TETRA TECH EC, INC.

California Energy Commission
DOCKETED
11-AFC-3
TN # 67897
OCT 19 2012

October 18, 2012

Eric Solorio, Project Manager
California Energy Commission
Docket No. 11-AFC-3
1516 9th St.
Sacramento, CA 95814

**Cogentrix Quail Brush Generation Project - Docket Number 11-AFC-3, Cumulative Impacts Analysis for the Quail Brush Power Project and Sycamore Landfill**

Docket Clerk:

Pursuant to the provisions of Title 20, California Code of Regulations, and on behalf of Quail Brush Genco, LLC, a wholly owned subsidiary of Cogentrix Energy, LLC, Tetra Tech hereby submits the Cumulative Impacts Analysis for the Quail Brush Power Project and Sycamore Landfill (11-AFC-3). This submittal is pursuant to the California Energy Commission (CEC) staff and Quail Brush Power Project technical conference call on 8-30-12, and related to CEC Data Requests 77, 78, 83, 84 and 85. The Quail Brush Generation Project is a 100 megawatt natural gas fired electric generation peaking facility to be located in the City of San Diego, California. This package supersedes the Cumulative Impacts Analysis for the Quail Brush Power Project and Sycamore Landfill docketed on October 17, 2012.

If you have any questions regarding this submittal, please contact Rick Neff at (704) 525-3800 or me at (303) 980-3653.

Sincerely,

Constance E. Farmer
Project Manager/Tetra Tech

cc: Lori Ziebart, Cogentrix
John Collins, Cogentrix
Rick Neff, Cogentrix
Proof of Service List

**BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA**
**1516 NINTH STREET, SACRAMENTO, CA 95814**
**1-800-822-6228 – WWW.ENERGY.CA.GOV**

***APPLICATION FOR CERTIFICATION FOR THE***
***QUAIL BRUSH GENERATION PROJECT***

DOCKET NO. 11-AFC-03
PROOF OF SERVICE
*(Revised 10/16/2012)*

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## DECLARATION OF SERVICE

I, Constance Farmer, declare that on October 18, 2012, I served and filed copies of the attached Cumulative Impacts Analysis for the Quail Brush Power Project and Sycamore Landfill, dated October 18, 2012. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/quailbrush/index.html.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

(*Check all that Apply*)

For service to all other parties:

_x_ Served electronically to all e-mail addresses on the Proof of Service list;

_x_ Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses marked *"hard copy required" or where no e-mail address is provided.

*AND*

For filing with the Docket Unit at the Energy Commission:

_x_ by sending an electronic copy to the e-mail address below (preferred method); *OR*

___ by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

CALIFORNIA ENERGY COMMISSION – DOCKET UNIT
Attn: Docket No. 11-AFC-03
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
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*OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:*

___ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

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

Constance C. Farmer

To: Gerry Bemis, CEC
Joseph Hughes, CEC

From: Richard Booth, AEROWEST
Gregory Darvin, Atmospheric Dynamics, Inc.

Date: October 18, 2012

Re: Cumulative Impacts Analysis for QBPP and Sycamore Landfill

Pursuant to the CEC staff and QBPP team conference call on 8-30-12, the cumulative analysis of the QBPP and Sycamore Landfill emissions sources is presented below in Response to staff's Data Request #85.

A cumulative (multisource) modeling analysis was performed that included the QBPP with the emissions sources at the Sycamore Landfill, which is located just north of the Project. These landfill sources were modeled with the Project Emissions for all applicable National and California state ambient air quality standards (NAAQS/CAAQS). It was determined that the existing landfill sources are already represented by the background concentrations included in the impact analyses presented in the application, thus, background was NOT included in this cumulative analyses.

The landfill consists of a number of sources, primarily turbines and flares, which are fueled primarily by landfill gas. There is a single diesel fueled engine which powers a tub grinder that only operates up to 10 hours per day. Emissions and source locations were provided by the San Diego Air Pollution Control District and are included at the end of this analysis. The stack characteristics for these sources are shown below and were used in the cumulative analysis.

| Equipment/ Input Data | Stack Parameters | | | | Emission Rates (g/s)[a] | | | |
|---|---|---|---|---|---|---|---|---|
| | Stack Height (m) | Stack Diameter (m) | Stack Temp. (deg K) | Exhaust Velocity meters per second (m/s) | $NO_X$ | $SO_2$ | CO | PM10/2.5 |
| **Averaging Period: 1-hour, 3-hours, and 8-hours** | | | | | | | | |
| Centaur 40 Turbine | 12.192 | 1.0058 | 722.0 | 46.488 | 0.5796 | 0.2646 | 1.8522 | n/a |
| GSC 1200R #1 | 12.192 | 1.0058 | 569.3 | 6.376 | 0.5040 | 0.0892 | 0.3780 | n/a |
| GSC 1200R #2 | 12.192 | 1.0058 | 569.3 | 6.376 | 0.5040 | 0.0892 | 0.3780 | n/a |
| Flare #1 | 9.144 | 2.4384 | 1088.7 | 3.578 | 0.5796 | 0.3717 | 0.6842 | n/a |
| Flare #2 | 12.192 | 2.4384 | 1088.7 | 3.274 | 0.5292 | 0.3402 | 0.6262 | n/a |
| Tub Grinder Diesel Engine | 4.572 | 0.2042 | 744.3 | 108.324 | 1.4994 | 0.0018 | 0.8669 | n/a |
| **Averaging Period: 24-hours** | | | | | | | | |
| Centaur 40 Turbine | 12.192 | 1.0058 | 722.0 | 46.488 | n/a | 0.2646 | n/a | 0.0277 |
| GSC 1200R #1 | 12.192 | 1.0058 | 569.3 | 6.376 | n/a | 0.0892 | n/a | 0.0126 |
| GSC 1200R #2 | 12.192 | 1.0058 | 569.3 | 6.376 | n/a | 0.0892 | n/a | 0.0126 |
| Flare #1 | 9.144 | 2.4384 | 1088.7 | 3.578 | n/a | 0.3717 | n/a | 0.2231 |
| Flare #2 | 12.192 | 2.4384 | 1088.7 | 3.274 | n/a | 0.3402 | n/a | 0.2042 |
| Tub Grinder Diesel Engine | 4.572 | 0.2042 | 744.3 | 108.324 | n/a | 0.0007 | n/a | 0.0210 |

| Equipment/ Input Data | Stack Parameters | | | | Emission Rates (g/s)[a] | | | |
|---|---|---|---|---|---|---|---|---|
| | Stack Height (m) | Stack Diameter (m) | Stack Temp. (deg K) | Exhaust Velocity meters per second (m/s) | $NO_X$ | $SO_2$ | CO | PM10/2.5 |
| **Averaging Period: Annual** | | | | | | | | |
| Centaur 40 Turbine | 12.192 | 1.0058 | 722.0 | 46.488 | 0.5796 | 0.2646 | n/a | 0.0277 |
| GSC 1200R #1 | 12.192 | 1.0058 | 569.3 | 6.376 | 0.5040 | 0.0892 | n/a | 0.0126 |
| GSC 1200R #2 | 12.192 | 1.0058 | 569.3 | 6.376 | 0.5040 | 0.0892 | n/a | 0.0126 |
| Flare #1 | 9.144 | 2.4384 | 1088.7 | 3.578 | 0.5796 | 0.3717 | n/a | 0.2231 |
| Flare #2 | 12.192 | 2.4384 | 1088.7 | 3.274 | 0.5292 | 0.3402 | n/a | 0.2042 |
| Tub Grinder Diesel Engine | 4.572 | 0.2042 | 744.3 | 108.324 | 0.3768 | 0.0004 | n/a | 0.0127 |

***Notes:*** Modeled emission rates based on estimated hours of operation. The tub grinder operation at 10 hours per day was assumed to occur during the hours of 8:00 AM and 6:00 PM, 2022 hours per year.

These landfill sources were modeled with the QBPP sources using AERMOD for both normal operations and startup/shutdown conditions for the pollutants and averaging times described above. For 1-hour $NO_2$ impacts, the same methods were used as in the Project modeling analyses with the exception that the $NO_2$/NOx ratio for the engines at QBPP were revised to 18.5% for use in the Plume Volume Molar Ratio Method (PVMRM). For the landfill sources, $NO_2$/NOx in-stack ratios of 10% for the turbines, 50% for the flares, and 20% for the diesel engine were used for the short-term $NO_2$ modeling analyses. An Ambient Ratio Method (ARM) factor of 75% (national default) was used for the annual $NO_2$ modeling analyses. The same property fence-line cartesian receptor grids as used in the Project modeling analyses were initially analyzed, even though a considerable number of QBPP receptors would occupy locations inside the landfill complex fenceline/property boundary and would not typically qualify as ambient air for the landfill sources. The AERMOD modeled impacts are presented below for the landfill sources only, the QBPP Project sources only, and total cumulative (QBPP+landfill) impacts.

| Pollutant/Avg.Time/ Form of Impact/Standard | Sycamore Landfill AERMOD Maxima ($\mu g/m^3$) | QBPP Project AERMOD Maxima ($\mu g/m^3$) | Cumulative AERMOD Maxima ($\mu g/m^3$) |
|---|---|---|---|
| **NORMAL QBPP OPERATIONS:** | | | |
| $NO_2$ 1-hour Maximum (CAAQS) | 275 | 191 | 275 |
| $NO_2$ 1-hour 5-year Avg.98$^{th}$% (NAAQS) | 154 | 83 | 154 |
| $NO_2$ Annual Maximum (CAAQS/NAAQS) | 12.1 | 1.2 | 12.2 |
| CO 1-hour Maximum (CAAQS/NAAQS): | 405 | 131 | 405 |
| CO 8-hour Maximum (CAAQS/NAAQS): | 172 | 40 | 172 |
| $SO_2$ 1-hour Maximum (CAAQS) | 132 | 20 | 132 |
| $SO_2$ 1-hour 5-year Avg.99$^{th}$% (NAAQS) | 81 | 11 | 81 |
| $SO_2$ 3-hour Maximum (NAAQS) | 92 | 10 | 92 |
| $SO_2$ 24-hour Maximum (CAAQS/NAAQS) | 54 | 3 | 54 |
| $SO_2$ Annual Maximum (NAAQS) | 6.2 | 0.2 | 6.2 |
| PM10 24-hr Maximum (CAAQS) | 27.1 | 17.1 | 27.1 |
| | | | |
| PM10 24-hr 6$^{th}$ High/5-years (NAAQS) | 13.2 | 13.3 | 15.0 |
| PM10 Annual Maximum (CAAQS) | 2.8 | 1.3 | 2.9 |

| | | | |
|---|---|---|---|
| PM2.5 24-hr 5-yr Avg.98$^{th}$% (NAAQS) | 7.8 | 8.9 | 9.9 |
| PM2.5 Annual Maximum (CAAQS) | 2.8 | 1.3 | 2.9 |
| PM2.5 Annual 5-yr Avg. (NAAQS) | 2.4 | 0.9 | 2.5 |
| **STARTUP/SHUTDOWN QBPP CONDITIONS:** | | | |
| $NO_2$ 1-hour Maximum (CAAQS) | 275 | 252 | 311 |
| $NO_2$ 1-hour 5-year Avg.98$^{th}$% (NAAQS) | 154 | 116 | 154 |
| CO 1-hour Maximum (CAAQS/NAAQS): | 405 | 1125 | 1126 |
| CO 8-hour Maximum (CAAQS/NAAQS): | 172 | 81 | 172 |
| $SO_2$ 1-hour Maximum (CAAQS) | 132 | 27 | 132 |
| $SO_2$ 1-hour 5-year Avg.99$^{th}$% (NAAQS) | 81 | 14 | 81 |
| $SO_2$ 3-hour Maximum (NAAQS) | 92 | 10 | 92 |

1-hour NO2 impacts are based on the Ozone Limiting Method (OLM) with concurrent ozone background concentrations from Kearney Mesa (San Diego Overland Ave) monitoring site. Annual $NO_2$ impacts use the USEPA-default ARM factor of 75%.

Almost all the maximum cumulative impacts were caused primarily by the Sycamore Landfill sources (impacts in first and third columns approximately the same). This can also be determined by examining the locations and periods of maximum impacts in the AERMOD outputs, since maximum impacts are caused primarily by the landfill sources for most pollutants and averaging times. The only maximum cumulative impacts caused primarily by the Project were 24-hour NAAQS impacts for PM10 and PM2.5 and 1-hour CO and $NO_2$ impacts for startup/shutdown conditions. As shown in the Project modeling analyses submitted earlier, the 24-hour PM impacts for QBPP occur in complex terrain. When this area was modeled with CTSCREEN, 24-hour PM impacts for QBPP were reduced significantly. Comparison of the cumulative modeling impacts to the AAQS are shown below.

### Comparison of Cumulative Air Quality Impacts to Ambient Air Quality Standards

| Pollutant | Avg. Period | Maximum Landfill Impact (µg/m$^3$) | Maximum QBPP Project Impact (µg/m$^3$) | Maximum Combined Impact (µg/m$^3$) | Ambient Air Quality CAAQS/NAAQS | |
|---|---|---|---|---|---|---|
| | | | | | (µg/m$^3$) | (µg/m$^3$) |
| **NORMAL QBPP OPERATIONS:** | | | | | | |
| $NO_2$ | 1-hour Federal | 154 | 83 | 154 | - | 188 |
| | 1-hour State | 275 | 191 | 275 | 339 | - |
| | Annual | 12.1 | 1.2 | 12.2 | 57 | 100 |
| $PM_{10}$ | 24-hour Federal | 13.2 | 13.3 | 15.0 | - | 150 |
| | 24-hour State | 27.1 | 17.1 | 27.1 | 50 | - |
| | Annual | 2.8 | 1.3 | 2.9 | 20 | - |
| $PM_{2.5}$ | 24-hour Federal | 7.8 | 8.9 | 9.9 | - | 35 |
| | Annual Federal | 2.4 | 0.9 | 2.5 | - | 15.0 |
| | Annual State | 2.8 | 1.3 | 2.9 | 12 | - |
| CO | 1-hour | 405 | 131 | 405 | 23,000 | 40,000 |
| | 8-hour | 172 | 40 | 172 | 10,000 | 10,000 |
| $SO_2$ | 1-hour Federal | 81 | 11 | 81 | - | 196 |
| | 1-hour State | 132 | 20 | 132 | 655 | - |
| | 3-hour | 92 | 10 | 92 | - | 1300 |
| | 24-hour | 54 | 3 | 54 | 105 | 365 |
| | Annual | 6.2 | 0.2 | 6.2 | - | 80 |

| Pollutant | Avg. Period | Maximum Landfill Impact ($\mu g/m^3$) | Maximum QBPP Project Impact ($\mu g/m^3$) | Maximum Combined Impact ($\mu g/m^3$) | Ambient Air Quality CAAQS/NAAQS | |
|---|---|---|---|---|---|---|
| | | | | | ($\mu g/m^3$) | ($\mu g/m^3$) |
| **STARTUP/SHUTDOWN QBPP CONDITIONS:** | | | | | | |
| $NO_2$ | 1-hour Federal | 154 | 116 | 154 | - | 188 |
| | 1-hour State | 275 | 252 | 311 | 339 | - |
| CO | 1-hour | 405 | 1125 | 1126 | 23,000 | 40,000 |
| | 8-hour | 172 | 81 | 172 | 10,000 | 10,000 |
| $SO_2$ | 1-hour Federal | 81 | 14 | 81 | - | 196 |
| | 1-hour State | 132 | 27 | 132 | 655 | - |
| | 3-hour | 92 | 10 | 92 | - | 1300 |

The results of the modeling analysis demonstrate that the cumulative impacts are less than the Federal and State AAQS under all operational scenarios for QBPP.

**Sycamore Landfill Facility-Stationary Source Data (Emissions data is PTE)**

| Source | mmbtu/hr | Stk Ht, ft | Stk Diam, ft | Stk Temp, F | Stk ACFM | **NOx, #/hr** | **CO, #/hr** | **VOC, #/hr** | **SOx, #/hr** | **PM10, #/hr** | **PM2.5, #/hr** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Centaur 40 | 45 | 40 | 3.3 | ~840 | ~78270 | 4.6 | 14.7 | 0.23 | 2.1 | 0.22 | 0.22 |
| GSC 1200 R | 10.8 | 40 | 3.3 | ~565 | ~10735 | 4 | 3 | 2 | 0.708 | <0.1 | <0.1 |
| GSC 1200 R | 10.8 | 40 | 3.3 | ~565 | ~10735 | 4 | 3 | 2 | 0.708 | <0.1 | <0.1 |
| Flare 1 | 59 | 30 | 8 | ~1500 | ~35400 | 4.6 | 5.43 | 0.31 | 2.95 | 1.77 | 1.77 |
| Flare 2 | 54 | 40 | 8 | ~1500 | ~32400 | 4.2 | 4.97 | 0.284 | 2.7 | 1.62 | 1.62 |
| Diesel ICE | 1200 HP | Est 15 | 0.67 | ~880 | ~7518 | 11.9 | 6.88 | 0.79 | 0.014 | 0.4 | 0.4 |
| | | | | *Totals* | | *33.3* | *38* | *5.6* | *9.2* | *4.2* | *4.2* |
| | Max hrs/day | Max hrs/yr | | **PM10/2.5 lbs/day** | | **NOx, tpy** | **CO, tpy** | **VOC, tpy** | **SOX, tpy** | **PM10, tpy** | **PM2.5, tpy** |
| Centaur 40 | 24 | 8760 | | 5.28 | | 20.15 | 64.39 | 1.01 | 9.2 | 0.96 | 0.96 |
| GSC 1200 R | 24 | 8760 | | 2.4 | | 17.52 | 13.14 | 8.76 | 3.1 | 0.44 | 0.44 |
| GSC 1200 R | 24 | 8760 | | 2.4 | | 17.52 | 13.14 | 8.76 | 3.1 | 0.44 | 0.44 |
| Flare 1 | 24 | 8760 | | 42.5 | | 20.15 | 23.78 | 1.36 | 12.92 | 7.75 | 7.75 |
| Flare 2 | 24 | 8760 | | 38.9 | | 18.4 | 21.77 | 1.24 | 11.83 | 7.1 | 7.1 |
| Diesel ICE | 10 | 2200 | | 4.0 | | 13.1 | 7.57 | 0.87 | 0.015 | 0.44 | 0.44 |
| | | *Totals* | | *95.5* | | *106.7* | *143.8* | *22* | *40.2* | *17.1* | *17.1* |

Notes:

1. Diesel ICE is Tier 2 certified, max ops is 10 hrs/day and 2200 hrs/yr. Cat C-32, TLD00120, engine family 6CPXL32.0ESK.
2. No hourly limits apply to the turbines or flares, therefore 8760 hrs/yr for PTE.
3. Data from APCD PTOs (900112-V3, 870383-V3, 971111-V2, 001203), SDAPCD EI 2008 and 2005, CARB EIS Database-2011 County request. RDEIR, Table 7-6, 2011.

Flare emissions estimates based on: *AP-42 Section 2.4, Table 2.4-4*, and *Emissions of Criteria and Hazardous Air Pollutants from Landfill Gas Flares, R. Booth, RTP Environmental Associates Inc., January 1998.*

| | |
|---|---|
| NOx | 0.078 lb/mmbtu |
| CO | 0.092 lbs/mmbtu |
| PM | 0.03 lbs/mmbtu |
| VOC | 0.00526 lbs/mmbtu |
| SOx | 0.05 lbs/mmbtu |

Flare exhaust flows estimated from ref: *Common Operational Fixes for Enclosed Flares, Tim Locke, MSW Management, March/April 2006. Graph 1, page 59*. At 1500 deg F ops temp, the combustion air flow would be approximately 600 scfm/mmbtu.

Diesel engine Tier 2 EFs: NOx-4.5 g/hp-hr, CO-2.6 g/hp-hr, VOC-0.3 g/hp-hr, PM-0.15 g/hp-hr, SOx-fuel S based.
Fuel S = 0.0015% S Wt. at ~66 gals/hr = 0.014 lbs SOx/hr
See Cat C32 spec sheet, #SS-006386.pdf

**LFG data:**
The total mmbtu/hr handling capacity of all combustion equipment used in LFG destruction/power generation is 179.6 mmbtu/hr.
Assuming LFG at 500 btu/scf, the current equipment could handle ~359,200 scf of LFG per hour, or 5987 scfm.
Assuming LFG at statewide average btu content of 339 btu/scf (as fired), the current equipment could handle 529,794 scf of LFG per hour, or 8830 scfm.
The RDEIR states the landfill is currently (2012) producing, at 90% collection efficiency, 3339 scfm or 200,340 scfh, which means at a heat content of 500 btu/scf, the landfill combustion devices are presently capable of destroying all the collected LFG being generated. At a heat content of 339 btu/scf (statewide average), the landfill combustion devices have a greater capability of handling all the present LFG generation.
Assuming the LFG heat content (statewide average) of 339 btu/scf, and the present combustion handling capability of 179.6 mmbtu/hr, this yields a LFG flow rate or ~8830 scfm, which according to the RDEIR is not forecasted to happen until 2023-2024. Assuming the LFG heat content of 500 btu/scf, and the present combustion handling capability of 179.6 mmbtu/hr, this yields a LFG flow rate or ~5987 scfm, which according to the RDEIR is not forecasted to happen until 2018-2019.
Using the RDEIR value of existing handling capacity of 6350 scfm, would place the need for new or modified systems in the 2019 timeframe.

Stack location data (Google Earth):

| Source | UTM E | UTM N | Elev, ft. |
|---|---|---|---|
| Centaur 40 Turbine | 497317.83 | 3635532.84 | 459 |
| GSC 1200 R Turbine | 497299.16 | 3635517.24 | 459 |
| GSC 1200 R Turbine | 497301.36 | 3635515.21 | 459 |
| Flare 1 | 497340.63 | 3635520.20 | 481 |
| Flare 2 | 497328.71 | 3635510.29 | 472 |
| Diesel ICE | 497423.18 | 3636383.54 | 658 |