with a height of 6 meters. Wind-blown fugitive dust emissions and sources at or near the ground that are at ambient temperature and have negligible vertical velocity will be modeled as area sources with a release height of 0.5 meters.

Combustion Diesel PM_{10} emission impacts from demolition/construction equipment will be evaluated to demonstrate that the cancer risk from construction activities will be below ten in one million at all receptors.

For the demolition/construction modeling analysis, the receptor grid will begin at the property boundary and will extend approximately one kilometer in all directions. The receptor grid will be laid out as follows:

1. One row of receptors spaced 25 meters apart along the facility's fence line;
2. Four tiers of receptors spaced 25 meters apart, extending 100 meters from the fence line; and
3. Additional tiers of receptors spaced 60 meters apart, extending from 100 meters to 1,000 meters from the fenceline.

3.10 Cumulative Air Quality Impact Analysis

To address CEC requirements, a cumulative air quality modeling impacts analysis of the project's typical operating mode will be performed in combination with other stationary source emissions sources within a six-mile radius that have received Authorities to Construct and/or modified permits to operate since June 2012, or are in the permitting process. For each criteria pollutant, facilities having an emission increase of less than five tons per year are generally considered to be *de minimis*, and these facilities may be excluded from the cumulative impacts analysis. Information on any recently constructed/permitted sources that might be appropriate for a cumulative air quality impact analysis (as defined above) will be requested from the SDAPCD.

Upon receipt of sufficient information from the local air agencies to allow air dispersion modeling of the recently constructed/permitted non-project sources to be included in the cumulative air quality impact analysis, AERMOD will be used in a procedure similar to that described earlier in this protocol.

3.11 Nitrogen Deposition Analysis

As part of the Petition to Amend filed with the CEC, it will be necessary to include a nitrogen deposition analysis. Nitrogen deposition is the input of NOx and ammonia (NH_3) derived pollutants, primarily nitric acid (HNO_3), from the atmosphere to the biosphere. Nitrogen deposition can lead to adverse impacts on sensitive species including direct toxicity, changes in species composition among native plants, and enhancement of invasive species.

We propose to use a tiered approach to analyze nitrogen deposition impacts for the Proposed Project, as outlined below.

- Tier 1: The total nitrogen emission levels (based on NOx and NH_3 emissions) for the Reconfigured Project will be compared to the baseline nitrogen emission levels for existing Units 1-5 and the peaker gas turbine at the Encina Power Station. If the total nitrogen emissions for the proposed new units will be lower than the baseline levels for the existing units that will be replaced as part of the Proposed Project, the cumulative nitrogen deposition impacts for the Proposed Project will be considered less-than-significant and no further analysis will be performed.

- Tier 2: If the Tier 1 analysis shows possible significant nitrogen deposition impacts, we will perform a nitrogen deposition modeling analysis examining the impacts on nearby areas classified as critical habitat and/or areas containing sensitive biological resources. The AERMOD model will be used for this analysis, and the analysis will compare the nitrogen deposition associated with the net increase in nitrogen emissions (discussed above) to the CEC-established nitrogen disposition significance threshold of 5 kg/ha/yr.[15] If the maximum modeled nitrogen deposition impact in a nearby area of concern is above this threshold, the cumulative nitrogen deposition impacts for the Proposed Project will be considered significant, and the Applicant will propose additional mitigation measures.

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[15] Based on discussion by CEC staff during a 10/1/13 CEC workshop for the El Segundo Power Facility Modification Project.

4. REPORTING

The results of the criteria pollutant and TAC modeling will be integrated into the application documents, and will include the information listed below.

- Project Description – Site map and site plan along with descriptions of the emitting equipment and air pollution control systems.

- Model Options and Input – Model options, screening and refined source parameters, criteria pollutant and TAC emission rates, meteorological data, and receptor grids used for the modeling analyses.

- Air Dispersion Modeling – Dispersion modeling results will include the following:

  – Plot plan showing emission points, nearby buildings (including dimensions), cross-section lines, property lines, fence lines, roads, and UTM coordinates;
  – A table showing building heights used in the modeling analysis;
  – Summaries of maximum modeled impacts; and
  – Model input and output files, including BPIP-PRIME and meteorological files as well as hourly ozone and NO_2 files used in demonstrating compliance with the 1-hour NO_2 standard, in electronic format on a compact disc, together with a description (README file) of all filenames.

- HRA – The HRA will include the following:

  – Descriptions of the methodology and inputs to the demolition/construction and operation AERMOD runs;
  – Tables of TAC emission rates and health impacts;
  – Figures showing sensitive receptor locations; and
  – Model input and output files in electronic format on a compact disc, together with a description (README file) of all filenames.

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Appendix A

Information on CTSCREEN Model

The CTDMPLUS and CTSCREEN Models

Complex terrain impacts may need to be modeled with more accuracy than that provided by AERMOD. The use of more refined modeling techniques is specifically addressed in USEPA's Appendix W[1] modeling guidance, as follows:

> *Since AERMOD treats dispersion in complex terrain, we have merged sections 4 and 5 of appendix W, as proposed in the April 2000 NPR [Notice of Proposed Rulemaking]. And while AERMOD produces acceptable regulatory design concentrations in complex terrain, it does not replace CTDMPLUS for detailed or receptor-oriented complex terrain analysis, as we have made clear in Guideline section 4.2.2. CTDMPLUS remains available for use in complex terrain. [p. 68225]*
>
> *4.2.2 Refined Analytical Techniques*
> *d. If the modeling application involves a well defined hill or ridge and a detailed dispersion analysis of the spatial pattern of plume impacts is of interest, CTDMPLUS, listed in Appendix A, is available. CTDMPLUS provides greater resolution of concentrations about the contour of the hill feature than does AERMOD through a different plume-terrain interaction algorithm. [p. 68233]*

CTSCREEN is the same basic model as CTDMPLUS, except that meteorological data are handled internally in a simplified manner. As discussed in the CTSCREEN users guide,[2]

> *Since [CTDMPLUS] accounts for the three-dimensional nature of plume and terrain interaction, it requires detailed terrain and meteorological data that are representative of the modeling domain. Although the terrain data may be readily obtained from topographic maps and digitized for use in the CTDMPLUS, the required meteorological data may not be as readily available.*
>
> *Since the meteorological input requirements of the CTDMPLUS can limit its application, the EPA's Complex-Terrain-Modeling, Technology-Transfer Workgroup developed a methodology to use the advanced techniques of CTDMPLUS in situations where on-site meteorological measurements are limited or unavailable. This approach uses CTDMPLUS in a "screening" mode--actual source and terrain*

[1] 40 CFR 51 Subpart W, as amended November 9, 2005 at 70 FR 68218, "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions."
[2] USEPA, EPA-600/8-90-087, "User's Guide to CTDMPLUS: Volume 2. The Screening Mode (CTSCREEN)," October 1990.

characteristics are modeled with an extensive array of predetermined meteorological conditions.

This CTDMPLUS screening mode (CTSCREEN) serves several purposes in regulatory applications. When meteorological data are unavailable, CTSCREEN can be used to obtain conservative (safely above those of refined models), yet realistic, impact estimates for particular sources.

Therefore, the use of the CTSCREEN version of CTDMPLUS is consistent with USEPA guidance.

Appendix B

Proposed NO_2/NOx Ratios for Modeling Compliance with One-Hour NO_2 Standards for Diesel Emergency Engines and Demolition/Construction Activities

Proposed NO_2/NOx Ratios for Modeling Compliance with One-Hour NO_2 Standards for Emergency Engines and for Demolition/Construction Activities

The use of the Tier 3 Plume Volume Molar Ratio Method (PVMRM) and Ozone Limiting Method (OLM) options in AERMOD requires the specification of an in-stack ratio (ISR) of NO_2/NOx for each NOx emissions source. The October 27, 2011 California Air Pollution Control Officers Association (CAPCOA) Guidance Document, titled "Modeling Compliance of The Federal 1-Hour NO_2 NAAQS,"[18] emphasized the importance of these in-stack ratios for the 1-hour NO_2 NAAQS, recommending that in-stack ratios used with either the OLM or PVMRM options be justified based on the specific application.

USEPA's Office of Air Quality Planning and Standards (OAQPS) is in the process of creating a database of test results that support in-stack NO_2/NOx ratios for specific source types. We are proposing to use USEPA's ISR database for the Project.

USEPA's ISR database is at *http://www.epa.gov/ttn/scram/no2_isr_database.htm*. As of January 2014, the file NO2_ISR_database.xlsx, which is to provide the NO_2 ISR data that have been submitted via the formal collection initiated by OAQPS, contained listings for several Diesel engines.

Following is a description of the procedures followed to obtain proposed NO_2/NOx ratios from the ISR database for the equipment associated with the Proposed Project.

Diesel Emergency Engines and Demolition/Construction Equipment

1. Sort by fuel to select all Diesel, #2 Diesel, and blank fuel fields to eliminate natural gas, biogas, and waste gas-fueled engines, leaving 40 records.

2. Eliminate any engines equipped with SCR (including the GE LeanNOx System)—the engines associated with the Proposed Project will be emergency firepump/generator engines and will not have SCR, leaving 39 records. Demolition/construction equipment Diesel engines will similarly not have SCR.

The remaining engines range in size from 440 kW to 4,400 kW (590 to 5,900 hp). The NO_2/NOx ratios range from 2.2% to 9.9%, with an average of 6.2%. We are proposing to use a ratio of 10% as reasonable and conservative for the emergency Diesel engines and demolition/construction equipment.

[18] California Air Pollution Control Officers Association (2011). "Modeling Compliance of The Federal 1-Hour NO2 NAAQS." Available at *http://www.valleyair.org/busind/pto/Tox_Resources/CAPCOANO2GuidanceDocument10-27-11.pdf*.

Appendix 5.1E
Air Quality Modeling Inputs

Table 5.1E-1
CECP Amendment
Equipment/Structure Dimensions

Item	Equipment Sizes	Revision: D
Number	Description	Size (LxWxH) in Feet (*length is N-S dimension)
30	Warehouse and Maintenance Building	75x116x30
31	Control Room and Administration Building	100x50x20
8	Gas Compressor Building	50x100x30
9	Air Compressor Building	30x50x20
10	Fire Pump Building	30x20x15
11	Diesel Storage Tank	8 ft Diameter x 6 ft Tall
22	Gas Metering	100x75x15
12	Ammonia Storage	50x75x15
12a	Ammonia Unloading Area	
12b	Ammonia forwarding pumps	
12c	Ammonia unloading pump	
12d	Ammonia Tank	
13	Demineralized Water Tank	43.3 Diameter x 32 Tall
14	Raw/Fire Water Tank	50.1 Diameter x 34 Tall
15	Water Treatment Trailers	(7) Parking Spaces plus (2) Spares
16	CEMS Enclosure	20x30x12
17	Unit Auxiliary Transformer	7.5x11x6
7	BOP PDC	40x15.5x15
100	Ocean Water Trailers	(9) 8x32 with two parking spaces
101	Ocean Water Storage Tank	50.3 Diameter x 34 Tall
102	Ultra Filtration Storage Tank (OWS)	20 Diameter x 20 Tall
103	Ultra Filtration Pumps	(2) 8 x 10
104	Solids unloading Space	
	Power Block	
1	Exhaust Stack	14.25 Diameter (OD) x 90 Tall
2	Combustion Turbine Enclosure	20.3x60x47.75
3	Generator Enclosure	15.5x38x27.5
4	VBV Exhaust Stack	13 Diameter x 48 Tall
5	SCR/COR DUCT WORK	59.25x23x38.7
18	Ammonia Prep Skid	19x8x10
19	Shell and Tube Heat Exchanger	12.1 Diameter x 42.5 Long
6	Fin Fan Coolers	50x160x14
20	Auxiliary Skid	15x13x28
20a	Fuel System	Located inside the aux skid
20b	Lube Oil System	Located inside the aux skid
25	Fire Protection System	6x3.2x5
23	NOx Control Water Injection Skid	8.5x13.5x6.5
21	Evaporative Coolers Water Skid	8.5x13.5x6.5
26	Water Wash Skid and Sump	7x11x8
27	Attemporation Blower Skid	8.5x16.5x6
24	GSU Transformer	35x29x25
28	CTG and Intercooler MCC	50x14.5x15
38	Emergency Diesel Generator	12.5x3.6x6.8
38a	Emergency Diesel Generator Fuel Storage Tank	

Table 5.1E-2
CECP Amendment
Screening Modeling Inputs
(per Gas Turbine)

Case	Amb Temp deg F	Stack height feet	Stack Height meters	Stack Diam feet	Stack Diam meters	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K
Cold 100% Load	44.5	90.0	27.43	13.5	4.11	1,012,885	478.09	117.94	35.95	763.7	679.65
Cold 25% Load	44.5	90.0	27.43	13.5	4.11	524,635	247.63	61.09	18.62	856.7	731.32
Hot 100% Load w/Evap.	96.0	90.0	27.43	13.5	4.11	985,287	465.07	114.72	34.97	813.1	707.09
Hot 100% load w/o Evap.	96.0	90.0	27.43	13.5	4.11	948,559	447.73	110.45	33.66	821.1	711.54
Hot 25% Load	96.0	90.0	27.43	13.5	4.11	499,004	235.53	58.10	17.71	920.2	766.59
Avg. 100% Load w/Evap.	60.3	90.0	27.43	13.5	4.11	1,023,515	483.11	119.18	36.32	779.1	688.21
Avg. 100% Load w/o Evap.	60.3	90.0	27.43	13.5	4.11	1,022,475	482.62	119.05	36.29	781.7	689.65
Avg. 25% Load	60.3	90.0	27.43	13.5	4.11	523,114	246.91	60.91	18.57	854.2	729.93
	NOx lb/hr	**CO lb/hr**	**PM10 lb/hr**	**SOx lb/hr**		**NOx g/sec**	**CO g/sec**	**PM10 g/sec**	**SOx g/sec**		
Cold 100% Load	8.90	8.60	3.50	2.04		1.121	1.084	0.441	0.257		
Cold 25% Load	3.40	3.40	3.50	0.79		0.428	0.428	0.441	0.100		
Hot 100% Load w/Evap.	8.30	8.10	3.50	1.91		1.046	1.021	0.441	0.241		
Hot 100% load w/o Evap.	8.10	7.80	3.50	1.85		1.021	0.983	0.441	0.234		
Hot 25% Load	3.20	3.10	3.50	0.74		0.403	0.391	0.441	0.093		
Avg. 100% Load w/Evap.	9.00	8.70	3.50	2.07		1.134	1.096	0.441	0.260		
Avg. 100% Load w/o Evap.	9.00	8.80	3.50	2.07		1.134	1.109	0.441	0.261		
Avg. 25% Load	3.50	3.40	3.50	0.79		0.441	0.428	0.441	0.100		

Table 5.1E-3
CECP Amendment
Screening Level Modeling Impacts
(Combined Impacts for Six Gas Turbines)

Operating Mode	Conc. (ug/m3) NO2 1-hr	Conc. (ug/m3) SO2 1-hr	Conc. (ug/m3) CO 1-hr	Conc. (ug/m3) SO2 3-hr	Conc. (ug/m3) CO 8-hr	Conc. (ug/m3) SO2 24-hr	Conc. (ug/m3) PM10 24-hr	Conc. (ug/m3) NO2 Annual	Conc. (ug/m3) SO2 Annual	Conc. (ug/m3) PM10 Annual
Cold 100% Load	20.512	4.701	19.821	2.990	7.116	0.595	1.021	0.215	0.049	0.084
Cold 25% Load	11.794	2.754	11.794	1.526	3.927	0.324	1.430	0.110	0.026	0.113
Hot 100% Load w/Evap.	19.106	4.398	18.645	2.798	6.694	0.557	1.020	0.200	0.046	0.084
Hot 100% load w/o Evap.	19.037	4.358	18.332	2.759	6.574	0.551	1.039	0.199	0.046	0.086
Hot 25% Load	11.281	2.609	10.928	1.443	3.629	0.306	1.449	0.104	0.024	0.114
Avg. 100% Load w/Evap.	20.462	4.699	19.780	2.999	7.109	0.596	1.009	0.215	0.049	0.084
Avg. 100% Load w/o Evap.	20.453	4.706	19.999	3.003	7.188	0.597	1.009	0.215	0.049	0.084
Avg. 25% Load	12.184	2.764	11.836	1.531	3.939	0.325	1.434	0.113	0.026	0.113

Table 5.1E-4
CECP Amendment
Emission Rates and Stack Parameters for Refined Modeling

	Stack Diam, m	Stack Height, m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam, ft	Stack Height, ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: One hour NOx																		
Unit 6	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Unit 7	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Unit 8	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Unit 9	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Unit 10	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Unit 11	4.1	27.4	680	478.0	35.9	1.1214	n/a	n/a	n/a	13.5	90	764	1,012,885	118	8.90	n/a	n/a	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	0.1181	n/a	n/a	n/a	0.5	20	842	1,867	158	0.94	n/a	n/a	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	0.2921	n/a	n/a	n/a	0.5	70	1263	3,185	322	2.32	n/a	n/a	n/a
Averaging Period: One hour CO and SOx																		
Unit 6	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Unit 7	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Unit 8	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Unit 9	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Unit 10	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Unit 11	4.1	27.4	690	482.6	36.3	n/a	0.2609	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	2.07	8.80	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	0.0002	0.0318	n/a	0.5	20	842	1,867	158	n/a	1.77E-03	0.25	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	0.0005	0.0422	n/a	0.5	70	1263	3,185	322	n/a	4.21E-03	0.33	n/a
Averaging Period: Three hours SOx																		
Unit 6	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 7	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 8	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 9	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 10	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 11	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	0.0001	n/a	n/a	0.5	20	842	1,867	158	n/a	5.89E-04	n/a	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	0.0002	n/a	n/a	0.5	70	1263	3,185	322	n/a	1.40E-03	n/a	n/a

Table 5.1E-4
Emission Rates and Stack Parameters for Refined Modeling (cont.)

	Stack Diam, m	Stack Height, m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam, ft	Stack Height, ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: Eight hours CO																		
Unit 6	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Unit 7	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Unit 8	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Unit 9	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Unit 10	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Unit 11	4.1	27.4	690	482.6	36.3	n/a	n/a	1.1088	n/a	13.5	90	782	1,022,475	119	n/a	n/a	8.80	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	n/a	0.0040	n/a	0.5	20	842	1,867	158	n/a	n/a	0.03	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	n/a	0.0053	n/a	0.5	70	1263	3,185	322	n/a	n/a	0.04	n/a
Averaging Period: 24-hour SOx																		
Unit 6	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 7	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 8	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 9	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 10	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Unit 11	4.1	27.4	690	482.6	36.3	n/a	0.2609	n/a	n/a	13.5	90	782	1,022,475	119	n/a	2.07	n/a	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	0.0000	n/a	n/a	0.5	20	842	1,867	158	n/a	7.36E-05	n/a	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	0.0000	n/a	n/a	0.5	70	1263	3,185	322	n/a	1.75E-04	n/a	n/a
Averaging Period: 24-hour PM10																		
Unit 6	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Unit 7	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Unit 8	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Unit 9	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Unit 10	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Unit 11	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.4410	13.5	90	920	499,004	58	n/a	n/a	n/a	3.50
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	n/a	n/a	0.0002	0.5	20	842	1,867	158	n/a	n/a	n/a	1.65E-03
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	n/a	n/a	0.0001	0.5	70	1263	3,185	322	n/a	n/a	n/a	1.07E-03

Table 5.1E-4
Emission Rates and Stack Parameters for Refined Modeling (cont.)

						Emission Rates, g/s									Emission Rates, lb/hr			
	Stack Diam, m		Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	NOx	SO2	CO	PM10	Stack Diam, ft		Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	NOx	SO2	CO	PM10
Averaging Period: Annual NOx and SOx																		
Unit 6	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Unit 7	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Unit 8	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Unit 9	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Unit 10	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Unit 11	4.1	27.4	690	482.6	36.3	0.4048	0.0268	n/a	n/a	13.5	90	782	1,022,475	119	3.21	0.21	n/a	n/a
Firepump Engine	0.2	6.1	723	0.9	48.3	0.0027	0.0000	n/a	n/a	0.5	20	842	1,867	158	0.02	4.03E-05	n/a	n/a
Generator Engine	0.1	21.3	957	1.5	98.1	0.0067	0.0000	n/a	n/a	0.5	70	1263	3,185	322	0.05	9.61E-05	n/a	n/a
Averaging Period: Annual PM10																		
Unit 6	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Unit 7	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Unit 8	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Unit 9	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Unit 10	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Unit 11	4.1	27.4	767	235.5	17.7	n/a	n/a	n/a	0.1359	13.5	90	920	499,004	58	n/a	n/a	n/a	1.08
Firepump Engine	0.2	6.1	723	0.9	48.3	n/a	n/a	n/a	0.0001	0.5	20	842	1,867	158	n/a	n/a	n/a	9.05E-04
Generator Engine	0.1	21.3	957	1.5	98.1	n/a	n/a	n/a	0.0001	0.5	70	1263	3,185	322	n/a	n/a	n/a	5.88E-04

Table 5.1E-5
CECP Amendment
Startup/Shutdown Modeling Inputs
Data For Each Unit

Operating Case	Stack Ht. feet	Stack Dia. ft	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K	NOx lb/hr	CO lb/hr	NOx g/sec	CO g/sec
GT Unit 6 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18
GT Unit 7 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18
GT Unit 8 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18
GT Unit 9 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18
GT Unit 10 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18
GT Unit 11 - Startup/Shutdown/Restart	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	28.24	17.31	3.56	2.18

Table 5.1E-6
CECP Amendment
Commissioning Modeling Inputs
Data For Each Unit

Operating Case	Stack Ht. feet	Stack Dia. ft	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K	NOx lb/hr	CO lb/hr	PM10 lb/hr	SOx lb/hr	NOx g/sec	CO g/sec	PM10 g/sec	SOx g/sec
GT Unit 6 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
GT Unit 7 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
GT Unit 8 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
GT Unit 9 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
GT Unit 10 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
GT Unit 11 - Commissioning	90	13.5	523,114	246.91	60.91	18.57	854.20	729.93	90.00	247.67	3.50	2.07	11.34	31.21	0.44	0.26
Existing Unit 1 - normal operation	383	26	418,696						9.07	55.58	7.55	2.13	1.14	7.00	0.95	0.27
Existing Unit 2 - normal operation	383	26	339,751						10.17	61.77	7.55	2.13	1.28	7.78	0.95	0.27
Existing Unit 3 - normal operation	383	26	370,708						9.94	28.75	8.41	2.37	1.25	3.62	1.06	0.30
Existing Unit 4 - normal operation	383	26	992,604						32.91	22.71	24.18	6.82	4.15	2.86	3.05	0.86
Existing Unit 5 - normal operation	383	26	996,771						37.44	118.80	25.90	7.30	4.72	14.97	3.26	0.92
Existing Units - combined stack =	383	26	3,118,530	1471.98	97.90	29.84	310.00	427.59	99.52	287.61	73.58	20.75	12.54	36.24	9.27	2.61
Existing Peaker GT			609,032	287.47			981.00	800.37	7.50	9.51	2.36	0.67	0.95	1.20	0.30	0.08

Appendix 5.1F
Demolition/Construction Emissions

APPENDIX 5.1F

Demolition/Construction Emissions

The demolition/construction of the Amended CECP is scheduled to occur in the following two phases:

- Construction of the new equipment (24-month period); and
- Demolition of the existing Encina Power Station (22-month period).

There is no overlap between these two phases. The emissions were calculated for each phase, and the results of this analysis are discussed below.

5.1 Emission Activities

The primary emission sources during demolition/construction will include exhaust from heavy construction equipment and vehicles, and fugitive dust generated by grading and excavating activities.

Combustion emissions during demolition/construction will result from the following:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, trenching, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from portable welding machines;
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site;
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site including the heavy hauling of major components using truck and/or rail; and
- Exhaust from vehicles used by workers to commute to the construction site.

Fugitive dust emissions from the demolition/construction will result from the following:

- Dust entrained during site preparation and grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

The detailed demolition/construction emissions calculations are shown in the tables attached to this analysis. As discussed in the modeling protocol submitted to the SDAPCD and CEC (see Appendix 5.1D), the CalEEMod model was used to calculate demolition and construction emissions for the Amended CECP.

5.2 Available Mitigation Measures

Listed below are typical mitigation measures being proposed to control exhaust emissions from the diesel heavy equipment and potential emissions of fugitive dust during demolition/construction activities.

- Unpaved surface travel and disturbed areas in the project demolition/construction site will be watered as frequently as necessary to prevent fugitive dust plumes. The frequency of watering can be reduced or eliminated during periods of precipitation.
- The vehicle speed limit will be 15 miles per hour within the demolition/construction site.
- The demolition/construction site entrances shall be posted with visible speed limit signs.

- Demolition/construction equipment vehicle tires will be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.
- Gravel ramps of at least 20 feet in length will be provided at the tire washing/cleaning station.
- Unpaved exits from the demolition/construction site will be graveled or treated to prevent track-out to public roadways.
- Demolition/construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the Compliance Project Manager.
- Demolition/construction areas adjacent to any paved roadway will be provided with sandbags or other measures as specified in the Storm Water Pollution Prevention Plan (SWPPP) to prevent run-off to roadways.
- Paved roads within the demolition/construction site will be cleaned at least once per day (or less during periods of precipitation) on days when demolition/construction activity occurs to prevent the accumulation of dirt and debris.
- At least the first 500 feet of any public roadway exiting from the demolition/construction site shall be cleaned at least once daily when dirt or runoff from the demolition/construction site is visible on public roadways.
- Soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or treated with appropriate dust suppressant compounds.
- Vehicles used to transport solid bulk material on public roadways and having the potential to cause visible emissions will be provided with a cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all demolition/construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

An on-site Air Quality Construction Mitigation Manager will be responsible for directing and documenting compliance with demolition/construction-related mitigation conditions.

5.3 Air Quality Impact Analysis

A dispersion modeling analysis was conducted based on the emissions discussed above using the approach discussed in the modeling protocol submitted to the SDAPCD and CEC (see Appendix 5.1D). Because it will be necessary to continue operating the existing Encina Power Station units during the construction of the new units, the dispersion modeling analysis includes the impacts for the existing Encina units. As shown in the attached detailed emission calculations, the emissions associated with the demolition of the Encina Power Station are lower (daily and annual) than the emissions associated with the construction of the new units. Therefore, because the following construction modeling analysis examines worst-case impacts, a separate modeling analysis was not performed examining the impacts for the demolition of the Encina Power Station.

As shown below in Table 5.1F-1, the results of the analysis indicate that construction activities are not expected to cause or contribute to exceedances of state or federal standards for criteria pollutants, with the exception of the annual state PM_{10}/$PM_{2.5}$ standards and annual federal $PM_{2.5}$ standard. For these pollutants and averaging periods, existing background concentrations already exceed state/federal standards. The best available emission control techniques will be used to minimize emissions during construction. The project construction impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards. It should also be noted that the maximum impacts shown in Table 5.1F-1 are lower (with the exception of SO_2 impacts) than the construction impacts analyzed for the Licensed CECP[1].

TABLE 5.1F-1
Modeled Maximum Impacts (Demolition/Construction – includes impacts from existing Encina units)

Pollutant	Averaging Time	Maximum Project Impact (μg/m³)	Background (μg/m³)	Total Impact (μg/m³)	State Standard (μg/m³)	Federal Standard (μg/m³)
NO_2	1-hour	134.7	152.4	287	339	--
	98th percentile	115.3	105.3[a]	158	--	188
	Annual	10.8	16.9	28	57	100
SO_2	1-hour	4.7	34.1	39	655	--
	99th percentile	4.7	35.8[c]	41	--	196
	24-hour	0.4	7.9	8	105	--
CO	1-hour	736.2	5,040	5,776	23,000	40,000
	8-hour	162.6	4,238	4,401	10,000	10,000
PM_{10}	24-hour	3.6	43	47	50	150
	Annual	0.9	22.8	24	20	--
$PM_{2.5}$	24-hour	2.9	26[b]	29	--	35
	Annual	0.7	13.2	14	12	12

[a] 1-hour NO_2 background concentration is shown as the 3-year average of the 98th percentile as that is the basis of the federal standard.

[b] 24-hr $PM_{2.5}$ background concentration reflects 3-year average of the 98th percentile values based on form of standard.

[c] 1-hr SO_2 background concentration reflects 3-year average of the 99th percentile values based on form of standard.

A health risk assessment of construction impacts was performed in accordance with OEHHA guidance, which requires adjusting the 70-year lifetime dosage to an exposure period of 9 years (despite the fact that project construction will last for only 24 months). At the point of maximum impact along the fenceline of the project, the annual average diesel particulate matter (DPM) impact is 0.5 μg/m^3. Based on a DPM 70-year lifetime unit risk factor of $4.15*10^{-4}$, a duration correction factor of 0.129 (9 years/70 years), and a duration correction factor of 0.224 (245 days per year at 8 hours per day vs. 365 days per year at 24 hours per day) to account for a worker along the fenceline, the cancer risk at the property line is calculated at approximately 6 in one million. This is below the SDAPCD significance threshold of 10 in one million. Because the offsite DPM impacts fall off sharply with distance from the project fenceline, the residential risk at the nearest residential receptor, approximately 0.7 km away, is also expected to be below this significance threshold.

5.4 Detailed Demolition and Construction Emission Calculations

Tables 5.1F-2 through 5.1F-21 provide detailed demolition and construction emission calculations.

1 CEC June 2012 Approval of CECP, Air Quality Table-5.

TABLE 5.1F-2
Construction of Amended CECP - Daily and Annual Construction Emissions

Daily Construction Emissions (peak month) (lbs/day)						
	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Off-Road Equipment (combustion)	118.13	144.91	5.90	0.27	5.47	5.47
Off-Road Equipment and On-Site Vehicle (combustion)	118.31	146.18	6.01	0.27	5.47	5.47
Construction - Fugitive Dust					2.76	1.34
On-site Vehicle - Fugitive Dust					0.24	0.06
Subtotal (Fugitive Dust)					3.00	1.40
Subtotal (On-site)	118.31	146.18	6.01	0.27	8.47	6.86
Offsite						
Worker Travel (combustion)	1.28	12.48	1.03	0.03	0.02	0.02
Truck Emissions (combustion)	2.72	4.19	0.34	0.01	0.04	0.04
Worker Travel - Fugitive Dust					2.29	0.61
Truck - Fugitive Dust					0.19	0.05
Subtotal (Offsite)	4.00	16.67	1.37	0.04	2.54	0.71
Total	122.31	162.85	7.38	0.31	11.01	7.58

Peak Construction Emissions (tons/yr, rolling 12-month maximum)						
	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Off-Road Equipment (combustion)	10.51	12.78	0.52	0.02	0.49	0.49
Off-Road Equipment and Vehicle (combustion)	10.55	12.94	0.54	0.02	0.49	0.49
Construction - Fugitive Dust					0.32	0.17
On-site Vehicle - Fugitive Dust					0.03	0.01
Subtotal (Fugitive Dust)					0.35	0.18
Subtotal (On-site)	10.55	12.94	0.54	0.02	0.84	0.67
Offsite						
Worker Travel (combustion)	0.14	1.30	0.10	0.00	0.00	0.00
Truck Emissions (combustion)	0.19	0.26	0.02	0.0005	0.000	0.003
Worker Travel - Fugitive Dust					0.24	0.06
Truck - Fugitive Dust					0.01	0.00
Subtotal (Offsite)	0.33	1.57	0.13	0.00	0.26	0.07
Total	10.87	14.51	0.67	0.03	1.09	0.74

TABLE 5.1F-3

Construction of Amended CECP - Modeled Emissions, Short-Term Impacts

Short-Term Impacts (24 hours and less)					
Daily working hours (hrs/day)	8				
	NOx	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
TOTAL					
Off Road Equipment and On-site Vehicle (Combustion) (lbs/day)	118.31	146.18	0.27	5.47	5.47
Off Road Equipment and On-site Vehicle (Combustion) (lbs/hr)	14.79	18.27	0.03	0.68	0.68
Off Road Equipment and On-site Vehicle (Combustion) (g/sec)	1.86	2.30	0.004	0.09	0.09
Construction and On-site Vehicle (Fugitive Dust) (lbs/day)				3.00	1.40
Construction and On-site Vehicle (Fugitive Dust) (lbs/hr)				0.38	0.17
Construction and On-site Vehicle (Fugitive Dust) (g/sec)				0.05	0.02

TABLE 5.1F-4

Construction of Amended CECP - Modeled Emissions, Long-Term Impacts

Long-Term Impacts (annual)					
Annual Number of Work Days, Rolling 12-month period (days/yr)	262				
Daily working hours (hrs/day)	8				
	NOx	**CO**	**SOx**	**PM10**	**PM2.5**
TOTAL					
Off Road Equipment and On-site Vehicle (Combustion) (lbs/day)	10.55	12.94	0.02	0.49	0.49
Off Road Equipment and On-site Vehicle (Combustion) (lbs/hr)	10.06	12.35	0.02	0.47	0.47
Off Road Equipment and On-site Vehicle (Combustion) (g/sec)	1.27	1.56	0.003	0.06	0.06
Construction and On-site Vehicle (Fugitive Dust) (lbs/day)				0.35	0.18
Construction and On-site Vehicle (Fugitive Dust) (lbs/hr)				0.33	0.17
Construction and On-site Vehicle (Fugitive Dust) (g/sec)				0.04	0.02

TABLE 5.1F-5

Construction of Amended CECP - Greenhouse Gas Emission Calculations

	GHG Emissions (MT, Total for 24-month Construction Period)			
	CO2	**CH4**	**N2O**	**CO2e**
Off-Road Equipment	2661.61	0.63	0	2674.94
Off-Road Equipment and On-site Vehicle	2701.14	0.64	0	2714.44
Worker Travel	327.85	0.02	0	327.97
Truck Emissions	45.35	3.50E-04	0	45.35
Total	3074.03	0.65	0	3087.76

TABLE 5.1F-6

Construction of CECP - Monthly and Annual Emission Calculations

Project Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		ROG																							
Off-Road Equipment	(tons/month)	0.011	0.016	0.026	0.030	0.030	0.037	0.033	0.036	0.040	0.036	0.042	0.050	0.048	0.059	0.065	0.047	0.012	0.011	0.007	0.004	0.004	0	0	0
On-site Vehicle	(tons/month)	4.19E-04	5.83E-04	7.49E-04	8.23E-04	1.03E-03	1.21E-03	9.31E-04	1.01E-03	1.11E-03	1.08E-03	1.17E-03	1.29E-03	1.22E-03	1.14E-03	1.09E-03	8.84E-04	5.65E-04	5.18E-04	4.13E-04	4.43E-04	3.97E-04	1.76E-04	1.14E-04	9.50E-05
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	1.40E-04	5.40E-04	1.78E-03	1.91E-03	3.35E-03	3.40E-03	1.55E-03	1.50E-03	1.63E-03	1.55E-03	1.44E-03	1.75E-03	1.43E-03	7.50E-04	5.00E-04	3.40E-04	3.10E-04	1.20E-04	1.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	0.004	0.005	0.005	0.005	0.005	0.007	0.007	0.008	0.009	0.009	0.010	0.010	0.010	0.010	0.010	0.008	0.005	0.005	0.004	0.004	0.004	0.002	0.001	0.001
Off-Road Equipment	Rolling 12-month total (tons/year)												0.39	0.42	0.47	0.51	0.52	0.51	0.48	0.45	0.42	0.39	0.35	0.31	0.26
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.08	0.07	0.07
		NOx																							
Off-Road Equipment	(tons/month)	0.21	0.32	0.51	0.58	0.59	0.74	0.66	0.73	0.81	0.74	0.85	1.01	0.96	1.19	1.30	0.94	0.25	0.22	0.14	0.08	0.07	0.00	0.00	0.00
On-site Vehicle	(tons/month)	7.10E-04	1.36E-03	2.94E-03	3.14E-03	4.96E-03	5.25E-03	2.90E-03	2.96E-03	3.22E-03	3.10E-03	3.09E-03	3.60E-03	3.15E-03	2.32E-03	1.98E-03	1.54E-03	1.08E-03	8.11E-04	6.56E-04	5.87E-04	5.25E-04	2.33E-04	1.52E-04	1.25E-04
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	0.001	0.005	0.016	0.016	0.029	0.029	0.013	0.013	0.014	0.013	0.012	0.015	0.012	0.006	0.004	0.003	0.003	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Worker Travel	(tons/month)	0.005	0.007	0.006	0.007	0.007	0.009	0.009	0.011	0.012	0.011	0.013	0.014	0.013	0.014	0.013	0.011	0.007	0.007	0.005	0.006	0.005	0.002	0.002	0.001
Off-Road Equipment	Rolling 12-month total (tons/year)												7.74	8.49	9.36	10.15	10.51	10.16	9.65	9.13	8.48	7.75	7.01	6.16	5.16
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.18	0.19	0.19	0.18	0.16	0.14	0.11	0.10	0.09	0.07	0.06	0.05	0.03
Worker Travel	Rolling 12-month total (tons/year)												0.11	0.12	0.13	0.13	0.14	0.14	0.13	0.13	0.13	0.12	0.11	0.10	0.09
		CO																							
Off-Road Equipment	(tons/month)	0.269	0.402	0.640	0.714	0.715	0.893	0.791	0.883	0.977	0.889	1.016	1.230	1.174	1.454	1.594	1.161	0.326	0.305	0.200	0.099	0.095	0.000	0.000	0.000
On-site Vehicle	(tons/month)	0.005	0.007	0.009	0.010	0.013	0.015	0.012	0.013	0.014	0.014	0.015	0.016	0.015	0.014	0.014	0.011	0.007	0.006	0.005	0.006	0.005	0.002	0.001	0.001
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	0.002	0.006	0.020	0.023	0.040	0.041	0.019	0.018	0.020	0.019	0.017	0.021	0.017	0.009	0.006	0.004	0.004	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Worker Travel	(tons/month)	0.051	0.064	0.062	0.068	0.068	0.089	0.088	0.100	0.109	0.108	0.120	0.130	0.127	0.130	0.128	0.105	0.065	0.063	0.050	0.056	0.050	0.022	0.014	0.012
Off-Road Equipment	Rolling 12-month total (tons/year)												9.42	10.32	11.38	12.33	12.78	12.39	11.80	11.21	10.42	9.54	8.65	7.64	6.41
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.25	0.26	0.26	0.25	0.23	0.19	0.16	0.14	0.12	0.10	0.08	0.06	0.04
Worker Travel	Rolling 12-month total (tons/year)												1.06	1.13	1.20	1.26	1.30	1.30	1.27	1.23	1.19	1.13	1.04	0.94	0.82
		SO2																							
Off-Road Equipment	(tons/month)	4.50E-04	7.30E-04	1.14E-03	1.30E-03	1.35E-03	1.67E-03	1.49E-03	1.63E-03	1.82E-03	1.68E-03	1.96E-03	2.28E-03	2.18E-03	2.70E-03	2.94E-03	2.19E-03	6.10E-04	5.30E-04	3.10E-04	1.80E-04	1.70E-04	0.00E+00	0.00E+00	0.00E+00
On-site Vehicle	(tons/month)	1.00E-05	1.45E-05	1.74E-05	2.19E-05	2.54E-05	3.04E-05	2.44E-05	2.74E-05	2.94E-05	2.94E-05	3.14E-05	3.59E-05	3.34E-05	3.30E-05	3.05E-05	2.75E-05	1.75E-05	1.60E-05	1.30E-05	1.40E-05	1.30E-05	6.00E-06	4.00E-06	3.00E-06
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	0.00E+00	1.00E-05	3.00E-05	4.00E-05	7.00E-05	7.00E-05	3.00E-05	3.00E-05	3.00E-05	3.00E-05	3.00E-05	4.00E-05	3.00E-05	2.00E-05	1.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	1.00E-04	1.30E-04	1.30E-04	1.60E-04	1.50E-04	2.00E-04	2.00E-04	2.30E-04	2.50E-04	2.50E-04	2.70E-04	3.00E-04	2.90E-04	3.00E-04	2.90E-04	2.60E-04	1.60E-04	1.60E-04	1.30E-04	1.40E-04	1.30E-04	6.00E-05	4.00E-05	3.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		PM10																							
Fugitive	(tons/month)	2.8E-02	2.7E-02	2.9E-02	2.7E-02	2.7E-02	2.9E-02	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.00	0.00	0.03	0.03	0.03	0.00	0.00	0.00
Fugitive (On-site Vehicle)	(tons/month)	8.6E-04	1.1E-03	1.2E-03	1.4E-03	1.5E-03	1.9E-03	1.8E-03	2.0E-03	2.2E-03	2.1E-03	2.4E-03	2.6E-03	2.5E-03	2.5E-03	2.4E-03	2.2E-03	1.4E-03	1.3E-03	1.0E-03	1.1E-03	1.0E-03	4.6E-04	3.0E-04	2.4E-04
Fugitive - Hauling	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	(tons/month)	7.00E-05	2.70E-04	9.00E-04	1.09E-03	1.91E-03	1.95E-03	8.90E-04	8.60E-04	9.30E-04	8.90E-04	8.20E-04	1.00E-03	8.20E-04	4.30E-04	2.90E-04	2.10E-04	2.00E-04	7.00E-05	7.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	(tons/month)	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Fugitive	Rolling 12-month total (tons/year)												0.32	0.32	0.32	0.32	0.32	0.30	0.27	0.27	0.27	0.27	0.25	0.22	0.19
Fugitive (On-Site Vehicle)	Rolling 12-month total (tons/year)												0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Fugitive - Hauling	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Truck	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.19	0.21	0.22	0.23	0.24	0.24	0.24	0.23	0.23	0.22	0.20	0.18	0.16
Off-Road Equipment	(tons/month)	0.009	0.015	0.023	0.025	0.026	0.033	0.030	0.034	0.038	0.035	0.040	0.047	0.045	0.056	0.060	0.044	0.012	0.011	0.007	0.003	0.003	0.000	0.000	0.000
On-site Vehicle	(tons/month)	9.96E-06	2.08E-05	4.50E-05	4.55E-05	7.21E-05	7.66E-05	4.26E-05	4.21E-05	4.71E-05	4.46E-05	4.36E-05	5.15E-05	4.46E-05	3.38E-05	2.69E-05	2.19E-05	1.59E-05	1.15E-05	9.48E-06	9.00E-06	8.00E-06	3.00E-06	2.00E-06	2.00E-06
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	2.00E-05	8.00E-05	2.50E-04	2.40E-04	4.20E-04	4.30E-04	2.00E-04	1.90E-04	2.10E-04	2.00E-04	1.80E-04	2.20E-04	1.80E-04	1.00E-04	6.00E-05	4.00E-05	4.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	7.00E-05	9.00E-05	8.00E-05	1.00E-04	1.00E-04	1.30E-04	1.30E-04	1.40E-04	1.60E-04	1.50E-04	1.70E-04	1.90E-04	1.80E-04	1.90E-04	1.80E-04	1.60E-04	1.00E-04	1.00E-04	8.00E-05	9.00E-05	8.00E-05	3.00E-05	2.00E-05	2.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.36	0.39	0.43	0.47	0.49	0.47	0.45	0.43	0.40	0.36	0.33	0.29	0.24
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 5.1F-6 (CONT.)

Construction of CECP - Monthly and Annual Emission Calculations

Project Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
													PM2.5												
Fugitive	(tons/month)	0.015	0.014	0.015	0.014	0.014	0.015	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.015	0.015	0.015	0.000	0.000	0.013	0.015	0.014	0.000	0.000	0.000
Fugitive (On-site Vehicle)	(tons/month)	2.28E-04	2.96E-04	3.12E-04	3.82E-04	4.14E-04	5.22E-04	4.73E-04	5.29E-04	5.79E-04	5.67E-04	6.29E-04	6.85E-04	6.58E-04	6.60E-04	6.43E-04	5.81E-04	3.65E-04	3.46E-04	2.76E-04	3.04E-04	2.72E-04	1.21E-04	7.80E-05	6.50E-05
Fugitive - Hauling	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	(tons/month)	2.00E-05	8.00E-05	2.60E-04	3.10E-04	5.50E-04	5.60E-04	2.50E-04	2.50E-04	2.70E-04	2.50E-04	2.40E-04	2.90E-04	2.30E-04	1.20E-04	8.00E-05	6.00E-05	6.00E-05	2.00E-05	2.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.000
Fugitive - Worker Travel	(tons/month)	0.002	0.003	0.003	0.003	0.003	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.004	0.003	0.003	0.003	0.003	0.001	0.001	0.001
Fugitive	Rolling 12-month total (tons/year)												0.17	0.17	0.17	0.17	0.17	0.16	0.14	0.14	0.14	0.14	0.13	0.11	0.10
Fugitive (On-Site Vehicle)	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Fugitive - Hauling	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Truck	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04
Off-Road Equipment	(tons/month)	0.009	0.015	0.023	0.025	0.026	0.033	0.030	0.034	0.038	0.035	0.040	0.047	0.045	0.056	0.060	0.044	0.012	0.011	0.007	0.003	0.003	0.000	0.000	0.000
On-site Vehicle	(tons/month)	8.96E-06	1.84E-05	4.20E-05	4.15E-05	6.67E-05	7.12E-05	3.86E-05	3.82E-05	4.21E-05	4.06E-05	4.12E-05	4.66E-05	4.22E-05	3.03E-05	2.59E-05	2.09E-05	1.34E-05	1.05E-05	8.48E-06	8.00E-06	7.00E-06	3.00E-06	2.00E-06	2.00E-06
Hauling Emission	(tons/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(tons/month)	2.00E-05	7.00E-05	2.30E-04	2.20E-04	3.90E-04	4.00E-04	1.80E-04	1.70E-04	1.90E-04	1.80E-04	1.70E-04	2.00E-04	1.70E-04	9.00E-05	6.00E-05	4.00E-05	3.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	6.00E-05	8.00E-05	8.00E-05	9.00E-05	9.00E-05	1.20E-04	1.20E-04	1.30E-04	1.40E-04	1.40E-04	1.60E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.50E-04	9.00E-05	9.00E-05	7.00E-05	8.00E-05	7.00E-05	3.00E-05	2.00E-05	2.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.36	0.39	0.43	0.47	0.49	0.47	0.45	0.43	0.40	0.36	0.33	0.29	0.24
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
													CO2												
Off-Road Equipment	(MT/month)	42.51	66.76	105.41	119.47	123.43	152.47	135.25	148.39	165.02	151.71	176.78	207.41	197.98	244.55	267.19	195.84	53.48	47.07	28.69	16.47	15.75	0.00	0.00	0.00
On-site Vehicle	(MT/month)	0.85	1.17	1.44	1.71	2.11	2.49	1.97	2.15	2.35	2.30	2.48	2.74	2.59	2.46	2.35	2.03	1.29	1.19	0.95	1.02	0.92	0.41	0.26	0.22
Hauling Emission	(MT/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(MT/month)	0.24	0.92	3.01	3.62	6.34	6.45	2.94	2.85	3.09	2.94	2.73	3.32	2.72	1.42	0.95	0.70	0.64	0.24	0.21	0.00	0.00	0.00	0.00	0.00
Worker Travel	(MT/month)	8.18	10.33	9.97	11.77	11.69	15.38	15.30	17.26	18.91	18.60	20.80	22.52	21.89	22.52	22.11	19.28	12.00	11.57	9.20	10.24	9.17	4.07	2.64	2.19
Off-Road Equipment	Rolling 12-month total (MT/year)												1,595	1,750	1,928	2,090	2,166	2,096	1,991	1,884	1,752	1,603	1,451	1,274	1,067
Hauling Emission	Rolling 12-month total (MT/year)												0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	Rolling 12-month total (MT/year)												38	41	41	39	36	31	25	22	19	16	13	10	7
Worker Travel	Rolling 12-month total (MT/year)												181	194	207	219	226	227	223	217	210	200	185	167	147
													CH4												
Off-Road Equipment	(MT/month)	0.012	0.015	0.026	0.031	0.032	0.038	0.032	0.035	0.039	0.035	0.041	0.050	0.048	0.057	0.063	0.044	0.011	0.009	0.008	0.005	0.005	0.000	0.000	0.000
On-site Vehicle	(MT/month)	4.50E-05	5.85E-05	5.94E-05	6.64E-05	6.94E-05	8.84E-05	8.40E-05	9.40E-05	1.03E-04	1.01E-04	1.13E-04	1.23E-04	1.19E-04	1.20E-04	1.18E-04	9.95E-05	6.10E-05	5.90E-05	4.70E-05	5.20E-05	4.70E-05	2.10E-05	1.30E-05	1.10E-05
Hauling Emission	(MT/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(MT/month)	0.00E+00	1.00E-05	3.00E-05	3.00E-05	5.00E-05	5.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	3.00E-05	2.00E-05	1.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(MT/month)	4.50E-04	5.70E-04	5.50E-04	6.20E-04	6.20E-04	8.10E-04	8.10E-04	9.10E-04	1.00E-03	9.80E-04	1.10E-03	1.19E-03	1.16E-03	1.19E-03	1.17E-03	9.80E-04	6.10E-04	5.90E-04	4.70E-04	5.20E-04	4.70E-04	2.10E-04	1.30E-04	1.10E-04
Off-Road Equipment	Rolling 12-month total (MT/year)												0.39	0.42	0.46	0.50	0.51	0.49	0.46	0.44	0.41	0.37	0.34	0.30	0.25
Hauling Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (MT/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
													N2O												
Off-Road Equipment	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
On-site Vehicle	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road Equipment	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road + On-Site Veh	Rolling 12-month total (MT/year)												0	0	0	0	0	0	0	0	0	0	0	0	0
Hauling Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
													CO2e												
Off-Road Equipment	(MT/month)	42.77	67.07	105.95	120.11	124.09	153.27	135.93	149.12	165.83	152.44	177.63	208.47	198.99	245.74	268.52	196.76	53.70	47.27	28.85	16.57	15.85	0.00	0.00	0.00
On-site Vehicle	(MT/month)	0.85	1.17	1.44	1.71	2.11	2.49	1.97	2.15	2.35	2.30	2.49	2.75	2.59	2.47	2.35	2.03	1.30	1.19	0.95	1.03	0.92	0.41	0.26	0.22
Off-Road + On-Site Veh	(MT/month)	43.62	68.24	107.40	121.83	126.20	155.76	137.90	151.27	168.18	154.73	180.12	211.21	201.59	248.20	270.87	198.79	55.00	48.46	29.81	17.60	16.77	0.41	0.26	0.22
Hauling Emission	(MT/month)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	(MT/month)	0.24	0.92	3.01	3.63	6.34	6.45	2.95	2.85	3.09	2.95	2.73	3.32	2.72	1.42	0.95	0.70	0.64	0.24	0.21	0.00	0.00	0.00	0.00	0.00
Worker Travel	(MT/month)	8.19	10.34	9.99	11.78	11.70	15.40	15.32	17.28	18.93	18.62	20.82	22.55	21.92	22.55	22.14	19.30	12.01	11.58	9.21	10.26	9.18	4.08	2.65	2.19
Off-Road Equipment	Rolling 12-month total (MT/year)												1,603	1,759	1,938	2,100	2,177	2,106	2,000	1,893	1,761	1,611	1,458	1,281	1,072
Off-Road + On-Site Veh	Rolling 12-month total (MT/year)												1,626	1,784	1,964	2,128	2,205	2,134	2,026	1,918	1,785	1,633	1,479	1,299	1,088
Hauling Emission	Rolling 12-month total (MT/year)												0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	Rolling 12-month total (MT/year)												38	41	41	39	36	31	25	22	19	16	13	10	7
Worker Travel	Rolling 12-month total (MT/year)												181	195	207	219	227	227	223	217	210	200	186	167	147

TABLE 5.1F-7

Construction of CECP – Summer (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	ROG (lbs/day)																							
Off-Road Equipment	0.95	1.52	2.25	2.82	2.87	3.24	3.13	3.29	3.65	3.47	3.64	4.55	4.55	5.37	5.90	4.29	1.23	0.98	0.72	0.35	0.35	0.00	0.00	0.00
On-site Vehicle	0.04	0.06	0.06	0.08	0.10	0.10	0.09	0.09	0.10	0.10	0.10	0.12	0.12	0.11	0.10	0.08	0.06	0.05	0.04	0.04	0.04	0.02	0.01	0.01
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.01	0.05	0.14	0.17	0.29	0.27	0.14	0.13	0.14	0.14	0.11	0.15	0.13	0.06	0.04	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.368	0.4869	0.4293	0.5243	0.5209	0.6257	0.6817	0.7341	0.804	0.8285	0.8459	0.9578	0.9753	0.9578	0.9403	0.7752	0.5306	0.4448	0.4067	0.394	0.3686	0.1716	0.1017	0.0921
	NOx (lbs/day)																							
Off-Road Equipment	18.67	30.23	44.58	55.62	56.54	64.31	62.62	66.24	73.51	70.31	73.57	91.45	91.45	107.84	118.13	85.87	24.56	19.49	14.44	6.80	6.80	0.00	0.00	0.00
On-site Vehicle	0.06	0.12	0.24	0.29	0.45	0.44	0.26	0.25	0.28	0.28	0.25	0.31	0.28	0.20	0.17	0.13	0.10	0.06	0.06	0.05	0.04	0.02	0.01	0.01
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.11	0.44	1.31	1.52	2.65	2.46	1.23	1.14	1.23	1.23	1.04	1.33	1.14	0.57	0.38	0.25	0.25	0.08	0.08	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.43	0.57	0.51	0.62	0.61	0.73	0.80	0.86	0.94	0.97	0.99	1.12	1.14	1.12	1.10	0.91	0.62	0.52	0.48	0.46	0.43	0.20	0.12	0.11
	CO (lbs/day)																							
Off-Road Equipment	24.46	38.25	55.66	68.03	68.09	77.63	75.37	80.25	88.82	84.67	88.33	111.79	111.79	132.18	144.91	105.58	32.59	26.49	19.99	8.63	8.63	0.00	0.00	0.00
On-site Vehicle	0.49	0.70	0.77	0.93	1.13	1.23	1.09	1.14	1.24	1.27	1.26	1.46	1.45	1.32	1.27	1.03	0.72	0.58	0.53	0.50	0.47	0.22	0.13	0.12
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.12	0.49	1.46	1.78	3.11	2.89	1.45	1.33	1.45	1.45	1.22	1.56	1.33	0.67	0.45	0.31	0.31	0.10	0.10	0.00	0.00	0.00	0.00	0.00
Worker Travel	4.75	6.28	5.54	6.71	6.67	8.01	8.72	9.40	10.29	10.60	10.83	12.26	12.48	12.26	12.03	9.87	6.76	5.67	5.18	5.02	4.69	2.19	1.29	1.17
	SO2 (lbs/day)																							
Off-Road Equipment	0.04	0.07	0.10	0.12	0.13	0.14	0.14	0.15	0.17	0.16	0.17	0.21	0.21	0.25	0.27	0.20	0.06	0.05	0.03	0.02	0.02	0.00	0.00	0.00
On-site Vehicle	1.03E-03	1.46E-03	1.59E-03	2.12E-03	2.54E-03	2.78E-03	2.49E-03	2.61E-03	2.85E-03	2.93E-03	2.91E-03	3.34E-03	3.32E-03	3.06E-03	2.94E-03	2.65E-03	1.85E-03	1.50E-03	1.37E-03	1.29E-03	1.21E-03	5.62E-04	3.33E-04	3.02E-04
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	2.40E-04	9.50E-04	2.86E-03	3.81E-03	6.66E-03	6.19E-03	3.09E-03	2.86E-03	3.09E-03	3.09E-03	2.62E-03	3.33E-03	2.86E-03	1.43E-03	9.50E-04	7.10E-04	7.10E-04	2.40E-04	2.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	PM10 (lbs/day)																							
Fugitive	2.56	2.56	2.56	2.56	2.56	2.56	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.56	2.76	2.56	0.21	0.21	2.56	2.35	2.35	0.00	0.00	0.00
Fugitive (On-site Vehicle)	0.08	0.11	0.10	0.14	0.15	0.17	0.17	0.18	0.20	0.21	0.21	0.24	0.24	0.23	0.22	0.20	0.14	0.12	0.11	0.10	0.10	0.04	0.03	0.02
Fugitive - Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	0.01	0.03	0.08	0.11	0.19	0.17	0.09	0.08	0.09	0.09	0.07	0.09	0.08	0.04	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	0.79	1.04	0.92	1.23	1.22	1.47	1.60	1.73	1.89	1.95	1.99	2.25	2.29	2.25	2.21	2.00	1.37	1.15	1.05	1.02	0.95	0.44	0.26	0.24
Off-Road Equipment	0.83	1.38	2.00	2.42	2.43	2.84	2.87	3.12	3.45	3.37	3.49	4.29	4.29	5.05	5.47	3.99	1.18	0.93	0.72	0.28	0.28	0.00	0.00	0.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.00	0.01	0.02	0.02	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
	PM2.5 (lbs/day)																							
Fugitive	1.31	1.31	1.31	1.31	1.31	1.31	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.31	1.34	1.31	0.02	0.02	1.31	1.29	1.29	0.00	0.00	0.00
Fugitive (On-site Vehicle)	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.01	0.01	0.01
Fugitive - Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	0.00	0.01	0.02	0.03	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	0.21	0.28	0.24	0.33	0.32	0.39	0.42	0.46	0.50	0.52	0.53	0.60	0.61	0.60	0.59	0.53	0.36	0.31	0.28	0.27	0.25	0.12	0.07	0.06
Off-Road Equipment	0.83	1.38	2.00	2.42	2.43	2.84	2.87	3.12	3.45	3.37	3.49	4.29	4.29	5.05	5.47	3.99	1.18	0.93	0.72	0.28	0.28	0.00	0.00	0.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.00	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00

TABLE 5.1F-7 (CONT.)

Construction of CECP – Summer (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	CO2 (lbs/day)																							
Off-Road Equipment	4,260	7,008	10,104	12,542	12,958	14,614	14,199	14,870	16,536	15,927	16,945	20,785	20,785	24,506	26,775	19,625	5,895	4,512	3,162	1,579	1,579	0	0	0
On-site Vehicle	90	129	144	187	228	247	215	225	246	252	249	287	285	259	248	214	150	120	110	104	97	45	27	24
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	24	97	290	382	668	620	310	286	310	310	262	334	286	143	95	70	70	23	23	0	0	0	0	0
Worker Travel	864	1,143	1,008	1,303	1,294	1,555	1,694	1,824	1,998	2,058	2,102	2,380	2,423	2,380	2,336	2,037	1,394	1,169	1,069	1,035	969	451	267	242
	CH4 (lbs/day)																							
Off-Road Equipment	1.24	1.56	2.49	3.21	3.30	3.67	3.40	3.48	3.90	3.63	3.89	5.04	5.04	5.67	6.35	4.40	1.19	0.90	0.88	0.47	0.47	0.00	0.00	0.00
On-site Vehicle	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	2.10E-04	8.40E-04	2.51E-03	2.95E-03	5.16E-03	4.79E-03	2.40E-03	2.21E-03	2.40E-03	2.40E-03	2.03E-03	2.58E-03	2.21E-03	1.11E-03	7.40E-04	5.20E-04	5.20E-04	1.70E-04	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.05	0.06	0.05	0.07	0.06	0.08	0.08	0.09	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.10	0.07	0.06	0.05	0.05	0.05	0.02	0.01	0.01
	N2O (lbs/day)																							
Off-Road Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO2e (lbs/day)																							
Off-Road Equipment	4,286	7,041	10,156	12,609	13,027	14,691	14,270	14,944	16,618	16,003	17,027	20,891	20,891	24,625	26,908	19,717	5,920	4,531	3,181	1,588	1,588	0	0	0
On-site Vehicle	90	129	144	187	228	247	215	225	246	252	249	288	285	259	248	214	150	120	110	104	97	45	27	24
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	24	97	290	382	668	620	310	286	310	310	262	334	286	143	95	70	70	23	23	0	0	0	0	0
Worker Travel	865	1,144	1,009	1,304	1,295	1,556	1,695	1,826	2,000	2,061	2,104	2,382	2,426	2,382	2,339	2,040	1,396	1,170	1,070	1,036	970	451	267	242

TABLE 5.1F-8

Construction of CECP – Winter (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ROG (lbs/day)																								
Off-Road Equipment	0.95	1.52	2.25	2.82	2.87	3.24	3.13	3.29	3.65	3.47	3.64	4.55	4.55	5.37	5.90	4.29	1.23	0.98	0.72	0.35	0.35	0.00	0.00	0.00
On-site Vehicle	0.04	0.06	0.07	0.08	0.11	0.11	0.10	0.10	0.11	0.11	0.11	0.13	0.12	0.11	0.11	0.09	0.06	0.05	0.04	0.04	0.04	0.02	0.01	0.01
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.01	0.05	0.16	0.19	0.34	0.31	0.16	0.14	0.16	0.16	0.13	0.17	0.14	0.07	0.05	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.39	0.52	0.46	0.56	0.55	0.66	0.72	0.78	0.85	0.88	0.90	1.02	1.03	1.02	1.00	0.82	0.56	0.47	0.43	0.42	0.39	0.18	0.11	0.10
NOx (lbs/day)																								
Off-Road Equipment	18.67	30.23	44.58	55.62	56.54	64.31	62.62	66.24	73.51	70.31	73.57	91.45	91.45	107.84	118.13	85.87	24.56	19.49	14.44	6.80	6.80	0.00	0.00	0.00
On-site Vehicle	0.07	0.13	0.26	0.30	0.47	0.46	0.28	0.27	0.29	0.30	0.27	0.33	0.30	0.21	0.18	0.14	0.11	0.07	0.07	0.05	0.05	0.02	0.01	0.01
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.11	0.45	1.34	1.55	2.72	2.52	1.26	1.16	1.26	1.26	1.07	1.36	1.16	0.58	0.39	0.26	0.26	0.09	0.09	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.49	0.64	0.57	0.69	0.69	0.82	0.90	0.97	1.06	1.09	1.11	1.26	1.28	1.26	1.24	1.02	0.70	0.59	0.54	0.52	0.49	0.23	0.13	0.12
CO (lbs/day)																								
Off-Road Equipment	24.46	38.25	55.66	68.03	68.09	77.63	75.37	80.25	88.82	84.67	88.33	111.79	111.79	132.18	144.91	105.58	32.59	26.49	19.99	8.63	8.63	0.00	0.00	0.00
On-site Vehicle	0.49	0.71	0.83	1.01	1.27	1.35	1.14	1.18	1.29	1.32	1.30	1.50	1.48	1.32	1.26	1.02	0.72	0.57	0.52	0.49	0.45	0.21	0.13	0.11
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.16	0.64	1.93	2.40	4.19	3.89	1.95	1.80	1.95	1.95	1.65	2.10	1.80	0.90	0.60	0.43	0.43	0.14	0.14	0.00	0.00	0.00	0.00	0.00
Worker Travel	4.63	6.13	5.40	6.52	6.48	7.78	8.48	9.13	10.00	10.30	10.52	11.91	12.13	11.91	11.69	9.54	6.53	5.48	5.01	4.85	4.54	2.11	1.25	1.13
SO2 (lbs/day)																								
Off-Road Equipment	0.04	0.07	0.10	0.12	0.13	0.14	0.14	0.15	0.17	0.16	0.17	0.21	0.21	0.25	0.27	0.20	0.06	0.05	0.03	0.02	0.02	0.00	0.00	0.00
On-site Vehicle	9.74E-04	1.38E-03	1.52E-03	2.03E-03	2.44E-03	2.66E-03	2.37E-03	2.47E-03	2.71E-03	2.78E-03	2.75E-03	3.17E-03	3.15E-03	2.89E-03	2.77E-03	2.49E-03	1.74E-03	1.41E-03	1.29E-03	1.21E-03	1.13E-03	5.28E-04	3.13E-04	2.83E-04
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	2.40E-04	9.50E-04	2.85E-03	3.79E-03	6.63E-03	6.16E-03	3.08E-03	2.84E-03	3.08E-03	3.08E-03	2.60E-03	3.31E-03	2.84E-03	1.42E-03	9.50E-04	7.10E-04	7.10E-04	2.40E-04	2.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00
PM10 (lbs/day)																								
Fugitive	2.56	2.56	2.56	2.56	2.56	2.56	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.56	2.76	2.56	0.21	0.21	2.56	2.35	2.35	0.00	0.00	0.00
Fugitive (On-site Vehicle)	0.08	0.11	0.10	0.14	0.15	0.17	0.17	0.18	0.20	0.21	0.21	0.24	0.24	0.23	0.22	0.20	0.14	0.12	0.11	0.10	0.10	0.04	0.03	0.02
Fugitive - Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	0.01	0.03	0.08	0.11	0.19	0.17	0.09	0.08	0.09	0.09	0.07	0.09	0.08	0.04	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	0.79	1.04	0.92	1.23	1.22	1.47	1.60	1.73	1.89	1.95	1.99	2.25	2.29	2.25	2.21	2.00	1.37	1.15	1.05	1.02	0.95	0.44	0.26	0.24
Off-Road Equipment	0.83	1.38	2.00	2.42	2.43	2.84	2.87	3.12	3.45	3.37	3.49	4.29	4.29	5.05	5.47	3.99	1.18	0.93	0.72	0.28	0.28	0.00	0.00	0.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.00	0.01	0.02	0.02	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
PM2.5 (lbs/day)																								
Fugitive	1.31	1.31	1.31	1.31	1.31	1.31	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.31	1.34	1.31	0.02	0.02	1.31	1.29	1.29	0.00	0.00	0.00
Fugitive (On-site Vehicle)	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.01	0.01	0.01
Fugitive - Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fugitive - Truck	1.89E-03	7.57E-03	2.27E-02	3.03E-02	5.30E-02	4.92E-02	2.46E-02	2.27E-02	2.46E-02	2.46E-02	2.08E-02	2.65E-02	2.27E-02	1.14E-02	7.57E-03	5.68E-03	5.68E-03	1.89E-03	1.89E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	0.21	0.28	0.24	0.33	0.32	0.39	0.42	0.46	0.50	0.52	0.53	0.60	0.61	0.60	0.59	0.53	0.36	0.31	0.28	0.27	0.25	0.12	0.07	0.06
Off-Road Equipment	0.83	1.38	2.00	2.42	2.43	2.84	2.87	3.12	3.45	3.37	3.49	4.29	4.29	5.05	5.47	3.99	1.18	0.93	0.72	0.28	0.28	0.00	0.00	0.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0.00	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00

TABLE 5.1F-8 (CONT.)

Construction of CECP – Winter (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	CO2 (lbs/day)																							
Off-Road Equipment	4,260	7,008	10,104	12,542	12,958	14,614	14,199	14,870	16,536	15,927	16,945	20,785	20,785	24,506	26,775	19,625	5,895	4,512	3,162	1,579	1,579	0	0	0
On-site Vehicle	85	122	137	178	220	237	205	213	233	239	236	273	270	245	233	202	141	113	104	97	91	42	25	23
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	24	96	288	379	663	616	308	284	308	308	260	331	284	142	95	70	70	23	23	0	0	0	0	0
Worker Travel	811	1073	947	1224	1215	1460	1591	1713	1876	1933	1974	2235	2276	2235	2194	1913	1310	1098	1004	972	910	423	251	227
	CH4 (lbs/day)																							
Off-Road Equipment	1.24	1.56	2.49	3.21	3.30	3.67	3.40	3.48	3.90	3.63	3.89	5.04	5.04	5.67	6.35	4.40	1.19	0.90	0.88	0.47	0.47	0.00	0.00	0.00
On-site Vehicle	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	2.10E-04	8.60E-04	2.57E-03	3.02E-03	5.29E-03	4.91E-03	2.46E-03	2.27E-03	2.46E-03	2.46E-03	2.08E-03	2.65E-03	2.27E-03	1.13E-03	7.60E-04	5.40E-04	5.40E-04	1.80E-04	1.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.05	0.06	0.05	0.07	0.06	0.08	0.08	0.09	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.10	0.07	0.06	0.05	0.05	0.05	0.02	0.01	0.01
	N2O (lbs/day)																							
Off-Road Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker Travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CO2e (lbs/day)																							
Off-Road Equipment	4,286	7,041	10,156	12,609	13,027	14,691	14,270	14,944	16,618	16,003	17,027	20,891	20,891	24,625	26,908	19,717	5,920	4,531	3,181	1,588	1,588	0	0	0
On-site Vehicle	85	122	137	179	220	237	205	214	233	239	236	273	270	245	234	202	141	113	104	97	91	42	25	23
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	24	96	288	379	663	616	308	284	308	308	260	332	284	142	95	70	70	23	23	0	0	0	0	0
Worker Travel	812	1,075	948	1,225	1,217	1,462	1,592	1,715	1,878	1,935	1,976	2,237	2,278	2,237	2,197	1,915	1,311	1,099	1,005	973	911	424	251	228

TABLE 5.1F-9

Construction of CECP - CalEEMod Input Data

Project Name	CECP Construction	
District	San Diego County	
Wind Speed	2.6	m/s
Precipitation Frequency	40	days/year
Climate Zone	13	
Urbanization Level	Urban	
Expected Operational Year	2021	
Utility Company	San Diego Gas & Electric	
CO2 Intensity Factor	720.49	
CH4 Intensity Factor	0.029	
N2O Intensity Factor	0.006	

CalEEMod Phase Name	Phase Type	Start Date	End Date	# day/Week	Number of Days	Daily hours	Month
Construction 1	Grading	2015/10/01	2015/10/31	5	22	8	1
Construction 2	Grading	2015/11/01	2015/11/30	5	21	8	2
Construction 3	Grading	2015/12/01	2015/12/31	5	23	8	3
Construction 4	Grading	2016/01/01	2016/01/31	5	21	8	4
Construction 5	Grading	2016/02/01	2016/02/29	5	21	8	5
Construction 6	Grading	2016/03/01	2016/03/31	5	23	8	6
Construction 7	Grading	2016/04/01	2016/04/30	5	21	8	7
Construction 8	Grading	2016/05/01	2016/05/31	5	22	8	8
Construction 9	Grading	2016/06/01	2016/06/30	5	22	8	9
Construction 10	Grading	2016/07/01	2016/07/31	5	21	8	10
Construction 11	Grading	2016/08/01	2016/08/31	5	23	8	11
Construction 12	Grading	2016/09/01	2016/09/30	5	22	8	12
Construction 13	Grading	2016/10/01	2016/10/31	5	21	8	13
Construction 14	Grading	2016/11/01	2016/11/30	5	22	8	14
Construction 15	Grading	2016/12/01	2016/12/31	5	22	8	15
Construction 16	Grading	2017/01/01	2017/01/31	5	22	8	16
Construction 17	Grading	2017/02/01	2017/02/28	5	20	8	17
Construction 18	Grading	2017/03/01	2017/03/31	5	23	8	18
Construction 19	Grading	2017/04/01	2017/04/30	5	20	8	19
Construction 20	Grading	2017/05/01	2017/05/31	5	23	8	20
Construction 21	Grading	2017/06/01	2017/06/30	5	22	8	21
Construction 22	Grading	2017/07/01	2017/07/31	5	21	8	22
Construction 23	Grading	2017/08/01	2017/08/31	5	23	8	23
Construction 24	Grading	2017/09/01	2017/09/30	5	20	8	24

TABLE 5.1F-10

Construction of CECP - CalEEMod Equipment Schedule Input

Project Month			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Construction Equipment Usage																										
	CalEEMod Equipment Type	**Rating (hp)**																								
CalEEMod INPUT																										
Air Compressors	Air compressors	78	0	2	2	2	2	4	6	8	9	10	10	10	10	12	12	9	2	1	1	0	0	0	0	0
Cranes, 225 Ton	Cranes	350	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Cranes, 150 Ton	Cranes	250	0	0	0	0	2	2	2	2	2	2	2	2	2	3	3	3	0	0	0	0	0	0	0	0
Cranes, 40 Ton and 20 Ton	Cranes	185	0	1	2	2	2	2	2	2	3	3	3	6	6	6	6	3	1	1	0	0	0	0	0	0
Light Towers	Dumpers/Tenders	15.5	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator, Backhoe	Excavator	84	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	2	1	1	1	0	0	0	0	0
Excavator, Motor Grader	Graders	150	1	1	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0
Water Trucks	Off-Highway Trucks	500	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0
Trucks, Fuel/Lube	Off-Highway Trucks	210	0	0	0	1	1	1	1	1	2	2	3	4	4	4	4	3	1	0	0	0	0	0	0	0
Trucks, Large	Off-Highway Trucks	180	1	1	3	3	3	3	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0
Paving Equipment	Paving Equipment	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0
Compactors	Paving Equipment	145	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	2	1	1	1	1	1	0	0	0
Truck, Concrete Pump	Pumps	190	0	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	0	0	0	0	0	0
Dozer	Rubber Tired Dozer	285	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0
Dozer	Rubber Tired Dozer	265	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Excavator, Loader	Rubber Tired Loader	200	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator, Loader	Rubber Tired Loader	140	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator, Loader	Rubber Tired Loader	150	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Welders	Welders	23	0	1	1	2	4	4	4	5	6	7	10	10	10	10	10	10	5	2	1	1	1	0	0	0

Notes:

CalEEMod default values for usage load factors are used.

No default CalEEMod equipment type for light towers; equipment type that matches the closest in horsepower (dumper/tenders) was chosen to represent light towers, per CalEEMod User Guide Section 4.3.2.

TABLE 5.1F-11

Construction of CECP - CalEEMod Vehicle Trips Input

Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
No of Days	22	21	23	21	21	23	21	22	22	21	23	22	21	22	22	22	20	23	20	23	22	21	23	20
Construction																								
Workers																								
Plant																								
Insulation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	9	11	11	11	18	14	0	0	0
Boiler Makers	0	0	3	3	5	10	12	12	19	19	17	19	19	22	19	14	6	6	6	6	6	11	0	0
Masons	0	0	0	2	4	4	4	4	3	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Carpenters	3	3	15	25	18	26	26	26	26	26	26	15	15	21	20	11	10	9	7	5	5	2	1	0
Electricians	3	3	5	7	8	10	14	20	24	24	24	25	25	35	35	35	18	15	11	7	7	5	5	5
Ironworkers	0	0	4	9	6	7	13	16	16	22	20	20	20	27	29	31	14	11	10	9	9	3	0	0
Laborers	22	34	34	38	38	38	38	38	38	38	36	28	25	34	25	25	14	13	13	15	15	3	2	2
Millwrights	0	0	0	0	0	0	6	6	7	7	7	11	11	14	13	10	9	8	8	8	8	1	1	1
Operating Engineers	24	30	0	3	6	9	7	9	10	10	12	12	12	13	15	16	9	8	7	7	7	1	1	0
Plasterers	0	0	0	0	0	0	0	0	1	2	2	2	3	4	4	2	2	1	0	0	0	0	0	0
Painters	0	0	0	0	0	0	0	1	1	2	2	4	3	4	4	4	4	4	3	3	2	2	0	0
Pipefitters	3	5	10	10	12	20	30	30	34	34	34	32	34	36	36	36	25	20	20	16	14	4	4	4
Sheetmetal Workers	0	0	0	0	0	2	4	7	7	8	8	9	10	11	11	8	6	5	3	3	3	1	0	0
Sprinkler Fitters	0	0	0	0	0	0	1	1	1	1	3	4	7	7	7	5	5	4	4	3	3	0	0	0
Teamsters	24	27	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0
Surveyors	3	5	5	5	4	5	4	4	3	3	3	3	3	3	3	2	2	2	2	1	1	2	0	0
Manual Staff Subtotal	**82**	**107**	**78**	**104**	**103**	**133**	**161**	**176**	**192**	**199**	**197**	**187**	**190**	**234**	**231**	**210**	**137**	**119**	**107**	**103**	**95**	**36**	**15**	**12**
Other Plant Staff	14	20	34	46	46	46	34	34	38	38	45	44	46	40	38	34	30	21	21	21	21	18	17	17
Plant Total	**96**	**127**	**112**	**150**	**149**	**179**	**195**	**210**	**230**	**237**	**242**	**231**	**236**	**274**	**269**	**244**	**167**	**140**	**128**	**124**	**116**	**54**	**32**	**29**
Linear Construction																								
Laborers												18	21											
Operating Engineers												9	7											
Pipefitters												7	7											
Teamsters												5	4											
Manual Staff Subtotal												**39**	**39**											
Linear Construction Staff												4	4											
Linear Construction Total												**43**	**43**											
Total Construction Staff	**96**	**127**	**112**	**150**	**149**	**179**	**195**	**210**	**230**	**237**	**242**	**274**	**279**	**274**	**269**	**244**	**167**	**140**	**128**	**124**	**116**	**54**	**32**	**29**
Worker Travel (trips/day)	**96**	**127**	**112**	**150**	**149**	**179**	**195**	**210**	**230**	**237**	**242**	**274**	**279**	**274**	**269**	**244**	**167**	**140**	**128**	**124**	**116**	**54**	**32**	**29**

TABLE 5.1F-11 (CONT.)

Construction of CECP - CalEEMod Vehicle Trips Input

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
No of Days	22	21	23	21	21	23	21	22	22	21	23	22	21	22	22	22	20	23	20	23	22	21	23	20
Construction Schedule for Truck Deliveries of Equipment																								
Generating Facility																								
Combustion Turbine/Generator							5	13	25	32	34	29	19	10	10									
Mechanical Equipment			5	5	16	16	32	32	54	54	53	53	32	26	13	5	3							
Electrical Equipment and Materials		3	3	8	8	11	16	16	32	32	32	43	37	27	16	16	5	5						
Piping, Supports & Valves		3	4	8	14	27	43	43	53	54	64	53	32	26	16	5	5							
Concrete and Rebar		50	197	245	484	484	105	87	43	17	9													
Miscellaneous Steel/Architectural				5	5	16	27	32	32	26	10	5												
Consumables/Supplies	14	16	35	38	43	43	43	43	43	46	46	46	46	37	37	27	27	10	10	3				
Contractor Mobilization & Demobilization	11	11	16	10	5										3	10	16	10	10	3				
Construction Equipment	5	5	11	8	8	5	5	5	4	4	2	2	1	1	3	3	5	3	3					
Miscellaneous																					3	3	3	3
Subtotal	**30**	**88**	**271**	**327**	**583**	**602**	**276**	**271**	**286**	**265**	**250**	**231**	**167**	**127**	**98**	**66**	**61**	**28**	**23**	**6**	**3**	**3**	**3**	**3**
Project Linears																								
Electrical Equipment and Materials												6	6											
Piping, Supports & Valves												18	18											
Concrete and Rebar												20	23											
Miscellaneous Steel/Architectural												2	4											
Consumables/Supplies												18	18											
Construction Equipment												13	13											
Subtotal												**77**	**82**											
Truck Travel Total	**30**	**88**	**271**	**327**	**583**	**602**	**276**	**271**	**286**	**265**	**250**	**308**	**249**	**127**	**98**	**66**	**61**	**28**	**23**	**6**	**3**	**3**	**3**	**3**
Truck Travel (Average Daily)	**1**	**4**	**12**	**16**	**28**	**26**	**13**	**12**	**13**	**13**	**11**	**14**	**12**	**6**	**4**	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**

TABLE 5.1F-12
Demolition of Existing Encina Power Station - Daily and Annual Construction Emissions

Daily Construction Emissions (peak month) (lbs/day)						
	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Off-Road Equipment (combustion)	53.01	89.66	2.20	0.14	0.22	0.22
Off-Road Equipment and On-Site Vehicle (combustion)	53.20	90.19	2.24	0.14	0.22	0.22
Construction - Fugitive Dust					0.47	0.07
On-site Vehicle - Fugitive Dust					0.18	0.05
Subtotal (Fugitive Dust)					0.65	0.12
Subtotal (On-site)	53.20	90.19	2.24	0.14	0.87	0.34
Offsite						
Worker Travel (combustion)	0.74	7.13	0.59	0.02	0.01	0.01
Truck Emissions (combustion)	0.08	0.14	0.01	0.00	0.00	0.00
Hauling Emissions (combustion)	4.28	4.44	0.36	0.01	0.06	0.06
Worker Travel - Fugitive Dust					1.59	0.42
Truck - Fugitive Dust					0.01	0.00
Hauling - Fugitive Dust					0.32	0.09
Subtotal (Offsite)	5.10	11.70	0.96	0.03	1.99	0.58
Total	58.30	101.89	3.21	0.17	2.86	0.92

Peak Construction Emissions (tons/yr, rolling 12-month maximum)						
	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Off-Road Equipment (combustion)	4.20	7.10	0.18	0.01	0.02	0.02
Off-Road Equipment and Vehicle (combustion)	4.21	7.15	0.19	0.01	0.02	0.02
Construction - Fugitive Dust					0.06	0.01
On-site Vehicle - Fugitive Dust					0.01	0.00
Subtotal (Fugitive Dust)					0.07	0.01
Subtotal (On-site)	4.21	7.15	0.19	0.01	0.09	0.03
Offsite						
Worker Travel (combustion)	0.05	0.47	0.04	0.00	0.00	0.00
Truck Emissions (combustion)	0.01	0.02	0.001	0.00	0.00	0.00
Hauling Emissions (combustion)	0.24	0.24	0.02	0.00	0.00	0.00
Worker Travel - Fugitive Dust					0.11	0.03
Truck - Fugitive Dust					0.00	0.00
Hauling - Fugitive Dust					0.02	0.01
Subtotal (Offsite)	0.30	0.72	0.06	0.00	0.13	0.04
Total	4.51	7.87	0.24	0.01	0.22	0.07

TABLE 5.1F-13

Demolition of Existing Encina Power Station - Modeled Emissions, Short-Term Impacts

Short Term Impacts (24 hours and less)					
Daily working hours (hrs/day)	8				
	NOx	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
TOTAL					
Off Road Equipment and On-site Vehicle (Combustion) (lbs/day)	53.20	90.19	0.14	0.22	0.22
Off Road Equipment and On-site Vehicle (Combustion) (lbs/hr)	6.65	11.27	0.02	0.03	0.03
Off Road Equipment and On-site Vehicle (Combustion) (g/sec)	0.84	1.42	0.002	0.00	0.00
Construction and On-site Vehicle (Fugitive Dust) (lbs/day)				0.65	0.12
Construction and On-site Vehicle (Fugitive Dust) (lbs/hr)				0.08	0.01
Construction and On-site Vehicle (Fugitive Dust) (g/sec)				0.01	0.00

TABLE 5.1F-14

Demolition of Existing Encina Power Station - Modeled Emissions, Long-Term Impacts

Long Term Impacts (annual)					
Annual Number of Work Days, Rolling 12-month period (days/yr)	261				
Daily working hours (hrs/day)	8				
	NOx	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
TOTAL					
Off Road Equipment and On-site Vehicle (Combustion) (lbs/day)	4.21	7.15	0.01	0.02	0.02
Off Road Equipment and On-site Vehicle (Combustion) (lbs/hr)	4.04	6.85	0.01	0.02	0.02
Off Road Equipment and On-site Vehicle (Combustion) (g/sec)	0.51	0.86	0.001	0.002	0.002
Construction and On-site Vehicle (Fugitive Dust) (tons/yr)				0.07	0.01
Construction and On-site Vehicle (Fugitive Dust) (lbs/hr)				0.07	0.01
Construction and On-site Vehicle (Fugitive Dust) (g/sec)				0.01	0.00

TABLE 5.1F-15

Demolition of Existing Encina Power Station - Greenhouse Gas Emission Calculations

	GHG Emissions (MT, Total for 22-month Construction Period)			
	CO2	**CH4**	**N2O**	**CO2e**
Off-Road Equipment	1360.73	0.40	0.00	1369.13
Off-Road Equipment and On-site Vehicle	1376.66	0.40	0.00	1385.07
Worker Travel	109.78	0.01	0.00	109.89
Truck Emissions	4.04	0.00	0.00	4.04
Hauling Emissions	80.62	0.00	0.00	80.63
Total	1571.09	0.41	0.00	1579.62

TABLE 5.1F-16

Demolition of Existing Encina Power Station - Monthly and Annual Emission Calculations

Project Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
		ROG																					
Off-Road Equipment	(tons/month)	5.45E-03	5.97E-03	8.53E-03	1.00E-02	9.43E-03	1.33E-02	1.97E-02	2.26E-02	2.31E-02	1.52E-02	1.32E-02	1.39E-02	1.56E-02	1.15E-02	9.95E-03	1.15E-02	1.24E-02	5.97E-03	6.54E-03	6.18E-03	6.48E-03	6.77E-03
On-site Vehicle	(tons/month)	7.98E-05	9.53E-05	2.17E-04	4.51E-04	6.41E-04	7.51E-04	7.63E-04	5.65E-04	4.39E-04	2.71E-04	2.01E-04	1.60E-04	1.27E-04	2.30E-04	2.21E-04	2.38E-04	1.78E-04	1.01E-04	6.94E-05	4.70E-05	4.90E-05	4.80E-05
Hauling Emission	(tons/month)	0.00E+00	4.50E-04	5.10E-04	8.70E-04	8.10E-04	3.49E-03	3.06E-03	3.14E-03	2.25E-03	5.40E-04	1.80E-04	4.50E-04	4.00E-05	1.22E-03	2.20E-03	2.22E-03	1.20E-03	2.70E-04	4.00E-05	0.00E+00	0.00E+00	0.00E+00
Truck Emission	(tons/month)	1.00E-04	0.00E+00	1.00E-04	1.10E-04	1.10E-04	1.00E-04	1.10E-04	1.10E-04	1.00E-04	1.10E-04	9.00E-05	1.00E-04	1.00E-04	1.10E-04	9.00E-05	1.10E-04	1.00E-04	1.00E-04	1.10E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	6.50E-04	7.10E-04	1.75E-03	3.88E-03	5.81E-03	5.48E-03	5.81E-03	3.79E-03	3.03E-03	2.26E-03	1.78E-03	1.21E-03	1.10E-03	1.48E-03	8.90E-04	1.02E-03	9.80E-04	7.20E-04	5.10E-04	4.70E-04	4.90E-04	4.80E-04
Off-Road Equipment	Rolling 12-month total (tons/year)												0.16	0.17	0.18	0.18	0.18	0.18	0.17	0.16	0.15	0.13	0.12
Hauling Emission	Rolling 12-month total (tons/year)												0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01
		NOx																					
Off-Road Equipment	(tons/month)	0.11	0.12	0.18	0.21	0.20	0.30	0.46	0.53	0.56	0.31	0.27	0.28	0.31	0.29	0.25	0.29	0.33	0.14	0.15	0.13	0.13	0.14
On-site Vehicle	(tons/month)	2.10E-04	3.98E-04	6.97E-04	1.23E-03	1.45E-03	3.17E-03	2.94E-03	2.72E-03	2.03E-03	7.62E-04	4.58E-04	5.59E-04	2.85E-04	1.09E-03	1.62E-03	1.67E-03	1.01E-03	3.79E-04	2.14E-04	6.20E-05	6.50E-05	6.30E-05
Hauling Emission	(tons/month)	0	0.00561	0.00631	0.0108	0.0101	0.043	0.0377	0.0387	0.0278	0.0063	0.00214	0.00534	0.00043	0.0143	0.0258	0.0261	0.0141	0.0032	0.00043	0	0	0
Truck Emission	(tons/month)	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Worker Travel	(tons/month)	0.001	0.001	0.002	0.005	0.008	0.007	0.008	0.005	0.004	0.003	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Off-Road Equipment	Rolling 12-month total (tons/year)												3.54	3.74	3.91	3.99	4.07	4.20	4.03	3.71	3.30	2.88	2.71
Hauling Emission	Rolling 12-month total (tons/year)												0.19	0.19	0.20	0.22	0.24	0.24	0.20	0.16	0.13	0.10	0.09
Truck Emission	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Worker Travel	Rolling 12-month total (tons/year)												0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.01
		CO																					
Off-Road Equipment	(tons/month)	0.197	0.216	0.294	0.341	0.322	0.502	0.784	0.915	0.941	0.535	0.466	0.489	0.545	0.479	0.417	0.479	0.547	0.238	0.261	0.222	0.232	0.243
On-site Vehicle	(tons/month)	0.001	0.001	0.003	0.006	0.008	0.009	0.009	0.007	0.005	0.003	0.002	0.002	0.002	0.003	0.003	0.003	0.002	0.001	0.001	0.001	0.001	0.001
Hauling Emission	(tons/month)	0.000	0.005	0.006	0.010	0.010	0.041	0.036	0.037	0.027	0.006	0.002	0.005	0.000	0.015	0.026	0.026	0.014	0.003	0.000	0.000	0.000	0.000
Truck Emission	(tons/month)	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000
Worker Travel	(tons/month)	0.008	0.009	0.022	0.048	0.073	0.068	0.073	0.047	0.038	0.028	0.022	0.015	0.014	0.018	0.011	0.013	0.012	0.009	0.006	0.006	0.006	0.006
Off-Road Equipment	Rolling 12-month total (tons/year)												6.00	6.35	6.61	6.74	6.87	7.10	6.84	6.31	5.62	4.91	4.62
Hauling Emission	Rolling 12-month total (tons/year)												0.19	0.19	0.20	0.22	0.23	0.24	0.20	0.16	0.13	0.10	0.09
Truck Emission	Rolling 12-month total (tons/year)												0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Worker Travel	Rolling 12-month total (tons/year)												0.45	0.46	0.47	0.45	0.42	0.36	0.30	0.23	0.19	0.16	0.14
		SO2																					
Off-Road Equipment	(tons/month)	3.00E-04	3.30E-04	4.50E-04	5.30E-04	4.90E-04	7.70E-04	1.21E-03	1.42E-03	1.45E-03	8.90E-04	7.70E-04	8.10E-04	9.10E-04	7.40E-04	6.90E-04	7.90E-04	8.70E-04	3.70E-04	4.10E-04	3.30E-04	3.50E-04	3.70E-04
On-site Vehicle	(tons/month)	2.00E-06	3.08E-06	7.08E-06	1.56E-05	2.16E-05	2.66E-05	2.65E-05	1.95E-05	1.59E-05	1.01E-05	7.54E-06	6.08E-06	4.00E-06	8.70E-06	7.86E-06	8.86E-06	6.70E-06	3.54E-06	2.00E-06	2.00E-06	2.00E-06	2.00E-06
Hauling Emission	(tons/month)	0.00E+00	2.00E-05	2.00E-05	3.00E-05	3.00E-05	1.40E-04	1.20E-04	1.20E-04	9.00E-05	2.00E-05	1.00E-05	2.00E-05	0.00E+00	5.00E-05	9.00E-05	9.00E-05	5.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Truck Emission	(tons/month)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	2.00E-05	2.00E-05	6.00E-05	1.40E-04	2.00E-04	1.90E-04	2.00E-04	1.30E-04	1.10E-04	9.00E-05	7.00E-05	5.00E-05	4.00E-05	6.00E-05	3.00E-05	4.00E-05	4.00E-05	3.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		PM10																					
Fugitive	(tons/month)	4.7E-03	4.7E-03	4.7E-03	4.7E-03	4.7E-03	4.7E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03	4.74E-03
Fugitive (On-site Vehicle)	(tons/month)	2.0E-04	2.3E-04	5.3E-04	1.2E-03	1.7E-03	1.7E-03	1.8E-03	1.2E-03	9.8E-04	7.3E-04	5.6E-04	4.0E-04	3.5E-04	5.2E-04	3.9E-04	4.4E-04	3.7E-04	2.4E-04	1.7E-04	1.4E-04	1.5E-04	1.6E-04
Fugitive - Hauling	(tons/month)	0.00E+00	4.10E-04	4.60E-04	7.80E-04	7.30E-04	3.14E-03	2.76E-03	2.82E-03	2.03E-03	5.00E-04	1.70E-04	4.30E-04	3.00E-05	1.14E-03	2.06E-03	2.08E-03	1.13E-03	2.60E-04	3.00E-05	0.00E+00	0.00E+00	0.00E+00
Fugitive - Truck	(tons/month)	7.00E-05	0.00E+00	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	(tons/month)	1.85E-03	2.03E-03	4.97E-03	1.10E-02	1.65E-02	1.56E-02	1.65E-02	1.08E-02	8.59E-03	6.92E-03	5.45E-03	3.70E-03	3.35E-03	4.52E-03	2.73E-03	3.14E-03	3.00E-03	2.19E-03	1.57E-03	1.43E-03	1.50E-03	1.57E-03
Fugitive	Rolling 12-month total (tons/year)												0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Fugitive (On-Site Vehicle)	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Fugitive - Hauling	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Fugitive - Truck	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.10	0.11	0.11	0.11	0.10	0.08	0.07	0.06	0.05	0.04	0.03
Off-Road Equipment	(tons/month)	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
On-site Vehicle	(tons/month)	2.48E-06	5.32E-06	1.03E-05	1.76E-05	2.10E-05	4.54E-05	4.26E-05	3.92E-05	2.91E-05	1.19E-05	7.10E-06	8.80E-06	4.02E-06	1.64E-05	2.51E-05	2.51E-05	1.54E-05	6.18E-06	3.02E-06	1.00E-06	1.00E-06	1.00E-06
Hauling Emission	(tons/month)	0.00E+00	8.00E-05	9.00E-05	1.50E-04	1.40E-04	6.10E-04	5.40E-04	5.50E-04	4.00E-04	1.00E-04	3.00E-05	8.00E-05	1.00E-05	2.20E-04	4.00E-04	4.00E-04	2.20E-04	5.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00
Truck Emission	(tons/month)	1.00E-05	0.00E+00	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	1.00E-05	1.00E-05	4.00E-05	8.00E-05	1.20E-04	1.10E-04	1.20E-04	8.00E-05	6.00E-05	5.00E-05	4.00E-05	3.00E-05	2.00E-05	3.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 5.1F-16 (CONT.)

Demolition of Existing Encina Power Station - Monthly and Annual Emission Calculations

Project Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
PM2.5																							
Fugitive	(tons/month)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Fugitive (On-site Vehicle)	(tons/month)	5.20E-05	5.99E-05	1.42E-04	3.08E-04	4.53E-04	4.62E-04	4.83E-04	3.31E-04	2.61E-04	1.95E-04	1.51E-04	1.07E-04	9.25E-05	1.40E-04	1.06E-04	1.17E-04	9.97E-05	6.47E-05	4.55E-05	3.80E-05	4.00E-05	4.20E-05
Fugitive - Hauling	(tons/month)	0.00E+00	1.10E-04	1.30E-04	2.20E-04	2.00E-04	8.60E-04	7.60E-04	7.70E-04	5.60E-04	1.40E-04	5.00E-05	1.20E-04	1.00E-05	3.10E-04	5.70E-04	5.70E-04	3.10E-04	7.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00
Fugitive - Truck	(tons/month)	2.00E-05	0.00E+00	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	(tons/month)	4.90E-04	5.40E-04	1.32E-03	2.93E-03	4.39E-03	4.13E-03	4.39E-03	2.86E-03	2.28E-03	1.84E-03	1.45E-03	9.80E-04	8.90E-04	1.20E-03	7.20E-04	8.30E-04	8.00E-04	5.80E-04	4.20E-04	3.80E-04	4.00E-04	4.20E-04
Fugitive	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fugitive (On-Site Vehicle)	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Hauling	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Fugitive - Truck	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01
Off-Road Equipment	(tons/month)	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
On-site Vehicle	(tons/month)	2.48E-06	4.78E-06	8.80E-06	1.60E-05	1.95E-05	4.27E-05	3.89E-05	3.60E-05	2.69E-05	1.13E-05	7.10E-06	7.80E-06	4.02E-06	1.53E-05	2.29E-05	2.35E-05	1.43E-05	5.18E-06	3.02E-06	1.00E-06	1.00E-06	1.00E-06
Hauling Emission	(tons/month)	0.00E+00	7.00E-05	8.00E-05	1.40E-04	1.30E-04	5.60E-04	4.90E-04	5.10E-04	3.60E-04	9.00E-05	3.00E-05	8.00E-05	1.00E-05	2.00E-04	3.60E-04	3.70E-04	2.00E-04	5.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00
Truck Emission	(tons/month)	1.00E-05	0.00E+00	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(tons/month)	1.00E-05	1.00E-05	3.00E-05	7.00E-05	1.10E-04	1.10E-04	1.10E-04	7.00E-05	6.00E-05	5.00E-05	4.00E-05	2.00E-05	2.00E-05	3.00E-05	2.00E-05	2.00E-05	2.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
Off-Road Equipment	Rolling 12-month total (tons/year)												0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Hauling Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2																							
Off-Road Equipment	(MT/month)	27.53	30.16	40.74	47.99	44.24	69.79	109.42	129.11	130.94	78.75	68.48	71.90	80.90	64.71	59.59	68.53	76.01	32.62	35.73	30.01	31.44	32.15
On-site Vehicle	(MT/month)	0.19	0.26	0.56	1.15	1.61	2.03	2.03	1.55	1.20	0.71	0.52	0.43	0.32	0.65	0.68	0.72	0.51	0.27	0.17	0.12	0.12	0.13
Hauling Emission	(MT/month)	0.00	1.58	1.78	3.04	2.84	12.14	10.66	10.92	7.85	1.91	0.65	1.62	0.13	4.35	7.85	7.91	4.28	0.97	0.13	0.00	0.00	0.00
Truck Emission	(MT/month)	0.22	0.00	0.22	0.23	0.24	0.21	0.24	0.23	0.22	0.24	0.20	0.22	0.23	0.24	0.20	0.24	0.23	0.22	0.24	0.00	0.00	0.00
Worker Travel	(MT/month)	1.60	1.75	4.28	9.51	14.23	13.41	14.23	9.28	7.41	5.75	4.53	3.08	2.79	3.76	2.27	2.61	2.49	1.82	1.30	1.19	1.25	1.25
Off-Road Equipment	Rolling 12-month total (MT/year)												849	902	937	956	976	1,008	971	897	798	699	652
Hauling Emission	Rolling 12-month total (MT/year)												55	55	58	64	69	70	59	49	38	30	28
Truck Emission	Rolling 12-month total (MT/year)												2	2	3	3	3	3	3	3	2	2	2
Worker Travel	Rolling 12-month total (MT/year)												89	90	92	90	83	72	60	47	39	33	28
CH4																							
Off-Road Equipment	(MT/month)	0.009	0.009	0.013	0.015	0.014	0.021	0.033	0.040	0.040	0.023	0.020	0.021	0.024	0.018	0.016	0.018	0.021	0.008	0.009	0.010	0.010	0.010
On-site Vehicle	(MT/month)	8.00E-06	9.54E-06	2.15E-05	4.81E-05	7.11E-05	7.09E-05	7.43E-05	5.03E-05	3.92E-05	2.85E-05	2.20E-05	1.55E-05	1.30E-05	1.96E-05	1.42E-05	1.52E-05	1.36E-05	9.54E-06	6.00E-06	6.00E-06	6.00E-06	6.00E-06
Hauling Emission	(MT/month)	0.00E+00	1.00E-05	1.00E-05	2.00E-05	2.00E-05	9.00E-05	8.00E-05	8.00E-05	6.00E-05	1.00E-05	0.00E+00	1.00E-05	0.00E+00	3.00E-05	6.00E-05	6.00E-05	3.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Truck Emission	(MT/month)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	(MT/month)	8.00E-05	9.00E-05	2.10E-04	4.70E-04	7.00E-04	6.60E-04	7.00E-04	4.60E-04	3.60E-04	2.80E-04	2.20E-04	1.50E-04	1.30E-04	1.80E-04	1.10E-04	1.20E-04	1.20E-04	9.00E-05	6.00E-05	6.00E-05	6.00E-05	6.00E-05
Off-Road Equipment	Rolling 12-month total (MT/year)												0.26	0.27	0.28	0.28	0.29	0.29	0.28	0.26	0.23	0.20	0.18
Hauling Emission	Rolling 12-month total (MT/year)												3.90E-04	3.90E-04	4.10E-04	4.60E-04	5.00E-04	5.10E-04	4.30E-04	3.50E-04	2.70E-04	2.10E-04	2.00E-04
Truck Emission	Rolling 12-month total (MT/year)												0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Worker Travel	Rolling 12-month total (MT/year)												4.38E-03	4.43E-03	4.52E-03	4.42E-03	4.07E-03	3.49E-03	2.92E-03	2.28E-03	1.88E-03	1.58E-03	1.36E-03
N2O																							
Off-Road Equipment	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
On-site Vehicle	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	(MT/month)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Road Equipment	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck Emission	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Travel	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2e																							
Off-Road Equipment	(MT/month)	27.71	30.35	41.01	48.29	44.52	70.24	110.12	129.93	131.78	79.23	68.89	72.34	81.39	65.09	59.92	68.91	76.44	32.80	35.92	30.21	31.65	32.37
On-site Vehicle	(MT/month)	0.19	0.26	0.56	1.15	1.61	2.03	2.04	1.55	1.20	0.71	0.52	0.43	0.32	0.65	0.68	0.72	0.51	0.27	0.17	0.12	0.12	0.13
Hauling Emission	(MT/month)	0.00	1.58	1.78	3.04	2.84	12.14	10.66	10.92	7.85	1.91	0.65	1.62	0.13	4.35	7.85	7.91	4.28	0.97	0.13	0.00	0.00	0.00
Truck Emission	(MT/month)	0.22	0.00	0.22	0.23	0.24	0.21	0.24	0.23	0.22	0.24	0.20	0.22	0.23	0.24	0.20	0.24	0.23	0.22	0.24	0.00	0.00	0.00
Worker Travel	(MT/month)	1.60	1.75	4.29	9.52	14.25	13.43	14.25	9.29	7.41	5.75	4.54	3.08	2.79	3.76	2.27	2.61	2.50	1.82	1.30	1.19	1.25	1.25
Off-Road Equipment	Rolling 12-month total (MT/year)												854	908	943	962	982	1,014	977	903	803	703	656
Hauling Emission	Rolling 12-month total (MT/year)												55	55	58	64	69	70	59	49	38	30	28
Truck Emission	Rolling 12-month total (MT/year)												2	2	3	3	3	3	3	3	2	2	2
Worker Travel	Rolling 12-month total (MT/year)												89	90	92	90	83	72	60	47	39	33	28

TABLE 5.1F-17

Demolition of Existing Encina Power Station – Summer (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	ROG (lbs/day)																					
Off-Road Equipment	0.52	0.52	0.81	0.91	0.82	1.33	1.71	2.06	2.20	1.32	1.32	1.32	1.41	1.00	1.00	1.00	1.13	0.57	0.57	0.59	0.59	0.59
On-site Vehicle	0.01	0.01	0.02	0.04	0.06	0.08	0.07	0.05	0.04	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00
Hauling Emission	0.00	0.04	0.05	0.07	0.07	0.33	0.25	0.27	0.20	0.04	0.02	0.04	0.00	0.10	0.21	0.18	0.10	0.02	0.00	0.00	0.00	0.00
Truck Emission	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Worker Travel	0.06	0.06	0.17	0.36	0.52	0.56	0.52	0.35	0.30	0.20	0.18	0.12	0.10	0.13	0.09	0.09	0.09	0.07	0.05	0.05	0.05	0.04
	NOx (lbs/day)																					
Off-Road Equipment	10.79	10.79	16.86	19.15	17.66	30.41	40.39	48.52	53.01	26.78	26.78	26.78	28.28	25.38	25.38	25.38	30.05	12.86	12.86	12.15	12.15	12.15
On-site Vehicle	0.02	0.03	0.06	0.10	0.12	0.30	0.24	0.24	0.18	0.06	0.04	0.05	0.02	0.09	0.16	0.14	0.09	0.03	0.02	0.01	0.01	0.01
Hauling Emission	0.00	0.47	0.58	0.94	0.84	4.15	3.17	3.39	2.56	0.53	0.21	0.49	0.04	1.20	2.49	2.19	1.24	0.29	0.04	0.00	0.00	0.00
Truck Emission	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.00	0.00
Worker Travel	0.07	0.07	0.20	0.43	0.61	0.66	0.61	0.42	0.35	0.24	0.21	0.14	0.12	0.15	0.11	0.11	0.11	0.08	0.05	0.05	0.05	0.05
	CO (lbs/day)																					
Off-Road Equipment	18.76	18.76	27.95	31.04	28.03	50.15	68.21	83.21	89.66	46.55	46.55	46.55	49.55	41.65	41.65	41.65	49.69	22.67	22.67	21.10	21.10	21.10
On-site Vehicle	0.10	0.10	0.26	0.52	0.71	0.91	0.81	0.61	0.50	0.29	0.25	0.19	0.14	0.24	0.25	0.23	0.19	0.12	0.07	0.06	0.06	0.05
Hauling Emission	0.00	0.39	0.48	0.78	0.69	3.41	2.61	2.79	2.10	0.46	0.18	0.43	0.03	1.05	2.17	1.91	1.08	0.26	0.03	0.00	0.00	0.00
Truck Emission	0.10	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.00	0.00	0.00
Worker Travel	0.81	0.81	2.17	4.59	6.57	7.13	6.57	4.48	3.75	2.54	2.30	1.49	1.29	1.66	1.15	1.15	1.15	0.88	0.58	0.58	0.58	0.54
	SO2 (lbs/day)																					
Off-Road Equipment	0.03	0.03	0.04	0.05	0.04	0.08	0.11	0.13	0.14	0.08	0.08	0.08	0.08	0.06	0.07	0.07	0.08	0.04	0.04	0.03	0.03	0.03
On-site Vehicle	2.65E-04	3.13E-04	7.53E-04	1.50E-03	2.05E-03	2.80E-03	2.46E-03	1.91E-03	1.55E-03	9.19E-04	7.82E-04	5.89E-04	4.38E-04	7.80E-04	8.76E-04	8.16E-04	6.31E-04	3.64E-04	2.20E-04	1.77E-04	1.77E-04	1.77E-04
Hauling Emission	0.00E+00	1.56E-03	1.92E-03	3.12E-03	2.79E-03	1.37E-02	1.05E-02	1.12E-02	8.45E-03	1.91E-03	7.40E-04	1.77E-03	1.40E-04	4.34E-03	9.01E-03	7.90E-03	4.47E-03	1.06E-03	1.30E-04	0.00E+00	0.00E+00	0.00E+00
Truck Emission	2.40E-04	0.00E+00	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	2.29E-03	2.29E-03	6.14E-03	1.30E-02	1.86E-02	2.02E-02	1.86E-02	1.27E-02	1.06E-02	7.80E-03	7.07E-03	4.58E-03	3.95E-03	5.10E-03	3.54E-03	3.54E-03	3.54E-03	2.71E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03
	PM10 (lbs/day)																					
Fugitive	0.45	0.41	0.45	0.43	0.41	0.47	0.41	0.43	0.45	0.41	0.47	0.45	0.43	0.41	0.47	0.41	0.43	0.45	0.41	0.45	0.43	0.41
Fugitive (On-site Vehicle)	0.02	0.02	0.05	0.11	0.15	0.18	0.16	0.12	0.10	0.07	0.06	0.04	0.03	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01
Fugitive - Hauling	0.00	0.04	0.04	0.07	0.07	0.32	0.24	0.26	0.20	0.04	0.02	0.04	0.00	0.10	0.21	0.18	0.10	0.02	0.00	0.00	0.00	0.00
Fugitive - Truck	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Fugitive - Worker Travel	0.18	0.18	0.48	1.03	1.47	1.59	1.47	1.00	0.84	0.62	0.56	0.36	0.31	0.40	0.28	0.28	0.28	0.21	0.14	0.14	0.14	0.14
Off-Road Equipment	0.05	0.05	0.07	0.08	0.07	0.12	0.17	0.20	0.22	0.12	0.12	0.12	0.13	0.09	0.09	0.09	0.11	0.05	0.05	0.05	0.05	0.05
On-site Vehicle	3.01E-04	5.03E-04	9.79E-04	1.65E-03	1.89E-03	4.61E-03	3.74E-03	3.59E-03	2.80E-03	1.05E-03	7.31E-04	8.35E-04	4.12E-04	1.47E-03	2.49E-03	2.23E-03	1.41E-03	5.62E-04	2.88E-04	9.90E-05	9.90E-05	9.90E-05
Hauling Emission	0.00	0.01	0.01	0.01	0.01	0.06	0.05	0.05	0.04	0.01	0.00	0.01	0.00	0.02	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00
Truck Emission	1.16E-03	0.00E+00	1.16E-03	1.16E-03	1.16E-03	1.16E-03	1.16E-03	1.16E-03	1.16E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	0.00E+00	0.00E+00	0.00E+00
Worker Travel	1.29E-03	1.29E-03	3.46E-03	7.32E-03	1.05E-02	1.14E-02	1.05E-02	7.15E-03	5.98E-03	4.36E-03	3.96E-03	2.56E-03	2.21E-03	2.85E-03	1.98E-03	1.98E-03	1.98E-03	1.51E-03	9.90E-04	9.90E-04	9.90E-04	9.90E-04
	PM2.5 (lbs/day)																					
Fugitive	0.07	0.06	0.07	0.07	0.06	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.06
Fugitive (On-site Vehicle)	5.07E-03	5.33E-03	1.38E-02	2.86E-02	4.02E-02	4.73E-02	4.29E-02	3.07E-02	2.54E-02	1.73E-02	1.54E-02	1.05E-02	8.61E-03	1.25E-02	1.08E-02	1.04E-02	9.23E-03	6.32E-03	4.02E-03	3.70E-03	3.70E-03	3.70E-03
Fugitive - Hauling	0.00	0.01	0.01	0.02	0.02	0.09	0.07	0.07	0.05	0.01	0.00	0.01	0.00	0.03	0.06	0.05	0.03	0.01	0.00	0.00	0.00	0.00
Fugitive - Truck	1.89E-03	0.00E+00	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	0.05	0.05	0.13	0.27	0.39	0.42	0.39	0.27	0.22	0.16	0.15	0.10	0.08	0.11	0.07	0.07	0.07	0.06	0.04	0.04	0.04	0.04
Off-Road Equipment	0.05	0.05	0.07	0.08	0.07	0.12	0.17	0.20	0.22	0.12	0.12	0.12	0.13	0.09	0.09	0.09	0.11	0.05	0.05	0.05	0.05	0.05
On-site Vehicle	2.76E-04	4.64E-04	9.01E-04	1.53E-03	1.74E-03	4.24E-03	3.44E-03	3.30E-03	2.58E-03	9.68E-04	6.76E-04	7.71E-04	3.81E-04	1.36E-03	2.30E-03	2.05E-03	1.31E-03	5.19E-04	2.67E-04	9.20E-05	9.20E-05	9.20E-05
Hauling Emission	0.00	0.01	0.01	0.01	0.01	0.06	0.04	0.05	0.03	0.01	0.00	0.01	0.00	0.02	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00
Truck Emission	1.06E-03	0.00E+00	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	9.90E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	1.19E-03	1.19E-03	3.20E-03	6.78E-03	9.71E-03	1.05E-02	9.71E-03	6.62E-03	5.53E-03	4.05E-03	3.67E-03	2.37E-03	2.05E-03	2.64E-03	1.83E-03	1.83E-03	1.83E-03	1.40E-03	9.20E-04	9.20E-04	9.20E-04	9.20E-04
	CO2 (lbs/day)																					
Off-Road Equipment	2,891	2,891	4,277	4,809	4,241	7,693	10,488	12,938	13,746	7,548	7,548	7,548	8,107	6,203	6,569	6,569	7,617	3,425	3,425	3,151	3,151	3,082
On-site Vehicle	21	26	61	120	162	232	202	161	130	71	60	47	33	64	76	71	53	29	17	13	13	13
Hauling Emission	0	152	187	304	272	1,340	1,023	1,096	825	184	72	170	13	417	866	759	429	102	12	0	0	0
Truck Emission	23	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	0	0	0
Worker Travel	177	177	474	1,005	1,439	1,559	1,439	981	820	581	527	341	294	380	263	263	263	201	132	132	132	126

TABLE 5.1F-17 (CONT.)

Demolition of Existing Encina Power Station – Summer (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	CH4 (lbs/day)																					
Off-Road Equipment	0.90	0.90	1.33	1.47	1.30	2.35	3.20	3.95	4.18	2.18	2.18	2.18	2.36	1.70	1.74	1.74	2.08	0.89	0.89	1.00	1.00	1.00
On-site Vehicle	8.49E-04	8.82E-04	2.31E-03	4.82E-03	6.83E-03	7.81E-03	7.11E-03	5.01E-03	4.16E-03	2.74E-03	2.45E-03	1.64E-03	1.37E-03	1.92E-03	1.56E-03	1.52E-03	1.39E-03	9.81E-04	6.29E-04	5.99E-04	5.99E-04	5.69E-04
Hauling Emission	0.00E+00	1.07E-03	1.32E-03	2.15E-03	1.92E-03	9.45E-03	7.21E-03	7.72E-03	5.82E-03	1.31E-03	5.10E-04	1.21E-03	9.00E-05	2.97E-03	6.17E-03	5.41E-03	3.06E-03	7.30E-04	9.00E-05	0.00E+00	0.00E+00	0.00E+00
Truck Emission	1.70E-04	0.00E+00	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.01	0.01	0.02	0.05	0.07	0.07	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	N2O (lbs/day)																					
Off-Road Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker Travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CO2e (lbs/day)																					
Off-Road Equipment	2,910	2,910	4,305	4,840	4,268	7,742	10,556	13,021	13,834	7,594	7,594	7,594	8,157	6,239	6,605	6,605	7,660	3,443	3,443	3,172	3,172	3,102
On-site Vehicle	21	26	61	120	162	232	203	161	130	71	60	47	34	64	76	71	53	29	17	13	13	13
Hauling Emission	0	152	187	305	272	1,340	1,023	1,096	825	184	72	170	13	417	866	759	429	102	12	0	0	0
Truck Emission	23	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	0	0	0
Worker Travel	177	177	475	1,006	1,440	1,561	1,440	981	821	582	527	341	295	380	264	264	264	202	132	132	132	127

TABLE 5.1F-18

Demolition of Existing Encina Power Station – Winter (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	ROG (lbs/day)																					
Off-Road Equipment	0.52	0.52	0.81	0.91	0.82	1.33	1.71	2.06	2.20	1.32	1.32	1.32	1.41	1.00	1.00	1.00	1.13	0.57	0.57	0.59	0.59	0.59
On-site Vehicle	0.01	0.01	0.02	0.04	0.06	0.08	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00
Hauling Emission	0.00	0.04	0.05	0.08	0.07	0.36	0.28	0.30	0.22	0.05	0.02	0.04	0.00	0.11	0.23	0.20	0.11	0.03	0.00	0.00	0.00	0.00
Truck Emission	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Worker Travel	0.07	0.07	0.18	0.38	0.55	0.59	0.55	0.37	0.31	0.21	0.19	0.12	0.11	0.14	0.10	0.10	0.10	0.07	0.05	0.05	0.05	0.05
	NOx (lbs/day)																					
Off-Road Equipment	10.79	10.79	16.86	19.15	17.66	30.41	40.39	48.52	53.01	26.78	26.78	26.78	28.28	25.38	25.38	25.38	30.05	12.86	12.86	12.15	12.15	12.15
On-site Vehicle	0.02	0.03	0.07	0.11	0.13	0.32	0.26	0.25	0.19	0.07	0.05	0.05	0.03	0.09	0.16	0.14	0.09	0.04	0.02	0.01	0.01	0.01
Hauling Emission	0.00	0.49	0.60	0.97	0.87	4.28	3.27	3.50	2.64	0.55	0.21	0.51	0.04	1.24	2.57	2.26	1.28	0.30	0.04	0.00	0.00	0.00
Truck Emission	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.00	0.00
Worker Travel	0.08	0.08	0.23	0.48	0.68	0.74	0.68	0.47	0.39	0.26	0.24	0.16	0.13	0.17	0.12	0.12	0.12	0.09	0.06	0.06	0.06	0.06
	CO (lbs/day)																					
Off-Road Equipment	18.76	18.76	27.95	31.04	28.03	50.15	68.21	83.21	89.66	46.55	46.55	46.55	49.55	41.65	41.65	41.65	49.69	22.67	22.67	21.10	21.10	21.10
On-site Vehicle	0.10	0.10	0.26	0.52	0.70	0.95	0.84	0.65	0.53	0.30	0.25	0.19	0.14	0.25	0.28	0.26	0.21	0.12	0.08	0.06	0.06	0.05
Hauling Emission	0.00	0.50	0.62	1.01	0.90	4.44	3.39	3.63	2.74	0.60	0.23	0.56	0.04	1.37	2.84	2.49	1.41	0.33	0.04	0.00	0.00	0.00
Truck Emission	0.14	0.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.00	0.00	0.00
Worker Travel	0.78	0.78	2.08	4.42	6.32	6.85	6.32	4.31	3.60	2.43	2.21	1.43	1.23	1.59	1.10	1.10	1.10	0.84	0.55	0.55	0.55	0.52
	SO2 (lbs/day)																					
Off-Road Equipment	0.03	0.03	0.04	0.05	0.04	0.08	0.11	0.13	0.14	0.08	0.08	0.08	0.08	0.06	0.07	0.07	0.08	0.04	0.04	0.03	0.03	0.03
On-site Vehicle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0.00E+00	1.55E-03	1.91E-03	3.11E-03	2.78E-03	1.37E-02	1.05E-02	1.12E-02	8.44E-03	1.91E-03	7.40E-04	1.77E-03	1.40E-04	4.33E-03	9.00E-03	7.89E-03	4.46E-03	1.06E-03	1.30E-04	0.00E+00	0.00E+00	0.00E+00
Truck Emission	2.40E-04	0.00E+00	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	2.15E-03	2.15E-03	5.76E-03	1.22E-02	1.75E-02	1.90E-02	1.75E-02	1.19E-02	9.96E-03	7.32E-03	6.64E-03	4.30E-03	3.71E-03	4.78E-03	3.32E-03	3.32E-03	3.32E-03	2.54E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03
	PM10 (lbs/day)																					
Fugitive	0.45	0.41	0.45	0.43	0.41	0.47	0.41	0.43	0.45	0.41	0.47	0.45	0.43	0.41	0.47	0.41	0.43	0.45	0.41	0.45	0.43	0.41
Fugitive (On-site Vehicle)	0.02	0.02	0.05	0.11	0.15	0.18	0.16	0.12	0.10	0.07	0.06	0.04	0.03	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01
Fugitive - Hauling	0.00	0.04	0.04	0.07	0.07	0.32	0.24	0.26	0.20	0.04	0.02	0.04	0.00	0.10	0.21	0.18	0.10	0.02	0.00	0.00	0.00	0.00
Fugitive - Truck	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Fugitive - Worker Travel	0.18	0.18	0.48	1.03	1.47	1.59	1.47	1.00	0.84	0.62	0.56	0.36	0.31	0.40	0.28	0.28	0.28	0.21	0.14	0.14	0.14	0.14
Off-Road Equipment	0.05	0.05	0.07	0.08	0.07	0.12	0.17	0.20	0.22	0.12	0.12	0.12	0.13	0.09	0.09	0.09	0.11	0.05	0.05	0.05	0.05	0.05
On-site Vehicle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0.00	0.01	0.01	0.01	0.01	0.06	0.05	0.05	0.04	0.01	0.00	0.01	0.00	0.02	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00
Truck Emission	1.17E-03	0.00E+00	1.17E-03	1.17E-03	1.17E-03	1.17E-03	1.17E-03	1.17E-03	1.17E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03	0.00E+00	0.00E+00	0.00E+00
Worker Travel	1.29E-03	1.29E-03	3.46E-03	7.32E-03	1.05E-02	1.14E-02	1.05E-02	7.15E-03	5.98E-03	4.36E-03	3.96E-03	2.56E-03	2.21E-03	2.85E-03	1.98E-03	1.98E-03	1.98E-03	1.51E-03	9.90E-04	9.90E-04	9.90E-04	9.90E-04
	PM2.5 (lbs/day)																					
Fugitive	0.07	0.06	0.07	0.07	0.06	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.07	0.07	0.06	0.07	0.07	0.06
Fugitive (On-site Vehicle)	0.01	0.01	0.01	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Fugitive - Hauling	0.00	0.01	0.01	0.02	0.02	0.09	0.07	0.07	0.05	0.01	0.00	0.01	0.00	0.03	0.06	0.05	0.03	0.01	0.00	0.00	0.00	0.00
Fugitive - Truck	1.89E-03	0.00E+00	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	0.00E+00	0.00E+00	0.00E+00
Fugitive - Worker Travel	0.05	0.05	0.13	0.27	0.39	0.42	0.39	0.27	0.22	0.16	0.15	0.10	0.08	0.11	0.07	0.07	0.07	0.06	0.04	0.04	0.04	0.04
Off-Road Equipment	0.05	0.05	0.07	0.08	0.07	0.12	0.17	0.20	0.22	0.12	0.12	0.12	0.13	0.09	0.09	0.09	0.11	0.05	0.05	0.05	0.05	0.05
On-site Vehicle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0.00	0.01	0.01	0.01	0.01	0.06	0.04	0.05	0.03	0.01	0.00	0.01	0.00	0.02	0.04	0.03	0.02	0.00	0.00	0.00	0.00	0.00
Truck Emission	1.07E-03	0.00E+00	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	0.00E+00	0.00E+00	0.00E+00
Worker Travel	1.19E-03	1.19E-03	3.20E-03	6.78E-03	9.71E-03	1.05E-02	9.71E-03	6.62E-03	5.53E-03	4.05E-03	3.67E-03	2.37E-03	2.05E-03	2.64E-03	1.83E-03	1.83E-03	1.83E-03	1.40E-03	9.20E-04	9.20E-04	9.20E-04	9.20E-04
	CO2 (lbs/day)																					
Off-Road Equipment	2,891	2,891	4,277	4,809	4,241	7,693	10,488	12,938	13,746	7,548	7,548	7,548	8,107	6,203	6,569	6,569	7,617	3,425	3,425	3,151	3,151	3,082
On-site Vehicle	20	25	58	114	153	222	194	154	125	68	57	45	32	61	75	69	51	28	16	12	12	12
Hauling Emission	0	152	187	304	272	1337	1020	1093	823	183	71	170	13	416	864	757	428	102	12	0	0	0
Truck Emission	23	0	23	23	23	23	23	23	23	22	22	22	22	22	22	22	22	22	22	0	0	0
Worker Travel	166	166	445	943	1351	1464	1351	921	770	546	495	320	276	356	247	247	247	189	124	124	124	119

TABLE 5.1F-18 (CONT.)

Demolition of Existing Encina Power Station – Winter (Peak) Daily Emissions

Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	CH4 (lbs/day)																					
Off-Road Equipment	0.90	0.90	1.33	1.47	1.30	2.35	3.20	3.95	4.18	2.18	2.18	2.18	2.36	1.70	1.74	1.74	2.08	0.89	0.89	1.00	1.00	1.00
On-site Vehicle	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emission	0.00E+00	1.09E-03	1.34E-03	2.18E-03	1.95E-03	9.58E-03	7.31E-03	7.84E-03	5.90E-03	1.33E-03	5.20E-04	1.23E-03	9.00E-05	3.02E-03	6.26E-03	5.49E-03	3.11E-03	7.40E-04	9.00E-05	0.00E+00	0.00E+00	0.00E+00
Truck Emission	1.80E-04	0.00E+00	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.80E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	0.00E+00	0.00E+00	0.00E+00
Worker Travel	0.01	0.01	0.02	0.05	0.07	0.07	0.07	0.05	0.04	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	N2O (lbs/day)																					
Off-Road Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hauling Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Emission	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker Travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CO2e (lbs/day)																					
Off-Road Equipment	2,910	2,910	4,305	4,840	4,268	7,742	10,556	13,021	13,834	7,594	7,594	7,594	8,157	6,239	6,605	6,605	7,660	3,443	3,443	3,172	3,172	3,102
On-site Vehicle	20	25	58	114	153	222	194	155	125	68	57	45	32	61	75	69	51	28	16	12	12	12
Hauling Emission	0	152	187	304	272	1,337	1,020	1,093	823	183	71	170	13	416	864	758	428	102	12	0	0	0
Truck Emission	23	0	23	23	23	23	23	23	23	22	22	22	22	22	22	22	22	22	22	0	0	0
Worker Travel	166	166	446	944	1,352	1,466	1,352	922	771	546	495	320	277	357	248	248	248	189	124	124	124	119

TABLE 5.1F-19

Demolition of Existing Encina Power Station - CalEEMod Input Data

Project Name	CECP Demolition of EPS	
District	San Diego County	
Wind Speed	2.6	m/s
Precipitation Frequency	40	days/year
Climate Zone	13	
Urbanization Level	Urban	
Expected Operational Year	2021	
Utility Company	San Diego Gas & Electric	
CO2 Intensity Factor	720.49	
CH4 Intensity Factor	0.029	
N2O Intensity Factor	0.006	

For the 22 months of demolition of existing Encina Power Station

CalEEMod Phase Name	Phase Type	Start Date	End Date	# day/Week	Number of Days	Daily hours	Month
Demolition EPS 1	Demolition	2018/04/01	2018/04/30	5	21	8	1
Demolition EPS 2	Demolition	2018/05/01	2018/05/31	5	23	8	2
Demolition EPS 3	Demolition	2018/06/01	2018/06/30	5	21	8	3
Demolition EPS 4	Demolition	2018/07/01	2018/07/31	5	22	8	4
Demolition EPS 5	Demolition	2018/08/01	2018/08/31	5	23	8	5
Demolition EPS 6	Demolition	2018/09/01	2018/09/30	5	20	8	6
Demolition EPS 7	Demolition	2018/10/01	2018/10/31	5	23	8	7
Demolition EPS 8	Demolition	2018/11/01	2018/11/30	5	22	8	8
Demolition EPS 9	Demolition	2018/12/01	2018/12/31	5	21	8	9
Demolition EPS 10	Demolition	2019/01/01	2019/01/31	5	23	8	10
Demolition EPS 11	Demolition	2019/02/01	2019/02/28	5	20	8	11
Demolition EPS 12	Demolition	2019/03/01	2019/03/31	5	21	8	12
Demolition EPS 13	Demolition	2019/04/01	2019/04/30	5	22	8	13
Demolition EPS 14	Demolition	2019/05/01	2019/05/31	5	23	8	14
Demolition EPS 15	Demolition	2019/06/01	2019/06/30	5	20	8	15
Demolition EPS 16	Demolition	2019/07/01	2019/07/31	5	23	8	16
Demolition EPS 17	Demolition	2019/08/01	2019/08/31	5	22	8	17
Demolition EPS 18	Demolition	2019/09/01	2019/09/30	5	21	8	18
Demolition EPS 19	Demolition	2019/10/01	2019/10/31	5	23	8	19
Demolition EPS 20	Demolition	2019/11/01	2019/11/30	5	21	8	20
Demolition EPS 21	Demolition	2019/12/01	2019/12/31	5	22	8	21
Demolition EPS 22	Demolition	2020/01/01	2020/01/31	5	23	8	22

TABLE 5.1F-20

Demolition of Existing Encina Power Station - CalEEMod Equipment Schedule Input

Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Demolition of Existing Encina Power Station																						
CalEEMod INPUT																						
Cranes	0	0	1	1	0	0	2	2	1	1	1	1	2	0	0	0	0	0	0	0	0	0
Crawler Tractors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crushing/Proc. Equipment	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0
Dumpers/Tenders	0	0	0	2	2	4	5	6	8	4	4	4	4	8	14	14	14	3	3	0	0	0
Excavator	1	1	1	1	1	4	7	9	10	2	2	2	2	5	5	5	7	2	2	1	1	1
Off-Highway Trucks	1	1	1	1	1	2	2	3	3	2	2	2	2	0	0	0	0	0	0	1	1	1
Rubber Tire Loader	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0
Skid Steel Loader	2	2	6	8	8	10	10	10	12	6	6	6	6	6	6	6	6	0	0	2	2	2
Surfacing Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tractors/Loaders/Backhoes	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	3	3	3	3	3

CalEEMod default values for equipment horsepower (hp) and usage load factors are used.

TABLE 5.1F-21

Demolition of Existing Encina Power Station - CalEEMod Vehicle Trips Input

Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Number of days	**21**	**23**	**21**	**22**	**23**	**20**	**23**	**22**	**21**	**23**	**20**	**21**	**22**	**23**	**20**	**23**	**22**	**21**	**23**	**21**	**22**	**23**
Demolition of Existing Encina Power Station																						
Workers																						
Craft																						
Laborers	10	10	45	105	155	165	146	91	72	56	50	28	25	25	15	15	15	12	10	10	10	10
Operating Engineers	2	2	2	2	2	4	8	10	12	4	4	4	2	8	8	8	8	4	2	2	2	2
Craft Staff Subtotal	**12**	**12**	**47**	**107**	**157**	**169**	**154**	**101**	**84**	**60**	**54**	**32**	**27**	**33**	**23**	**23**	**23**	**16**	**12**	**12**	**12**	**12**
Contractor Staff																						
Construction Manager	3	3	7	13	17	20	20	16	13	10	9	7	6	9	6	6	6	5				
Administrators	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Engineering Supervisor	3	3	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1
Health and Safety Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Contractor Staff Subtotal	**10**	**10**	**12**	**18**	**22**	**25**	**25**	**21**	**18**	**15**	**14**	**12**	**11**	**16**	**11**	**11**	**11**	**10**	**5**	**5**	**5**	**5**
Total Number of Workers	**22**	**22**	**59**	**125**	**179**	**194**	**179**	**122**	**102**	**75**	**68**	**44**	**38**	**49**	**34**	**34**	**34**	**26**	**17**	**17**	**17**	**17**
Worker Trip (trips/day)	**22**	**22**	**59**	**125**	**179**	**194**	**179**	**122**	**102**	**75**	**68**	**44**	**38**	**49**	**34**	**34**	**34**	**26**	**17**	**17**	**17**	**17**
Truck Deliveries																						
Equipment Services	1	1	4	4	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	1	1	1
Oxygen & Propane	1	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0	0
Diesel Fuel	4	4	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	2	2	2
Drinking Water	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
First Aid Supplies	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Small Tools & Supplies	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2
Subtotal	**12**	**11**	**25**	**25**	**25**	**25**	**30**	**29**	**29**	**29**	**29**	**29**	**30**	**29**	**29**	**29**	**29**	**29**	**30**	**6**	**6**	**6**
Truck Trips (Average Daily)	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**
Truck Hauling																						
ACM/OHMs (Roll-off Bins)	0	40	46	73	58	222	148	163	50	0	0	0	0	0	0	0	0	0	0	0	0	0
C&D (Roll-off Bins)	0	4	4	12	12	8	16	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0
C&D (End-Dump Trucks)	0	0	0	0	0	20	30	40	60	40	20	30	4	4	4	4	4	8	4	0	0	0
Metals (End-Dump Trucks)	0	4	4	7	16	118	129	120	122	19	0	20	0	130	238	240	128	22	0	0	0	0
Hauling Trips (total)	**0**	**48**	**54**	**92**	**86**	**368**	**323**	**331**	**238**	**59**	**20**	**50**	**4**	**134**	**242**	**244**	**132**	**30**	**4**	**0**	**0**	**0**

Appendix 5.1G
ERC Summary (from 8/4/2009 SDAPCD FDOC for the CECP, Appendix D

Summary of Emission Reduction Credits (ERCs) Proposed as Offsets

ERC Certificate No.	Original Issue Date	Type	Pollutant	ERC Amount, tons per year	NOx Equivalent Amount, tons per year	Location of Emission Reductions	Description Emission Reduction	Current Owner
978938-05	6/30/2004	Class A	NOx	35.3	35.3	Naval Air Station—North Island; Foot of Neville Road, Naval Training Center, San Diego; Vesta Street & Ward Road Naval Station San Diego	Permanent shutdown of peaking combustion turbines	Cabrillo Power II, LLC
981518-01	8/01/2006	Class A	NOx	2.3	2.3	3200 Harbor Drive, San Diego	Permanent shutdown of peaking combustion turbines	Cabrillo Power II, LLC
070823-02	11/19/99	Class A	VOCs	5.3	2.65	850 Lagoon Drive, Chula Vista	Shutdown of Vapor Degreasers and Cold Solvent Cleaners	Element Markets, LLC
080212-01	9/22/2006	Class A	VOCs	18.7	9.35	7757 Andrews Avenue, San Diego	Shutdown and restricted operation of wood coating and adhesive application operations	Inland Gas and Electric GP, LLC

Appendix 5.1H
Nearby New/Modified Projects

SIERRA RESEARCH INC
1801 J STREET, SACRAMENTO CA 95811
TEL 916.444.6666
FAX 916.444.8373
http://www.sierraresearch.com

Fax

January 21, 2014

FROM: Kate Gianolini

TO: Virginia Fox
San Diego APCD, Public Records

FAX: 858-586-2601

PAGES: Transmittal Cover Page + 3

COMMENTS:

Please see the attached Request for Public Records and accompanying letter detailing the requested records. We would appreciate an expedited review because there is a very short turn-around time for this project. If there are any questions on this request, please contact Tom Andrews at 916-444-6666. Thank you for your assistance.

SAN DIEGO AIR POLLUTION CONTROL DISTRICT

REQUEST FOR PUBLIC RECORDS

Date: January 21, 2014

Name: Tom Andrews

Agency: Sierra Research

Address: 1801 J Street

City: Sacramento State: CA Zip: 95811

Phone: (916) 444-6666 Fax: (916) 444-8373

I request to inspect the following Public Records (please be specific): Please provide the information discussed in the attached cover letter.

INSPECTION OF PUBLIC RECORDS

The district shall make a determination if the records requested are available with the exception of those records specifically exempted from disclosure by state law and those records labeled as "TRADE SECRET" which are not emission data, within ten (10) days of the date of the receipt of the request. If, for good cause, the determination cannot be made within the ten (10) working days, the District will notify the requesting person the reasons for the delay and when the determination is expected to be made within an additional 14 days, as prescribed by law. Those records labeled as "TRADE SECRETS" shall be governed by the procedure set forth in District Rule 177 Section (g).

If you have any questions, please contact Public Records at (858) 586-2618.

Mail or fax completed form to:

San Diego APCD
Public Records
10124 Old Grove Road
San Diego, CA 92131 Phone: (858) 586-2600 Fax No.: (858) 586-2601

01/06

sierra
research

1801 J Street
Sacramento, CA 95811
Tel: (916) 444-6666
Fax: (916) 444-8373
Ann Arbor, MI
Tel: (734) 761-6666
Fax: (734) 761-6755

January 21, 2014

Virginia Fox
San Diego County Air Pollution Control District
10124 Old Grove Road
San Diego, CA 92131

Subject: Cumulative Air Quality Impacts Analysis Public Records Request
Amended Carlsbad Energy Center Project (CECP)

Dear Ms. Fox:

This is a public records request for specific information needed to perform a cumulative air quality impact analysis. The proposed project is the Amended Carlsbad Energy Center (CECP), and will be located on the property of the existing Encina Power Station, located at 4600 Carlsbad Boulevard, Carlsbad, CA. The proposed CECP would be located at 33 degrees 8 minutes 27 seconds north latitude and 117 degrees 20 minutes 3 seconds west longitude, equivalent to stack Universal Transverse Mercator (UTM) coordinates of 3,666,945.98 meters northing, 468,833.15 meters easting in Zone 11 of North American Datum 1927 (NAD 27).

Specifically, we request the information listed below for facilities located within a six-mile radius of the CECP project site.

- A list of all new Authorities to Construct and/or modified Permits to Operate issued after June 1, 2012, for projects that result in a net emissions increase of 5 tons per year or more of NOx, PM_{10}, SOx, or CO.

- A list of projects for which Authority to Construct permits have not been issued to date but that are reasonably foreseeable and are expected to result in a net emissions increase of 5 tons per year or more of NOx, PM_{10}, SOx, or CO.

- For each new/modified source identified above, please provide the following information, to the extent available:

    - Facility name
    - Facility location
    - Type of new/modified basic emitting equipment
    - Net emission increases for all criteria pollutants

- For each new/modified source identified above, also please provide the following facility information for each stack:
    - Height
    - Inside diameter
    - Exit temperature
    - Exhaust flow rate or velocity
    - Base elevation
    - UTM coordinates

If you have any questions regarding this request, please do not hesitate to call me at (916) 444-6666.

Sincerely,

Tom Andrews
Principal Engineer

Enclosure

Tom W. Andrews

From: Haddad, Suha H. <Suha.Haddad@sdcounty.ca.gov>
Sent: Thursday, February 06, 2014 8:14 AM
To: Tom W. Andrews
Cc: Moore, Steve
Subject: Requested Info.
Attachments: Cabrillo 1.pdf; Cabrillo 2.pdf; Cabrillo 3.pdf; CHPCE La Salina.pdf; Carlsbad Stack Emissions.xls

Good morning,

Attached are the requested information.

Please let me know of any questions

Thank you,

Suha Haddad
(858) 586-2716

EPA United States Environmental Protection Agency

SOURCE MANAGEMENT SYSTEM

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FACILITY AND UNIT DETAILS

Cabrillo Power I Encina Power Station, CA (ORISPL 302)

The General Tab for the facility is displayed below. You may access additional information by clicking the other tabs.

General | Units | Generators | Owners/Operators | Representatives | Contacts | Programs

* Required information.

*Facility ID (ORISPL):	302	* Facility Name:	Cabrillo Power I Encina Power Station
* State:	CA	County:	San Diego
EPA Region:	9	State ID:	73
EPA AIRS ID:	06-073-00033	Facility ID (FRS ID):	110000730433
Latitude:	33.1408 (Latitude Example: 12.1234)	Longitude:	-117.3342 (Longitude Example: -123.1234)
NERC Region:	WECC - Western Electricity Coordinating Council		

Facility Description: 12/10/2012 (C. Hillock) Carlsbad Energy Center (listed as Encina Power Station units 6 and 7) is currently under final review by the CA Energy Commission. If built, the units would not be expected to come online before 2016. This project would be on the Encina Power Station site. 10/25/07- S Rosoff (intern) confirmed lat/long data.

Last Modified: 01/21/2013 (jcarter)

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Internal Memo

Rule 1200 Health Risk Assessment

Facility ID:	01073
Application:	**002146**
Project Engineer:	Arthur Carbonell
Toxics Risk Analyst:	Michael Kehetian
Date Submitted to Toxics:	08/15/12
Date Completed by Toxics:	09/05/12
HRA Tools Used:	BEEST-ISC3P

The following estimated risks are valid only for the input data provided by the Project Engineer.

Estimated Risk Levels:

Maximum Individual Cancer Risk (Resident)	0.2 in one million LCP
Chronic Noncancer Health Hazard Index	≤ 1
Acute Health Hazard Index	≤ 1

Process Data:

212-hp Digester Gas Engine

Operation Parameter	**Value**
Fuel Usage (MMscf/hr)	2.45E-03
Hours Per Year	8760

Worst-Case Potential Emissions:

Toxic Air Contaminant	**Emission Factor (lb/MMscf)**	**Emissions (lb/hr)**	**Emissions (lb/yr)**
AMMONIA	4.80E-03	1.18E-05	1.03E-01
BENZENE	1.78E-01	4.37E-04	3.82E+00
CHLOROBENZENE	2.00E-04	4.90E-07	4.29E-03

DICHLOROBENZENE-P	1.80E-03	4.41E-06	3.86E-02
DICHLOROETHANE (EDC, ETHYLENE DICHLORIDE), 1,2-	1.40E-03	3.43E-06	3.00E-02
ETHYL BENZENE	1.00E-03	2.45E-06	2.15E-02
FORMALDEHYDE	1.31E+00	3.21E-03	2.82E+01
HEXANE-N	6.48E-02	1.59E-04	1.39E+00
HYDROCHLORIC ACID	6.46E-01	1.58E-03	1.39E+01
HYDROGEN SULFIDE	2.15E-02	5.27E-05	4.61E-01
METHYL CHLOROFORM (1,1,1-TCA)	1.00E-04	2.45E-07	2.15E-03
METHYL ETHYL KETONE	1.00E-04	2.45E-07	2.15E-03
METHYLENE CHLORIDE	1.00E-04	2.45E-07	2.15E-03
PERCHLOROETHYLENE	5.00E-04	1.23E-06	1.07E-02
TOLUENE	6.48E-02	1.59E-04	1.39E+00
TRICHLOROETHYLENE	3.00E-04	7.35E-07	6.44E-03
XYLENES	4.50E-03	1.10E-05	9.66E-02

Release Parameters:

Stack Height (ft)	18
Stack Diameter (ft)	0.41
Temperature deg F	300
Vertical Airflow (acfm)	534

Discussion

The HRA was conducted in accordance with EPA and OEHHA guidance and District standard procedures. A point source was modeled with refined air dispersion modeling using EPA's ISC-Prime model, actual Oceanside / 1996-1998 meteorology data, complex terrain, and rural dispersion coefficients. Building downwash effects were calculated using the EPA BPIP-Prime model. The receptor grid was sufficiently dense to identify maximum impacts.

Since the engine emissions are based on continuous operations (24 hours per day and 7 days a week) an occupational ground level concentration (GLC) adjustment was not applied referencing the OEHHA Guidance Manual, *Calculating Cancer Risk Using Different Exposure Durations*, Section 8.2.2, *B. Worker*.

APP-002146

2.4 Attachments:
None.

3.0 EMISSIONS

3.1 Emission Estimate Summary:

Table 1: Calculated Normal Emissions					
	NOx	CO	VOC	SOx	PM_{10}
lbs/hr	0.28	2.34	0.37	0.005	0.07
lbs/day	6.73	56.1	8.97	0.12	1.62
tons/yr	1.23	10.2	1.62	0.02	0.30

3.2 Emission Estimate Assumptions:
Operating Schedule: 24 hrs/day, 8760 hrs/yr
Manufacturer's Emission Guarantees: NOx = 0.6 g/BHP-hr
CO = 5.0 g/BHP-hr
VOC = 0.8 g/BHP-hr
Exhaust flow rate calculated using EPA Method 19 (F_d = 9570 dscf/MMBtu)

3.3 Emission Calculations:
See attached calculations sheet.

3.4 Attachments:
None.

4.0 APPLICABLE RULES

4.1 Prohibitory Rules:

Rule 50 – Visible Emissions:
This rule limits air contaminant emissions into the atmosphere of shade greater than Ringlemann Number 1, to a maximum aggregate of three minutes in any consecutive sixty minute time period.
With proper maintenance and operation, no visible emissions are expected from this equipment.

Rule 51 – No Nuisance:
This rule prohibits discharge of air contaminants that cause or have a tendency to cause injury, nuisance or annoyance to people and/or the public or damage to business or property.
With proper maintenance and operation, no nuisance complaints are expected from the operation of this equipment.

Rule 53 – Specific Air Contaminants:
This rule prohibits the discharge of sulfur compounds, calculated as SO_2 in excess of 0.05% by volume on a dry basis and the discharge of particulate matter from combustion sources in excess of 0.10 grains/dscf standardized to 12% CO_2.
The estimated SOx (as SO_2) emissions from this engine is 2.4 ppm. The estimated grain loading from this engine is 0.0033 gr/dscf.

Rule 62 – Sulfur Content of Fuels:
This rule prohibits the use of any gaseous fuel containing more than 10 grains of sulfur compounds, calculated as H_2S, per 100 dscf of gas, and any liquid fuel containing more than 0.5% sulfur by weight.
This rule does not apply to the combustion of digester gas.

APP-002146

1. **Ducted or Stack Emissions** (For 1 or more emission points). Estimate values if you are unsure.

Parameter	Point #1	Point #2	Point #3	Point #4	Point #5	Point #6
Height of Exhaust above ground (ft)	18					
Stack Diameter (or length/width) (ft)	5 in.					
Exhaust Gas Temperature* (°F)	300					
Exhaust Gas Flow (actual cfm or fps)	534					
Is Exhaust Vertical (Yes or No)	Y					
Raincap? (None, Flapper Valve, Raincap)	No					
Distance to Property Line (+/- 10 ft)	20					

* Use "70 °F" or "Ambient" if unknown

2. **Unducted Emissions** (For 1 or more emission points). Estimate if you are unsure.

Describe how unducted gases, vapors, and/or particles get into the outside air. Provide a brief description of the process or operation for each unducted emission point. If unducted emissions come out of building openings such as doors or windows, estimate the **size of the opening** (example – 3 ft x 4 ft window).

If unducted emissions originate outside your buildings, estimate the **size of the emission zone** (example - paint spraying 2' x 2' x 2' bread boxes).

RECEPTOR DATA A receptor is a residence or business whose occupants could be exposed to toxic emissions from your facility. In order to estimate the risk to nearby receptors, please provide the distance from the emission point to the nearest residence and to the nearest business.

Distance to nearest residence 250 ft

Distance to nearest business 250 ft

Distance to nearest school 1790 ft

Name of Preparer: Chuck Solt **Title:** Principal of Lindh & Associate

Phone No.: (916) 729-5004 **E-mail:** Chuck@CSolt.net **Date:** 4/4/2012

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.

APCD
AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO

County of San Diego
AIR POLLUTION CONTROL DISTRICT
10124 Old Grove Road, San Diego, CA 92131

(858) 586-2600
FAX (858) 586-2601
Smoking Vehicle Hotline
1-800-28-SMOKE
www.sdapcd.org

February 19, 2013

Owner Manager
CHPCE La Salina LLC
1 Liberty Square, 11th Floor
Boston, MA 02109

After examination of your Application APCD2012-APP-002146 for an Air Pollution Control District (District) Authority to Construct and Permit to Operate for equipment to be located at 1360 TAIT ST, OCEANSIDE, CA 92054 in San Diego County, the District has decided on the following actions:

Authority to Construct is granted pursuant to Rule 20 of the Air Pollution Control District Rules and Regulations for equipment to consist of:

Cogeneration Engine: Liebherr, Model G6926, digester gas fired, 212 BHP, S/N TBD, driving a 150 kW generator.

This Authority to Construct is issued with the following conditions:

1 Operation of this equipment shall be conducted in accordance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

2 The emissions of oxides of nitrogen (NOx), calculated as nitrogen dioxide, from the engine exhaust shall not exceed 0.6 g/BHP-hr.

3 The emissions of carbon monoxide (CO) from the engine exhaust shall not exceed 5.0 g/BHP-hr.

4 The emissions of volatile organic compounds (VOC), calculated as methane, from the engine exhaust shall not exceed 0.8 g/BHP-hr.

5 The engine shall be equipped with a digester gas fuel flow meter and recorder. This meter shall be in full operation at all times when the engine is in operation and shall be calibrated in accordance with manufacturer's specifications at least once every six months to verify that an accurate reading of plus or minus 5 percent is being maintained.

6 The exhaust stack shall be equipped with source test ports and platforms to allow for the measurement and collection of stack gas samples consistent with all approved test protocols. The ports and platforms shall be constructed in accordance with San Diego Air Pollution Control District Method 3A, Appendix Figure 2, and approved by the District.

7 Within 60 days after the initial startup, an initial source test shall be conducted by an independent, ARB approved tester, or the District, at the applicant's expense, to determine initial compliance with the emission standards of this Authority to Construct. A source test protocol shall be submitted to the District for approval at least 30 days prior to

the initial source test. The source test protocol shall comply with the following requirements:
a. Measurements of outlet oxides of nitrogen (NOx), carbon monoxide (CO), and stack gas oxygen content (O2%) shall be conducted in accordance with the District Source Test Method 100, or the Air Resources Board (ARB) Test Method 100 as approved by the U.S. Environmental Protection Agency (EPA).
b. Measurements of outlet volatile organic compound (VOC) emissions shall be conducted in accordance with the San Diego Air Pollution Control District Methods 25A and/or 18.
c. Source testing shall be performed at no less than 90% of the engine rated load. If it is demonstrated to the District that this engine cannot operate at these conditions, then emissions source testing shall be performed at the highest achievable continuous power rating or under the typical duty cycle or typical operational mode of the engine.
d. During the source test, the site shall measure and record the higher heating value, in BTU per cubic feet, the flow rate, in standard cubic feet per minute, and the composition of the digester gas.

8 Within 30 days after completion of the initial source tests, a final test report shall be submitted to the District for review and approval. The testing contractor shall include, as part of the test report, a certification that to the best of his knowledge the report is a true and accurate representation of the test conducted and the results.

9 Based on source testing, additional monitoring parameters may be established through modification of a Startup Authorization or Permit to Operate to ensure compliance. Operating characteristics monitored by continuous parametric monitors may also be restricted to specified ranges or limits, as determined by the District, based upon manufacturer's recommended operating procedures and initial compliance source test results.

10 This equipment shall be properly maintained and kept in good operating condition at all times.

11 The owner or operator shall change the engine oil and filter, inspect the spark plugs, and inspect/replace as necessary all hoses and belts every 1,440 hours of operation or annually whichever comes first. (NESHAP ZZZZ)

12 The owner or operator shall conduct periodic inspections of this engine, and any add-on control equipment, as applicable, to ensure that the engine and control equipment is operated in compliance with the provision of this Authority to Construct. The periodic inspections shall be conducted at least once every six months.

13 The owner or operator shall conduct periodic maintenance of this engine, and any add-on control equipment, as applicable, as recommended by the engine and control equipment manufacturers or as specified by any other maintenance procedure approved in writing by the District. The periodic maintenance shall be conducted at least once each calendar year.

14 The owner or operator shall keep a manual of recommended maintenance provided by the manufacturer, or other maintenance procedures as approved in writing by the District.

15 The owner or operator shall maintain an operating log containing, at a minimum, the following: records of periodic engine inspections, including the dates the inspection was performed; records of engine maintenance, including the dates maintenance was performed and the nature of the maintenance.

16 The permittee shall comply with all initial and periodic notification requirements specified by 40 CFR 60.4245, including submitting an intial notification and results of all performance testing to the APCD, and any other applicable notification requirements required by 40 CFR 60.7.

17 All records required by this permit shall be kept for a minimum of three years and made available to District personnel upon request.

18 This equipment shall be source tested at least once each permit year (annual source test) to demonstrate compliance with the emission standards contained in this Authority to Construct. For the purposes of this Authority to Construct, a permit year is the 12-month period ending on the last day of the permit expiration month. It is the responsibility of the permittee to schedule the source test with the District. The source test shall be performed or witnessed by the District. Each annual source test shall be separated by at least 90 days from any annual source test performed in a different permit year.

19 Access, facilities, utilities and any necessary safety equipment for source testing and inspection shall be provided upon request of the Air Pollution Control District.

20 This Air Pollution Control District Permit does not relieve the holder from obtaining permits or authorizations required by other governmental agencies.

21 The permittee shall, upon determination of applicability and written notification by the District, comply with all applicable requirements of the Air Toxics "Hot Spots" Information and Assessment Act (California Health and Safety Code Section 44300 et seq.)

This Authority to Construct authorizes temporary operation of the above-specified equipment. This temporary Permit to Operate shall take effect upon written notification to the District that construction (or modification) has been completed in accordance with this Authority to Construct. This temporary Permit to Operate will remain in effect, unless withdrawn or modified by the District, and a revised temporary permit (Startup Authorization) is issued or a Permit to Operate is granted or denied.

Upon completion of construction (or modification) in accordance with this Authority to Construct, and prior to commencing operation, the applicant must complete and mail, deliver or fax the enclosed Construction Completion Notice to the District. After mailing, delivering or faxing the notice, the applicant may commence operation of the equipment. Operation must be in compliance with all the conditions of this Authority to Construct and applicable District Rules.

This Authority to Construct shall be posted on or within 25 feet of the above described equipment or maintained readily available at all times on the operating premises.

This Air Pollution Control District Authority to Construct does not relieve the holder from obtaining permits or authorizations, which may be required by other governmental agencies. This Authority to Construct is not authority to exceed any applicable emission standard established by this District or any other governmental agency. This authorization is subject to cancellation if any emission standard or condition is violated.

Within 30 days after receipt of this Authority to Construct, the applicant may petition the Hearing Board for a hearing on any conditions imposed herein in accordance with Rule 25.

This Authority to Construct will expire on 02/19/2014 unless an extension is granted in writing.

CHPCE La Salina LLC
Application #: APCD2012-APP-002146

February 19, 2013

This is not a Permit to Operate. Please be advised that installation or operation of this process or equipment without written authorization may be a misdemeanor subject to fines and penalties.

If you have any questions regarding this action, please contact me at (858) 586 2741 or via email at Arthur.Carbonell@sdcounty.ca.gov.

Arthur Carbonell
Associate Engineer

CC: Compliance Division

Appendix 5.5A
Offsite Consequence Analysis

APPENDIX 5.5A

Offsite Consequence Analysis

The Amended Carlsbad Energy Center Project (Amended CECP) will be a natural gas-fired, simple-cycle electrical generating facility rated at a net generating capacity of 632 megawatts (MW)[1]. The project will consist of six GE LMS 100 combustion turbine generators. Aqueous ammonia (ammonium hydroxide at 19 percent nominal concentration by weight) will be used to reduce oxides of nitrogen (NOx) emissions. One 20,000-gallon aqueous ammonia aboveground storage tank (holding 17,000 gallons of aqueous ammonia) will be installed to provide an approximately 5-day continuous supply of aqueous ammonia.

Aqueous ammonia will be delivered to the plant by truck transport. The ammonia delivery truck unloading station will include a bermed and sloped pad surface. The bermed truck drainage pad will slope from the north end to a collection trough on the south end that will drain into a sump with an approximately 0.25-square-foot opening underlying the ammonia tank. The ammonia storage tank will be surrounded by a 34-foot by 30-foot secondary containment area that will also drain into the sump. The sump will be capable of holding the full contents of the tank, plus rainwater.

The ammonia tank will be equipped with a pressure relief valve set at 50 pounds per square inch gage (psig), a vapor equalization system, and a vacuum breaker system. The storage tank will be maintained at ambient temperature and atmospheric pressure.

Analysis

An analysis of tank failure and subsequent release of aqueous ammonia was prepared using a numerical dispersion model. The analysis assumed the complete failure of the storage tank, the immediate release of the contents of the tank, and the formation of an evaporating pool of aqueous ammonia within the secondary containment structure. It was conservatively assumed that the spill would remain in the secondary containment area, rather than draining into the sump, which has a much smaller surface area. Evaporative emissions of ammonia would be subsequently released into the atmosphere.

Meteorological conditions at the time of the release would control the evaporation rate, dispersion, and transport of ammonia released to the atmosphere. For purposes of this analysis, the following meteorological data were used:

- U.S. Environmental Protection Agency (EPA) default (worst-case) meteorological data, supplemented by daily temperature data, as defined by 19 California Code of Regulations (CCR) 2750.2.

The maximum temperature recorded near the CECP in the past 3 years was 88 degrees Fahrenheit (°F) or 304.3 Kelvin[2]. Maximum temperatures combined with low wind speeds and stable atmospheric conditions would be expected to result in the highest ammonia concentrations at the farthest distance downwind of the release site.

Table 5.5A-1 displays the meteorological data values used in the modeling analysis.

[1] Rated at average annual ambient condition of 60.3°F with evaporative cooling and 79 percent relative humidity.

[2] Data found under "Extreme Maximum Temperature" at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca6377.

TABLE 5.5A-1
Meteorological Input Parameters

Parameter	Worst-Case Meteorological Data
Wind Speed, meters/second	1.5
Stability Class	F
Relative Humidity, Percent	50
Ambient Temperature, Kelvin (°F)	304.3 (88)

Modeling was conducted using the SLAB numerical dispersion model, based on an evaporating pool release and the meteorological data presented in Table 5.5A-1. A complete description of the SLAB model is available in *User's Manual for SLAB: An Atmospheric Dispersion Model for Denser-Than-Air Releases, D. E. Ermak, Lawrence Livermore National Laboratory, June 1990*. The SLAB User's Manual contains a substance database, which includes chemical-specific data for ammonia. These data were used in the modeling without exception or modification.

Emissions of aqueous ammonia were calculated pursuant to the guidance given in *RMP Offsite Consequence Analysis Guidance, EPA, April 1999* and using the emission calculation tool for evaporating solutions, provided in the Area Locations of Hazardous Atmospheres (ALOHA) model made available by the EPA.[3]

Release rates for ammonia vapor from an evaporating 19-percent solution of aqueous ammonia were calculated assuming mass transfer of ammonia across the liquid surface occurs according to principles of heat transfer by natural convection. For the worst-case condition, it was assumed that a complete failure of the storage tank occurred, releasing the contents of the tank into the secondary containment area. The ammonia release rate was calculated using ALOHA, based on the meteorological data displayed in Table 5.5A-1 and the dimensions of the secondary containment area.

During the worst-case scenario, an initial ammonia evaporation rate was calculated for the secondary containment area and was assumed to occur for 1 hour after the initial release. For concentrated solutions, the initial evaporation rate is substantially higher than the rate averaged over time periods of a few minutes or more because the concentration of the solution immediately begins to decrease as evaporation begins.

Although the edge of the secondary containment area is raised above ground level, the release height used in the modeling was set at 0 meter above ground level (AGL) to maintain the conservative nature of the analysis. Downwind concentrations of ammonia were calculated at heights of 1.6 and 0 meters AGL. The California Office of Environmental Health Hazard Assessment (OEHHA) has designated 1.6 meters as the breathing zone height for individuals.

An analysis and the subsequent impacts of the tank loading hose failure with a leak below the excess flow valves activation set-point was considered. This analysis would normally be completed under typical or average meteorological conditions for the area. However, after review of the possible failure modes, it was determined that the impact of this leak would be bracketed by the complete tank failure as a worst-case for the hose failure.

Toxic Effects of Ammonia

With respect to the assessment of potential impacts associated with an accidental release of ammonia, four offsite "bench mark" exposure levels were evaluated, as follows: (1) the lowest concentration posing a risk of lethality, 2,000 parts per million (ppm); (2) the Occupational Safety and Health Administration's (OSHA) Immediately Dangerous to Life and Health (IDLH) level of 300 ppm; (3) the Emergency Response Planning

[3] http://www2.epa.gov/cameo/cameo-downloading-installing-and-running-aloha

Guideline (ERPG) level of 150 ppm, which is the American Industrial Hygiene Association's (AIHA) updated ERPG-2 for ammonia; and (4) the level considered by the California Energy Commission (CEC) staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm (*Preliminary Staff Assessment-Otay Mesa Generating Project, 99-AFC-5, May 2000)*.

The odor threshold of ammonia is approximately 5 ppm, and minor irritation of the nose and throat will occur at 30 to 50 ppm. Concentrations greater than 140 ppm will cause detectable effects on lung function, even for short-term exposures (0.5 to 2 hours). At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death occurs at concentrations of 2,500 to 7,000 ppm.

The ERPG-2 value is based on a 1-hour exposure or averaging time; therefore, the modeled distance to ERPG-2 concentrations are presented in terms of a 1-hour (or 60minute) averaging time. The ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action. OSHA's IDLH for ammonia is based on a 30minute exposure or averaging time; therefore, the IDLH modeling concentrations at all offsite receptors will be given in terms of a 30minute averaging time.

Modeling Results

Figures 5.5A-1 and 5.5A-2 and Table 5.5A-2 show the modeled distance to the four benchmark criteria concentrations: lowest concentration posing a risk of lethality (2,000 ppm), OSHA's IDLH (300 ppm), AIHA's ERPG-2 (150 ppm), and the CEC significance value (75 ppm).

TABLE 5.5A-2
Distance to EPA and CEC Toxic Endpoints (ammonia)

Scenario	Distance in Meters to 2,000 ppm	Distance in Meters to OSHA's IDLH (300 ppm)	Distance in Meters to AIHA's ERPG-2 (150 ppm)	Distance in Meters to CEC Significance Value (75 ppm)
0 meter AGL	5.5	5.7	5.8	5.8
1.6 meters AGL	6.3	6.6	6.7	6.9

The model input file and the output files are available upon request.

The closest point on the project boundary to the secondary containment area is approximately 190 feet (58 meters) to the north. The results of the offsite consequence analysis for the worst-case release scenario of ammonia at CECP indicate that the concentrations exceeding the benchmarks above would not extend beyond the property boundary at the 0 and 1.6 meter AGL scenarios.

Assessment of the Methodology Used

Numerous conservative assumptions were used in the above analysis of the release scenarios. These include the following:

- Worst case of a constant mass flow, at the highest possible initial evaporation rate for the modeled wind speed and temperature was used, whereas in reality the evaporation rate would decrease with time as the concentration in the solution decreases.
- Worst-case stability class was used, which almost exclusively occurs during nighttime hours, but the maximum ambient temperature of 88°F was used, which would occur during daylight hours.
- Again, worst-case meteorology corresponds to nighttime hours, whereas the worst-case release of a tank failure would most likely occur during daytime activities at the power plant. At night, activity at a power plant is typically minimal.

Risk Probability

Accidental releases of aqueous ammonia in industrial use situations are rare. Statistics compiled on the normalized accident rates for Risk Management Program (RMP) chemicals for the years 1994-1999 from *Chemical Accident Risks in U.S. Industry-A Preliminary Analysis of Accident Risk Data from U.S. Hazardous Chemical Facilities, J.C. Belke, Sept 2000*, indicates that ammonia (all forms) averages 0.017 accidental releases per process per year, and 0.018 accidental releases per million pounds stored per year. Data derived from *The Center for Chemical Process Safety, 1989*, indicating the accidental release scenarios and probabilities for ammonia in general is shown in Table 5.5A-3.

TABLE 3
General Accidental Release Scenarios and Probabilities for Ammonia

Accident Scenario	Failure Probability
Onsite Truck Release	0.0000022
Loading Line Failure	0.005
Storage Tank Failure	0. 000095
Process Line Failure	0.00053
Evaporator Failure	0.00015

Conclusions

Several factors need to be considered when determining the potential risk from the use and storage of hazardous materials. These factors include the probability of equipment failure, population densities near the project site, meteorological conditions, and the process design. Considering the results of the above analysis, and accounting for the probabilities of a tank failure resulting in the modeled ammonia concentrations at the conditions modeled, the risk posed to the local community from the storage of aqueous ammonia at CECP is not significant.

The results of the catastrophic scenario analysis indicate that the probability of a complete storage tank failure in combination with the conservatively modeled meteorological conditions would not pose a significant threat since ammonia concentrations above the four “bench mark” thresholds of 2,000, 300, 150, and 75 ppm would not be accessible to the public.

As described above, numerous conservative assumptions have been made at each step in this analysis. The conservative nature of these assumptions has resulted in a significant overestimation of the probability of an ammonia release at the CECP site, and the predicted distances and elevations to toxic endpoints do not pose a threat to the public. Therefore, it is concluded that risk from exposure to aqueous ammonia due to CECP is less than significant.

LEGEND

Carlsbad Energy Center Project		**Ammonia Dispersion**	
Ammonia Tank		75 ppm	
SCE 12kV easement		150 ppm	
Tank 4		300 ppm	
		2,000 ppm	

65 0
Feet
N

Figure 5.5A-1
Offsite Consequence Analysis
Carlsbad Energy Center Project

CH2MHILL

LEGEND

- Ammonia Tank
- Encina Power Station Site
- Amended CECP Project Site
- Poseidon Desalinization Site
- Cannon Substation; SDGE Switchyard
- Footprint of the Amended Project's Major Features

Ammonia Dispersion

- 75 ppm - 2,000 ppm

0 250 500
Feet

N

Figure 5.5A-2
Offsite Consequence Analysis
Carlsbad Energy Center Project

CH2MHILL

Appendix 5.9A
Sensitive Receptors within 3-Miles of Project Site

Table 5.9A-1
Sensitive Receptors within 3-Miles of CECP

TYPE	NAME	X_COORD	Y_COORD
Daycare	PARKHURST, CARLENE FAMILY CHILD CARE	-117.314164	33.103256
Daycare	CARLSBAD EDUCATIONAL FOUNDATION-PACIFIC RIM ELEM.	-117.30596	33.11021
Daycare	KINDERCARE-CARLSBAD	-117.304659	33.115406
Daycare	BERIAN, KRISTEN FAMILY CHILD CARE	-117.291455	33.116743
Daycare	HANNAY, CAROL FAMILY CHILD CARE	-117.297139	33.117927
Daycare	MA, AMY FAMILY CHILD CARE	-117.304933	33.118095
Daycare	NHA-LAUREL TREE HEAD START	-117.3017	33.121575
Daycare	STEED, SHAWNA FAMILY CHILD	-117.301645	33.121587
Hospital	HOSPICE OF THE NORTH COAST	-117.326944	33.129286
Hospital	HOSPICE OF NORTH COAST	-117.327067	33.129516
College	GEMOLOGICAL INSTITUTE OF AMERICA	-117.317849	33.131271
Daycare	CARLSBAD COUNTRY DAY SCHOOL	-117.304289	33.141853
Daycare	CARLSBAD EDUCATIONAL FOUNDATION - KELLY ELEM.	-117.311178	33.148369
Daycare	HOWARD, LYNNA FAMILY CHILD CARE	-117.331587	33.149835
Daycare	GRISHAM, SYLVIA & JAMES FAMILY CHILD CARE	-117.317959	33.15086
Daycare	BLOSCH, SUSAN FAMILY CHILD CARE	-117.310411	33.151917
Daycare	WATSON, JAMIE AND ERIC FAMILY CHILD CARE	-117.317479	33.152949
School	ST PATRICK	-117.336518	33.153421
Daycare	CARLSBAD EDUCATIONAL FOUNDATION - JEFFERSON ELEM.	-117.339545	33.153804
Daycare	MEGASTAR CHILDRENS CHRISTIAN ACADEMY	-117.336956	33.153974
Daycare	ESTES, CYNTHIA FAMILY DAY CARE	-117.335491	33.155521
Daycare	CASA MONTESSORI DE CARLSBAD	-117.342449	33.155659
Daycare	FRIEDRICHS, ROSIE FAMILY CHILD CARE	-117.346229	33.15843
Nursing	CARLSBAD BY THE SEA	-117.352914	33.15875
Daycare	NHA - CARLSBAD HEAD START	-117.339011	33.158819
Daycare	CARLSBAD MONTESSORI SCHOOL	-117.344394	33.158876
Daycare	GREENE, MARYANN & JAMES FAMILY CHILD CARE	-117.34538	33.159199
Daycare	SAGUILAN, DIGNA FAMILY CHILD CARE	-117.339038	33.159346
Hospital	CARLSBAD BY THE SEA	-117.352215	33.159599
Daycare	CARLSBAD EDUCATIONAL FOUNDATION - MAGNOLIA ELEM.	-117.326725	33.160115
Daycare	PILGRIM DAY CARE CENTER	-117.325903	33.161682
Daycare	HUDGINS, BRENDA FAMILY DAY CARE	-117.320903	33.161929
Daycare	BENAVIDEZ, KARAH FAMILY CHILD CARE	-117.294235	33.162203
Hospital	QUALITY CARE MEDICAL CENTER INC	-117.349585	33.162523
Daycare	VALLE-LICERIO, ROSEMARY FAMILY CHILD CARE	-117.313575	33.162808
Daycare	DANNA, DORA FAMILY CHILD CARE	-117.339381	33.163389
Daycare	HATFIELD, LIGIA & REJANE, MINNIE FAMILY CHILD CARE	-117.332984	33.164161
Daycare	BAGLEY, KATHLEEN FAMILY CHILD CARE	-117.319178	33.164199
Daycare	BIRKLEY, JANICE FAMILY DAY CARE	-117.31248	33.165011
Hospital	LAS VILLAS DE CARLSBAD RESIDENTIAL	-117.344175	33.165279
Hospital	LAS VILLAS DE CARLSBAD HEALTH	-117.344065	33.165279
Nursing	LAS VILLAS DE CARLSBAD HEALTH CENTER	-117.344065	33.165279
Daycare	PACKARD, SUSAN FAMILY CHILD CARE	-117.327916	33.16544
Daycare	VAZIRI, ZAHRA FAMILY CHILD CARE	-117.330382	33.166166
Daycare	CROOT, DEBBIE FAMILY DAY CARE	-117.32767	33.166367
Daycare	COOPER, ANNA FAMILY CHILD CARE	-117.327971	33.166923
Daycare	CARLSBAD CHILDREN'S HOUSE	-117.34838	33.166932
School	BEAUTIFUL SAVIOUR LUTHERAN SCH	-117.33534	33.16709
Daycare	BURT, SHARON FAMILY CHILD CARE	-117.316219	33.1673
Daycare	BURKHALTER, SUZANNE FAMILY CHILD CARE	-117.343065	33.167966
Daycare	BLACKBURN, KATHRYN FAMILY DAY CARE	-117.308891	33.16819
Daycare	CARLSBAD CHILDREN'S GARDEN	-117.34838	33.168614
Daycare	CARLSBAD EDUCATIONAL FOUNDATION-BUENA VISTA ELEM.	-117.342531	33.168884
Daycare	HANNA, LILY BETH & DIA FAMILY CHILD CARE	-117.343216	33.168893
Daycare	KESSNER, ISABEL FAMILY CHILD CARE	-117.334779	33.17137
Hospital	WELL BEING MEDICAL CLINIC	-117.323547	33.173118
Hospital	BRIGHTON GARDENS OF CARLSBAD	-117.323629	33.173213
Nursing	BRIGHTON GARDENS OF CARLSBAD	-117.323629	33.173213
Hospital	NCHS OCEANSIDE CARLSBAD HEALTH CNTR	-117.362858	33.174822
School	BRIGHT HORIZONS	-117.325369	33.175047
Daycare	IMMANUEL LUTHERAN CHILDREN'S LEARNING CENTER	-117.357913	33.175447
School	SOUTH OCEANSIDE ELEMENTARY	-117.358118	33.17746
Daycare	HEDSTROM, LORA AND DENARO, ERIN	-117.353489	33.178171
Daycare	BROCKAVICH, MICHELLE FAMILY CHILD CARE	-117.354954	33.178511
Daycare	MAAC PROJECT HEAD START NORTH COAST	-117.351023	33.179608
Hospital	NORTH COAST KIDNEY CENTER	-117.317438	33.181287
Hospital	QUALITY CARE MEDICAL CENTER	-117.323218	33.182571

Appendix 5.9B
Detailed Noncriteria Emission Calculations

Table 5.9B-1
CECP Amendment
Non-Criteria Pollutant Emission Calculations Gas Turbines (Hourly Emissions)

Pollutant	Uncontrolled Emission Factor (lbs/MMBtu)	Basis	Normal Oper. Controlled Emission Factor (lbs/MMBtu)	Worst Case Startup/Shutdown VOC Emiss. Vs. Normal Operation VOC Emiss.(5) (lbs/hr)/(lbs/hr)	Startup/Shutdown Emission Factor(5) (lbs/MMBtu)	Commissioning Emission Factor(6) (lbs/MMBtu)	Single GT Max. Firing Rate (MMBtu/hr)	Single GT Normal Oper. Emissions (lbs/hr)	Single GT Startup/Shutdown Emissions (lbs/hr)	Single GT Commissioning Emissions (lbs/hr)
Ammonia	6.87E-03	Permit Limit(3)	6.87E-03	2.48	6.87E-03	6.87E-03	983.6	6.76E+00	6.76E+00	6.76E+00
Propylene	7.56E-04	0.5*CATEF(2)	3.78E-04	2.48	9.36E-04	7.56E-04	983.6	3.72E-01	9.21E-01	7.44E-01
Hazardous Air Pollutants (HAPs) - Federal										
Acetaldehyde	4.00E-05	0.5*AP-42(1)	2.00E-05	2.48	4.95E-05	4.00E-05	983.6	1.97E-02	4.87E-02	3.93E-02
Acrolein	6.42E-06	0.5*AP-42(1)	3.21E-06	2.48	7.95E-06	6.42E-06	983.6	3.16E-03	7.82E-03	6.31E-03
Benzene	1.20E-05	0.5*AP-42(1)	5.99E-06	2.48	1.48E-05	1.20E-05	983.6	5.89E-03	1.46E-02	1.18E-02
1,3-Butadiene	4.30E-07	0.5*AP-42(1)	2.15E-07	2.48	5.32E-07	4.30E-07	983.6	2.11E-04	5.24E-04	4.23E-04
Ethylbenzene	3.20E-05	0.5*AP-42(1)	1.60E-05	2.48	3.96E-05	3.20E-05	983.6	1.57E-02	3.90E-02	3.15E-02
Formaldehyde	9.00E-04	0.5*CATEF(2)	4.50E-04	2.48	1.11E-03	9.00E-04	983.6	4.43E-01	1.10E+00	8.85E-01
Hexane, n-	2.54E-04	0.5*CATEF(2)	1.27E-04	2.48	3.15E-04	2.54E-04	983.6	1.25E-01	3.09E-01	2.50E-01
Naphthalene	1.31E-06	0.5*AP-42(1)	6.53E-07	2.48	1.62E-06	1.31E-06	983.6	6.42E-04	1.59E-03	1.28E-03
Total PAHs (listed individually bel	6.43E-07	SUM	3.22E-07	2.48	7.97E-07	6.43E-07	983.6	3.16E-04	7.84E-04	6.33E-04
Acenaphthene	1.86E-08	0.5*CATEF(2)	9.32E-09	2.48	2.31E-08	1.86E-08	983.6	9.17E-06	2.27E-05	1.83E-05
Acenapthyene	1.44E-08	0.5*CATEF(2)	7.21E-09	2.48	1.79E-08	1.44E-08	983.6	7.09E-06	1.76E-05	1.42E-05
Anthracene	3.32E-08	0.5*CATEF(2)	1.66E-08	2.48	4.11E-08	3.32E-08	983.6	1.63E-05	4.04E-05	3.27E-05
Benzo(a)anthracene	2.22E-08	0.5*CATEF(2)	1.11E-08	2.48	2.75E-08	2.22E-08	983.6	1.09E-05	2.70E-05	2.18E-05
Benzo(a)pyrene	1.36E-08	0.5*CATEF(2)	6.82E-09	2.48	1.69E-08	1.36E-08	983.6	6.71E-06	1.66E-05	1.34E-05
Benzo(e)pyrene	5.34E-10	0.5*CATEF(2)	2.67E-10	2.48	6.61E-10	5.34E-10	983.6	2.63E-07	6.50E-07	5.25E-07
Benzo(b)fluoranthrene	1.11E-08	0.5*CATEF(2)	5.54E-09	2.48	1.37E-08	1.11E-08	983.6	5.45E-06	1.35E-05	1.09E-05
Benzo(k)fluoranthrene	1.08E-08	0.5*CATEF(2)	5.40E-09	2.48	1.34E-08	1.08E-08	983.6	5.31E-06	1.32E-05	1.06E-05
Benzo(g,h,i)perylene	1.34E-08	0.5*CATEF(2)	6.72E-09	2.48	1.66E-08	1.34E-08	983.6	6.61E-06	1.64E-05	1.32E-05
Chrysene	2.48E-08	0.5*CATEF(2)	1.24E-08	2.48	3.07E-08	2.48E-08	983.6	1.22E-05	3.02E-05	2.44E-05
Dibenz(a,h)anthracene	2.30E-08	0.5*CATEF(2)	1.15E-08	2.48	2.85E-08	2.30E-08	983.6	1.13E-05	2.80E-05	2.26E-05
Fluoranthene	4.24E-08	0.5*CATEF(2)	2.12E-08	2.48	5.25E-08	4.24E-08	983.6	2.09E-05	5.16E-05	4.17E-05
Fluorene	5.70E-08	0.5*CATEF(2)	2.85E-08	2.48	7.06E-08	5.70E-08	983.6	2.80E-05	6.94E-05	5.61E-05
Indeno(1,2,3-cd)pyrene	2.30E-08	0.5*CATEF(2)	1.15E-08	2.48	2.85E-08	2.30E-08	983.6	1.13E-05	2.80E-05	2.26E-05
Phenanthrene	3.08E-07	0.5*CATEF(2)	1.54E-07	2.48	3.81E-07	3.08E-07	983.6	1.51E-04	3.75E-04	3.03E-04
Pyrene	2.72E-08	0.5*CATEF(2)	1.36E-08	2.48	3.37E-08	2.72E-08	983.6	1.34E-05	3.31E-05	2.68E-05
Propylene oxide	2.90E-05	0.5*AP-42(1)	1.45E-05	2.48	3.59E-05	2.90E-05	983.6	1.43E-02	3.53E-02	2.85E-02
Toluene	1.31E-04	0.5*AP-42(1)	6.53E-05	2.48	1.62E-04	1.31E-04	983.6	6.42E-02	1.59E-01	1.28E-01
Xylene	6.40E-05	0.5*AP-42(1)	3.20E-05	2.48	7.92E-05	6.40E-05	983.6	3.15E-02	7.79E-02	6.30E-02

Notes:
(1) AP-42, Table 3.1-3, 4/00.
(2) From CARB CATEF database (converted from lbs/MMscf to lbs/MMBtu based on site natural gas HHV of 1,019.9 Btu/scf).
(3) Based on 5 ppm ammonia slip from SCR system.
(4) Based on SDAPCD workbook emission factor.
(5) Controlled emission factor adjusted upward based on VOC emission ratio - as required by SDAPCD for the Pio Pico Energy Center.
(6) Based on uncontrolled emission factors - as required by SDAPCD for the Pio Pico Energy Center.

Table 5.9B-2
CECP Amendment
Non-Criteria Pollutant Emissions Gas Turbines (Annual Emissions)

Pollutant	Single Turbine Normal Operating Hours (hrs/yr)	Single Turbine Startup/Shutdown Hours (hrs/yr)	Single Turbine Commissioning Hours (hrs/yr)	Single Turbine(1) Annual Emissions (tons/yr)	Six Turbines(1) Annual Emissions (tons/yr)	Single Turbine Annual Commissioning Emissions (tons/yr)	Six Turbines Annual Commissioning Emissions (tons/yr)
Ammonia	1,900	800	213	9.12	54.73	0.72	4.31
Propylene	1,900	800	213	0.72	4.33	0.08	0.47
Hazardous Air Pollutants (HAPs) - Federal							
Acetaldehyde	1,900	800	213	0.038	0.23	0.004	0.025
Acrolein	1,900	800	213	0.006	0.04	0.001	0.004
Benzene	1,900	800	213	0.011	0.07	0.001	0.008
1,3-Butadiene	1,900	800	213	0.000	0.00	0.000	0.000
Ethylbenzene	1,900	800	213	0.031	0.18	0.003	0.020
Formaldehyde	1,900	800	213	0.859	5.15	0.094	0.564
Hexane, n-	1,900	800	213	0.242	1.45	0.027	0.159
Naphthalene	1,900	800	213	0.001	0.01	0.000	0.001
Total PAHs (listed individually bel	1,900	800	213	0.001	0.00	0.000	0.000
Acenaphthene	1,900	800	213	0.000	0.00	0.000	0.000
Acenapthyene	1,900	800	213	0.000	0.00	0.000	0.000
Anthracene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(a)anthracene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(a)pyrene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(e)pyrene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(b)fluoranthrene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(k)fluoranthrene	1,900	800	213	0.000	0.00	0.000	0.000
Benzo(g,h,i)perylene	1,900	800	213	0.000	0.00	0.000	0.000
Chrysene	1,900	800	213	0.000	0.00	0.000	0.000
Dibenz(a,h)anthracene	1,900	800	213	0.000	0.00	0.000	0.000
Fluoranthene	1,900	800	213	0.000	0.00	0.000	0.000
Fluorene	1,900	800	213	0.000	0.00	0.000	0.000
Indeno(1,2,3-cd)pyrene	1,900	800	213	0.000	0.00	0.000	0.000
Phenanthrene	1,900	800	213	0.000	0.00	0.000	0.000
Pyrene	1,900	800	213	0.000	0.00	0.000	0.000
Propylene oxide	1,900	800	213	0.028	0.17	0.003	0.018
Toluene	1,900	800	213	0.125	0.75	0.014	0.082
Xylene	1,900	800	213	0.061	0.37	0.007	0.040
Total (HAPs) =				1.40	8.42	0.15	0.92
Total (All) =				11.25	67.48	0.95	5.70

Notes:
(1) Includes startup/shutdown emissions.

Table 5.9B-3
CECP Amendment
Non-Criteria Pollutant Emission Calculations Emergency Engines

Pollutant	Emission Factor (lbs/Mgal)	Basis	Firepump Fuel Use (gals/hr)	Generator Fuel Use (gals/hr)	Firepump Fuel Use (gals/year)	Generator Fuel Use (gals/year)	Firepump Hourly Emissions (lbs/hr)	Generator Hourly Emissions (lbs/hr)	Firepump Annual Emissions (tons/yr)	Generator Annual Emissions (tons/yr)
Diesel PM (Not a HAPS)	N/A	N/A	14.8	35.9	2960	7180	3.96E-02	2.58E-02	3.96E-03	2.58E-03
Acrolein	1.07E-03	CATEF	14.8	35.9	2960	7180	1.58E-05	3.84E-05	1.584E-06	3.841E-06

Pollutant	Firepump Acute Modeling Hourly Emission Rate (g/sec)	Generator Acute Modeling Hourly Emission Rate (g/sec)	Firepump Chronic/Cancer Risk Modeling Annual Emission Rate (g/sec)	Generator Chronic/Cancer Risk Modeling Annual Emission Rate (g/sec)
Diesel PM (Not a HAPS)	N/A	N/A	1.14E-04	7.41E-05
Acrolein	2.00E-06	4.84E-06	N/A	N/A

Table 5.9B-4
CECP Amendment
Non-Criteria Pollutant Emission Factors
Existing Units 1 - 5 and Peaker Gas Turbine

Pollutant	Boiler Emission Factors(1) lb/MMscf	GT Emission Factors(1) lb/MMscf	Unit 1 Max Firing Rate MMBtu/hr	Unit 2 Max Firing Rate MMBtu/hr	Unit 3 Max Firing Rate MMBtu/hr	Unit 4 Max Firing Rate MMBtu/hr	Unit 5 Max Firing Rate MMBtu/hr	GT Max Firing Rate MMBtu/hr	Natural Gas HHV Btu/scf
Ammonia (not a HAP)	4.58E+00	0.00E+00	1013	1013	1128	3245	3475	317	1019.8
Benzene	2.10E-03	1.22E-02	1013	1013	1128	3245	3475	317	1019.8
Formaldehyde	7.50E-02	7.24E-01	1013	1013	1128	3245	3475	317	1019.8
Hexane	1.30E-03		1013	1013	1128	3245	3475	317	1019.8
Naphthalene	6.10E-04	1.30E-03	1013	1013	1128	3245	3475	317	1019.8
Dichlorobenzene	1.20E-03		1013	1013	1128	3245	3475	317	1019.8
Toluene	3.40E-03	1.33E-01	1013	1013	1128	3245	3475	317	1019.8
1,3-Butadiene		4.00E-04	1013	1013	1128	3245	3475	317	1019.8
Acetaldehyde		4.08E-02	1013	1013	1128	3245	3475	317	1019.8
Acrolein		6.50E-03	1013	1013	1128	3245	3475	317	1019.8
Ethyl Benzene		3.26E-02	1013	1013	1128	3245	3475	317	1019.8
PAHs (other)		2.20E-03	1013	1013	1128	3245	3475	317	1019.8
Xylene		6.53E-02	1013	1013	1128	3245	3475	317	1019.8

Notes:
(1) All factors except hexane and ammonia from the SDAPCD 2009 Toxic Inventory Report for the Encina Power Plant.
Hexane from the Ventura County APCD AB2588 emission factors for natural gas external combustion equipment (greater than 100 MMBtu/hr), May 17, 2001.
Ammonia based on SDAPCD permit limit of 10 ppm @ 3% O2 ammonia slip.

Table 5.9B-5
CECP Amendment
Non-Criteria Pollutant Hourly Emissions
Existing Units 1 - 5 and Peaker Gas Turbine

Pollutant	Unit 1 Emissions lb/hr	Unit 2 Emissions lb/hr	Unit 3 Emissions lb/hr	Unit 4 Emissions lb/hr	Unit 5 Emissions lb/hr	GT Emissions lb/hr
Ammonia (not a HAP)	4.55E+00	4.55E+00	5.07E+00	1.46E+01	1.56E+01	0.00E+00
Benzene	2.09E-03	2.09E-03	2.32E-03	6.68E-03	7.16E-03	3.79E-03
Formaldehyde	7.45E-02	7.45E-02	8.30E-02	2.39E-01	2.56E-01	2.25E-01
Hexane	1.29E-03	1.29E-03	1.44E-03	4.14E-03	4.43E-03	0.00E+00
Naphthalene	6.06E-04	6.06E-04	6.75E-04	1.94E-03	2.08E-03	4.04E-04
Dichlorobenzene	1.19E-03	1.19E-03	1.33E-03	3.82E-03	4.09E-03	0.00E+00
Toluene	3.38E-03	3.38E-03	3.76E-03	1.08E-02	1.16E-02	4.13E-02
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-02
Acrolein	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-03
Ethyl Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-02
PAHs (other)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-04
Xylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-02

Appendix 5.9C
Modeling Inputs for Screening Level HRA

Table 5.9C-1
CECP Amendment
Non-Criteria Pollutant Emissions Gas Turbines (Modeling Inputs)

Pollutant	For Acute Modeling Hourly Normal Oper. Emission Rate Per Turbine (g/sec) (each)	For Acute Modeling Hourly Startup/Shutdown Emission Rate Per Turbine (g/sec) (each)	For Acute Modeling Hourly Commissioning Emission Rate Per Turbine (g/sec) (each)	For Chronic/Cancer Risk Modeling Annual Normal Oper. Emission Rate(1) Per Turbine (g/sec) (each)	For Chronic/Cancer Risk Modeling Annual Commissioning Emission Rate(1) Per Turbine (g/sec) (each)
Ammonia	8.51E-01	8.51E-01	8.51E-01	2.62E-01	2.07E-02
Propylene	4.68E-02	1.16E-01	9.37E-02	2.08E-02	2.27E-03
Hazardous Air Pollutants (HAPs) - Federal					
Acetaldehyde	2.48E-03	6.14E-03	4.96E-03	1.10E-03	1.20E-04
Acrolein	3.98E-04	9.85E-04	7.96E-04	1.76E-04	1.93E-05
Benzene	7.42E-04	1.84E-03	1.48E-03	3.29E-04	3.60E-05
1,3-Butadiene	2.66E-05	6.60E-05	5.33E-05	1.18E-05	1.29E-06
Ethylbenzene	1.98E-03	4.91E-03	3.97E-03	8.79E-04	9.62E-05
Formaldehyde	5.58E-02	1.38E-01	1.12E-01	2.47E-02	2.71E-03
Hexane, n-	1.57E-02	3.90E-02	3.15E-02	6.97E-03	7.64E-04
Naphthalene	8.09E-05	2.00E-04	1.62E-04	3.59E-05	3.93E-06
Total PAHs (listed individually below)	3.99E-05	9.87E-05	7.97E-05	1.77E-05	1.93E-06
Acenaphthene	1.16E-06	2.86E-06	2.31E-06	5.12E-07	5.60E-08
Acenapthyene	8.94E-07	2.21E-06	1.79E-06	3.96E-07	4.34E-08
Anthracene	2.06E-06	5.09E-06	4.11E-06	9.11E-07	9.98E-08
Benzo(a)anthracene	1.38E-06	3.41E-06	2.75E-06	6.09E-07	6.67E-08
Benzo(a)pyrene	8.45E-07	2.09E-06	1.69E-06	3.74E-07	4.10E-08
Benzo(e)pyrene	3.31E-08	8.19E-08	6.62E-08	1.47E-08	1.61E-09
Benzo(b)fluoranthrene	6.87E-07	1.70E-06	1.37E-06	3.04E-07	3.33E-08
Benzo(k)fluoranthrene	6.69E-07	1.66E-06	1.34E-06	2.97E-07	3.25E-08
Benzo(g,h,i)perylene	8.33E-07	2.06E-06	1.67E-06	3.69E-07	4.04E-08
Chrysene	1.54E-06	3.81E-06	3.07E-06	6.81E-07	7.46E-08
Dibenz(a,h)anthracene	1.43E-06	3.53E-06	2.85E-06	6.31E-07	6.91E-08
Fluoranthene	2.63E-06	6.51E-06	5.25E-06	1.16E-06	1.27E-07
Fluorene	3.53E-06	8.75E-06	7.06E-06	1.56E-06	1.71E-07
Indeno(1,2,3-cd)pyrene	1.43E-06	3.53E-06	2.85E-06	6.31E-07	6.91E-08
Phenanthrene	1.91E-05	4.73E-05	3.82E-05	8.46E-06	9.26E-07
Pyrene	1.69E-06	4.17E-06	3.37E-06	7.47E-07	8.18E-08
Propylene oxide	1.80E-03	4.45E-03	3.59E-03	7.96E-04	8.72E-05
Toluene	8.09E-03	2.00E-02	1.62E-02	3.59E-03	3.93E-04
Xylene	3.97E-03	9.82E-03	7.93E-03	1.76E-03	1.92E-04

Notes:
(1) Includes startup/shutdown emissions.

Table 5.9C-2
CECP Amendment
Non-Criteria Pollutant Modeling Inputs
Existing Units 1 - 5 and Peaker Gas Turbine

Pollutant	Unit 1 Hourly Emiss (g/sec)	Unit 2 Hourly Emiss. (g/sec)	Unit 3 Hourly Emiss. (g/sec)	Unit 4 Hourly Emiss. (g/sec)	Unit 5 Hourly Emiss. (g/sec)	GT Hourly Emiss. (g/sec)
Ammonia (not a HAP)	5.73E-01	5.73E-01	6.38E-01	1.84E+00	1.97E+00	0.00E+00
Benzene	2.63E-04	2.63E-04	2.93E-04	8.42E-04	9.02E-04	4.78E-04
Formaldehyde	9.39E-03	9.39E-03	1.05E-02	3.01E-02	3.22E-02	2.84E-02
Hexane	1.63E-04	1.63E-04	1.81E-04	5.21E-04	5.58E-04	0.00E+00
Naphthalene	7.63E-05	7.63E-05	8.50E-05	2.45E-04	2.62E-04	5.09E-05
Dichlorobenzene	1.50E-04	1.50E-04	1.67E-04	4.81E-04	5.15E-04	0.00E+00
Toluene	4.26E-04	4.26E-04	4.74E-04	1.36E-03	1.46E-03	5.21E-03
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-05
Acetaldehyde	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03
Acrolein	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-04
Ethyl Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03
PAHs (other)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.62E-05
Xylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-03

Appendix 5.11A
Soil Loss Calculations

Table 5.11-3. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

Feature (acreage)[2]	Activity	Duration (months)	Estimates Using Revised Universal Soil Loss Equation[1]		
			Soil Loss (tons) without BMPs	Soil Loss (tons) with BMPs	Soil Loss (tons/yr) No Project
Encina Power Station	Demolition	22	249.8	6.97	0.3167
	Grading	2	50.2	0.63	---
Laydown Areas 1-7	Grading	0	0.0	0.0	---
	Construction	0	0.0	0.0	---
Soil Loss Estimates	All activities listed above		**299.9**	**7.6**	**0.32**

Notes:

1. Soil losses (tons/acre/year) are estimated using RUSLE2 software available on line [http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_index.htm].
   - -The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit.
   - -Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the site coordinates using the on line tools at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm
   - -Estimates of actual soil losses use the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration so loss is given as tons/year.

Project Assumptions:

-It is assumed that demolition at the Encina Power Station will take 22 months, with an additional 2 months of grading once structures are removed.

-It is assumed that Laydown Areas 1-7 are either currently paved or graveled, and will just require minor clean-up before use.

RUSLE2 Assumptions as follows:

100-ft slope length. Estimated soil unit slope is the lower end of the unit slope class due to thet fact that the project area was previously developed.

Construction soil losses assume the following inputs: Management - Bare ground; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

Grading soil losses assume the following inputs: Management - Bare ground/rough surface; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

Construction with BMP soil losses assume the following inputs: Management - Silt fence; Contouring - Perfect, no row grade; Diversion/terracing - None; Strips and Barriers - 2 fences, 1 at end of RUSLE slope.

No Project soil losses assume the following inputs: Management - Dense grass, not harvested; Contouring - None, rows up and down hill; Diversion/terracing - None; Strips and Barriers - None.

Affected Area (soil map unit)	Acreage		Soil Loss Estimates Using RUSLE2 software (tons/ac/year)			
Site (MIC)		**Slope**	**Demo w/o BMP's**	**Demo w/ BMP's**	**Grading**	**No Project**
Demo - Encina Power Station	**6.0**	2.0	1.9	0.053	4.2	0.053
			11.4	**0.3**	**25.1**	**0.3**
Laydown Areas (MIC)						
1 - Construction Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
2 - Construction Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
3 - Contractor Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
4 - Contractor Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
5 - Contractor Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
6 - Contractor Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
7 - Contractor Laydown Area	**0**	2.0	1.9	0.053	4.2	0.053
subtotal			**0.0**	**0.0**	**0.0**	**0.0**
Total Affected Area			**11.4**	**0.3**	**25.1**	**0.3**

Assumptions:
The No Project soil loss assumes a 'dense grass, not harvested' management scenario.

Table 5.11-5. Estimate of Total Suspended Particulates (TSP) Emitted from Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust:				
Demo - Encina Power Station	11.4	2	0.392	0.137
Laydown Areas (Areas A-F)	17.0	0	0.000	0.000
Wind Blown Dust:				
Demo - Encinas Power Station	6.0	22	1.041	0.364
Laydown Areas (Areas A-F)	0.0	0	0.000	0.000
Estimated Total			1.4	0.5

Project Assumptions:

Demolition of the Encina Power Station will take 22 months, followed by 2 months of grading. Approximately 50% of the site will be bare soil during demo.

The laydown areas are all currently paved or graveled, or have been accounted for in previous grading calculations (permitted AFC).

Data Sources:

[a] PM10 Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, Level 2 Analysis Procedure, March 1996

[b] PM10 to TSP Conversion Factor Source: Bay Area Air Quality Management District CEQA Guidelines, Assessing the Air Quality Impacts of Projects, December 1999.

SCAQMD CEQA Handbook (1993) Table 11-4 for mitigation efficiency rates (estimated at 65% for watering three times daily).

Project: CECP PTA

Dust from Wind Erosion - With and Without Mitigation

Grading

PM10 Emission Factor (ton/acre/month)[a]	0.011	MRI factor of 0.011 tons/acre/month is based on 168 hours per month of construction activity. Fact Sheet, 4/26/2007.
Encina Power Station Demo		
Duration (months):	2	Assumes 22 months demo followed by 2 months active grading
Site Acreage:	11.4	
PM10 Emitted (tons):	0.25	
TSP Emitted (tons)[b]:	**0.392**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.137**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Laydown Areas (A-F)		
Duration (months):	0	Assumes all areas are previously graveled or paved
Site Acreage:	17.0	
PM10 Emitted (tons):	0.00	
TSP Emitted (tons)[b]:	**0.000**	assume TSP is 64% PM10
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total Unmitigated TSP Emitted (tons):	**0.392**	
Total Mitigated TSP Emitted (tons):	**0.137**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4

[a]Emission Factor Source: Midwest Research Institute, South Coast AQMD Project No. 95040, March 1996, Level 2 Analysis Procedure

[b] Conversion Factor Source: Bay Area Air Quality Management District (BAAQMD) BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans. December 1999

Wind Blown Dust

TSP Emission Factor (ton/acre/year)	0.38	Emission Factor Source: AP-42, Section 11.9 Western Surface Coal Mining Table 11.9-4, January 1995.
Encina Power Station Demo		
Acres exposed	5.98	Assumes 22 months of demo; site 50% exposed during demo
Duration (months)	22	
TSP Emitted for Site (tons):	**1.041**	
Mitigated TSP Emitted (tons):	**0.364**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Laydown Areas (A-F)		
Acres exposed	0	Assumes all areas are previously graveled or paved
Duration (months)	0	
TSP Emitted for Site (tons):	**0.000**	
Mitigated TSP Emitted (tons):	**0.000**	Assume 65% reduction in TSP with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4
Total (tons) without mitigation	**1.041**	
Total (tons) with mitigation	**0.364**	Assume 65% reduction in PM10 with watering thrice daily per SCAQMD CEQA Handbook (1993) Table 11-4

Project: CECP Petition to Amend (PTA)

Updated 3/29/2014 to remove Fuel Oil Tank Demo - JLK

Object	Soil Map Unit	Acres	Affected Acres	Notes	
Encina Power Station - Demo	MIC	11.41	11.41		
Additional small buildings (to be demo'ed with Encina PS)		0.54	0.54	*From Project Location Figure received on 3/11/2014*	
			5.98	*Assumes 50% of the site will be bare soil during demo*	
~~Demo of Fuel Oil Tank Units~~				~~*Assumes 3 months of tank demo and excavation of cushion soil followed by 2 months of active soil grading*~~	
~~Unit 4~~	~~MIC~~	~~2.8~~	~~**0.00**~~	~~*Assumes 50% of tank area will be bare during demo; acreage calculated via GoogleEarth (~107 m on each side); **Removal of intermediate soil b*~~	11449
~~Units 1 and 2~~	~~MIC~~	~~5.6~~	~~**0.00**~~	~~*Assumes 50% of tank area will be bare during demo*~~	
		~~8.4~~	~~**0.00**~~		
Laydown Areas (LDA)					
As numbered by Jenny					
1 - Proposed Construction LDA	MIC	2.98	**0**	Overlaps with LDA A from the original AFC	
2 - Proposed Construction LDA	MIC	5.63	**0**	*Some overlap with LDA D and E from the original AFC; **grading accounted for in the demo of tanks 1 and 2, above.**	
3 - Proposed Contractor LDA	MIC	1.82	**0**	Acreage from Project Location Figure; **already paved** (via Google Earth)	
4 - Proposed Contractor LDA	MIC	1.11	**0**	Acreage from Project Location Figure; **already graveled** (via Google Earth)	
5 - Proposed Contractor LDA	MIC	0.79	**0**	Acreage from Project Location Figure; **already graveled** (via Google Earth)	
6 - Proposed Contractor LDA	MIC	2.28	**0**	*Some overlap with LDA F from the original AFC; small buildings to be demo'ed with Encina Power Station (covered in Encinas calcs) **already paved/graveled & contains buildings (**via GoogleEarth)	
7 - Proposed Contractor LDA	MIC	2.38	**0**	Acreage from Project Location Figure; **area paved/graveled and contains buildings and pipes** (via GoogleEarth)	
		16.99		Assumes 50% of laydown areas will be bare during grading, and will then be covered with gravel or otherwise stabilized.	

***All linears accounted for in original AFC**