San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

MAR 1 3 2014

Dennis Champion
Occidental of Elk Hills, Inc.
10800 Stockdale Highway
Bakersfield, CA 93311

**Re: Notice of Preliminary Decision – Emission Reduction Credits**
**Facility Number: S-2234**
**Project Number: S-1133368**

Dear Mr. Champion:

Enclosed for your review and comment is the District's analysis of Occidental of Elk Hills, Inc.'s application for Emission Reduction Credits (ERCs) resulting from the shutdown of the 35R gas plant and three IC engines driving gas compressors, at Sections 26 and 35, Township 30 South, Range 23 East. The quantity of ERCs proposed for banking is 60,076 lb-NOx/yr, 57 lb-SOx/yr, 3,994 lb-PM10/yr, 69,454 lb-CO/yr, and 49,531 lb-VOC/yr.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. After addressing all comments made during the 30-day public notice comment period, the District intends to the issue the ERCs. Please submit your written comments on this project within the 30-day public comment period, as specified in the enclosed public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Stephen Leonard of Permit Services at (661) 392- 5605.

Sincerely,

David Warner
Director of Permit Services

DW: SPL/cp

Enclosures

cc: Mike Tollstrup, CARB (w/enclosure) via email
cc: Gerardo C. Rios, EPA (w/enclosure) via email

**Seyed Sadredin**
Executive Director/Air Pollution Control Officer

**Northern Region**
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

**Central Region (Main Office)**
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**Southern Region**
34946 Flyover Court
Bakersfield, CA 93308-9725
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www.valleyair.org www.healthyairliving.com

# San Joaquin Valley Air Pollution Control District
## ERC Application Review
### Shutdown of 35R Gas Plant and IC Engines

| | | | |
|---|---|---|---|
| Facility Name: | Occidental of Elk Hills, Inc. | Date: | February 14, 2014 |
| Mailing Address: | 10800 Stockdale Hwy<br>Bakersfield, CA 93311 | Engineer: | Stephen Leonard |
| | | Lead Engineer: | Allan Phillips |
| | | Date: | 2/14/14 |

Contact Person: Mike Kelly, Vector Environmental
Telephone: 661-323-1477, ext. 205

Project #: S-1133368
Submitted: August 13, 2013
Deemed Complete: January 6, 2014

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## I. Summary:

Occidental of Elk Hills, Inc. (OEHI) owns and operates the Elk Hills Oil Fields. The primary business of this facility is the processing of extracted natural gas and natural gas liquids. The 35R Lean Oil Absorption Plant (LOAP) and three I.C. engine powered gas compressors have been shut down. The permits to operate for the gas plant and engines have been surrendered to the District. OEHI is applying for emission reduction credits (ERCs) for the associated shutdown and reduction in emissions.

The following emission reductions have been found to qualify for ERC banking:

| | $NO_x$ [lb/qtr] | $SO_x$ [lb/qtr] | $PM_{10}$ [lb/qtr] | CO [lb/qtr] | VOC [lb/qtr] |
|---|---|---|---|---|---|
| 1st Quarter | 13,364 | 13 | 895 | 15,032 | 10,584 |
| 2nd Quarter | 11,182 | 12 | 877 | 14,680 | 10,957 |
| 3rd Quarter | 18,022 | 16 | 1,115 | 19,973 | 14,277 |
| 4th Quarter | 17,508 | 16 | 1,107 | 19,769 | 13,713 |

## II. Applicable Rules:

Rule 2201 New and Modified Stationary Source Review Rule (4/21/11)
Rule 2301 Emission Reduction Credit Banking (1/19/12)
Rule 4409 Rule 4409 – Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities (4/20/05)
Rule 4702 Internal Combustion Engines (11/14/13)

## III. Location of Reduction:

The physical location of the equipment involved with this application is as follows:

| Permit Unit | Section | Township | Range |
|---|---|---|---|
| S-2234-19 | SE35 | 30 South | 23 East |
| S-2234-27 | SE35 | 30 South | 23 East |
| S-2234-28 | SE35 | 30 South | 23 East |
| S-2234-127 | 26 | 30 South | 23 East |

## IV. Method of Generating Reductions:

The emissions reduction are generated by the permanent shutdown of the 35R LOAP, District permit S-2234-19, two gas compressors driven by 4,000 bhp natural gas fired lean-burn I. C. engines, District permits S-2234-27 and S-2234-28, and one gas compressor driven by a 1,834 bhp natural gas fired rich-burn I. C. engine with non-selective catalytic reduction, District permit S-2234-127. The applicant surrendered the Permits to Operate (PTOs) for the associated equipment on March 21, 2013.

## V. Calculations:

### A. Assumptions and Emission Factors

Assumptions:

- Gas plant historically would operate 24 hours/day, 7 days/week.
- Reductions are considered surplus as gas production is now re-routed to a new, fully offset cryogenic gas plant onsite, issued District permits S-2234-216-0 through '-239-0 (see District project S1103628).
- Source test measured exhaust emissions for shutdown engines consistently lower than permitted emission factors or AP-42 emission factors.
- Measured VOC content of gas shall be applied to fugitive component emissions calculations.

- Screening records of fugitive VOC components at the 35R LOAP (S-2234-19) historically report no leaking components. Fugitive component HAE for S-2234-19 shall be calculated with measured VOC content (% of TOC) and CAPCOA screening factors.
- The gas compressor driven by engine S-2234-127 is identified in the permit and carries a permit limit of 0.7 lbs-VOC/day "potential to emit" VOC emissions based on CAPCOA "Screening Factors", 100% VOC content, and component counts. HAE shall be calculated with measured VOC content (26.44% of TOC) and CAPCOA screening factors.
- The gas compressors for engines S-2234-27 & '-28 were not assessed VOC emissions for permitting purposes, but are screened for Rule 4409 purposes and do not have a history of frequent leaking components. HAE shall also be calculated with CAPCOA screening factors and measured VOC content (26.44% of TOC).
- Fugitive component count VOC emissions are consistent and need not be averaged for the baseline period.

Emission Factors:

See Appendices D-K for historical source test data, historical fuel usage, measured and approved emissions factors, historical actual emissions, and fugitive component VOC emissions during the baseline period described below.

**B. Baseline Period Determination and Data**

Occidental of Elk Hills submitted the application to the District on August 13, 2013. Pursuant to District Rule 2201, Section 3.8, the baseline period for determining HAE shall be a period of time equal to either:

3.8.1 The two consecutive years of operation immediately prior to the submission date of the complete application; or

3.8.2 at least two consecutive years within the five years immediately prior to the submission date of the complete application if determined by the APCO as more representative of normal source operation; or

3.8.3 a shorter period of at least one year if the emissions unit has not been in operation for two years and this represents the full operational history of the emissions unit, including any replacement units; or

3.8.4 Zero years if an emissions unit has been in operation for less than one year (only for use when calculating AER).

For the purposes of this section, the submission of the complete application is considered to be August 13, 2013.

Records stored by OEHI show the average natural gas production rate from the Elk Hills Field for the period of 1977 through 2012 was approximately 120 billion cubic feet (Bcf) per year, with peak production in 1999 (see Appendix C for graphical representation of 1980 through 2012). Performing a running two year average during the same period shows the average gas production rate is 119 Bcf/yr.

During the five year period immediately preceding the shutdown of the 35R Gas Plant, the two-year period which most closely matches the historic two year average of 119 Bcf/yr is the period of 2010 through 2011. This period is selected as the baseline period for purposes of determining historical actual emissions.

The following table contains the summary of crude oil, produced water, and well head gas extracted from the Elk Hills Field for the two-year baseline period indicated.

| Calendar Years | Crude oil (Bbl) | Produced Water (Bbl) | Gas (Mcf) |
|---|---|---|---|
| 2010 – 2011 | 13,852,683 | 142,413,177 | 118,811,547 |

## C. Historical Actual Emissions (HAE)

### I.C. Engine S-2234-27 (K-9)

| Historical Exhaust Emissions by Quarter 2010 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | NOx | SOx | PM10 | CO | VOC |
| 1st Quarter | 6,605.69 | 8.06 | 409.43 | 12,426.46 | 6,391.88 |
| 2nd Quarter | 7,232.09 | 8.82 | 448.25 | 13,604.81 | 6,998.00 |
| 3rd Quarter | 8,573.44 | 10.46 | 531.39 | 16,128.13 | 8,295.93 |
| 4th Quarter | 8,481.46 | 10.35 | 525.72 | 15,955.86 | 8,207.32 |

| Historical Exhaust Emissions by Quarter 2011 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 12,340.39 | 1.31 | 431.58 | 8,066.63 | 2,452.81 |
| 2nd Quarter | 14,164.78 | 1.51 | 495.38 | 9,259.20 | 2,815.43 |
| 3rd Quarter | 15,132.44 | 1.61 | 529.22 | 9,891.74 | 3,007.76 |
| 4th Quarter | 15,192.36 | 1.62 | 531.32 | 9,930.90 | 3,019.67 |

| Averaged Exhaust Emissions During Baseline Period (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 9,473 | 5 | 421 | 10,247 | 4,422 |
| 2nd Quarter | 10,698 | 5 | 472 | 11,432 | 4,907 |
| 3rd Quarter | 11,853 | 6 | 530 | 13,010 | 5,652 |
| 4th Quarter | 11,837 | 6 | 529 | 12,943 | 5,614 |

| Fugitive Component VOC Emissions from Gas Compressor During Baseline Period (lb/qtr) | | | | |
|---|---|---|---|---|
| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
| VOC | 9 | 9 | 9 | 9 |

## I.C. Engine S-2234-28 (K-10)

| Historical Exhaust Emissions by Quarter 2010 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | NOx | SOx | PM10 | CO | VOC |
| 1st Quarter | 10,190.25 | 6.09 | 309.13 | 8,573.80 | 10,431.94 |
| 2nd Quarter | 10,132.82 | 6.05 | 307.39 | 8,525.49 | 10,373.14 |
| 3rd Quarter | 15,683.18 | 9.36 | 475.77 | 13,195.41 | 16,055.13 |
| 4th Quarter | 14,508.56 | 8.67 | 440.13 | 12,207.12 | 14,852.66 |

| Historical Exhaust Emissions by Quarter 2011 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 428.06 | 5.11 | 331.13 | 4,008.44 | 158.62 |
| 2nd Quarter | 88.49 | 1.06 | 68.45 | 828.64 | 32.79 |
| 3rd Quarter | 514.36 | 6.14 | 397.90 | 4,816.77 | 190.61 |
| 4th Quarter | 588.42 | 7.02 | 455.19 | 5,510.22 | 218.06 |

| Averaged Exhaust Emissions During Baseline Period (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 5,309 | 6 | 320 | 6,291 | 5,295 |
| 2nd Quarter | 5,110 | 4 | 188 | 4,677 | 5,203 |
| 3rd Quarter | 8,099 | 8 | 437 | 9,006 | 8,123 |
| 4th Quarter | 7,548 | 8 | 448 | 8,859 | 7,535 |

| Fugitive Component VOC Emissions from Gas Compressor During Baseline Period (lb/qtr) | | | | |
|---|---|---|---|---|
| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
| VOC | 9 | 9 | 9 | 9 |

## I.C. Engine S-2234-127 (R-25)

| Historical Exhaust Emissions by Quarter 2010 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | NOx | SOx | PM10 | CO | VOC |
| 1st Quarter | 64.03 | 3.18 | 258.17 | 162.88 | 0 |
| 2nd Quarter | 84.14 | 4.18 | 339.29 | 214.06 | 0 |
| 3rd Quarter | 57.92 | 2.88 | 233.56 | 147.36 | 0 |
| 4th Quarter | 51.01 | 2.53 | 205.69 | 129.77 | 0 |

| Historical Exhaust Emissions by Quarter 2011 (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 70.61 | 3.79 | 250.44 | 165.02 | 0 |
| 2nd Quarter | 81.34 | 4.36 | 288.49 | 190.09 | 0 |
| 3rd Quarter | 87.67 | 4.7 | 310.96 | 204.89 | 0 |
| 4th Quarter | 84.71 | 4.54 | 300.45 | 197.97 | 0 |

| Averaged Exhaust Emissions During Baseline Period (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 67 | 3 | 254 | 164 | 0 |
| 2nd Quarter | 83 | 4 | 314 | 202 | 0 |
| 3rd Quarter | 73 | 4 | 272 | 176 | 0 |
| 4th Quarter | 68 | 4 | 253 | 164 | 0 |

| Fugitive Component VOC Emissions from Gas Compressor During Baseline Period (lb/qtr) | | | | |
|---|---|---|---|---|
| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
| VOC | 36 | 36 | 37 | 37 |

**35R LOAP Gas Plant S-2234-19**

| Fugitive Component VOC Emissions from LOAP Gas Plant S-2234-19 During Baseline Period (lb/qtr) | | | | |
|---|---|---|---|---|
| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
| VOC | 1,989 | 2,011 | 2,033 | 2,033 |

**SUM OF AVERAGED HAE DURING BASELINE PERIOD**

| Sum of Exhaust Emissions + Fugitive VOC Emissions During Baseline Period (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 14,849 | 14 | 995 | 16,702 | 11,760 |
| 2nd Quarter | 12,425 | 13 | 974 | 16,311 | 12,175 |
| 3rd Quarter | 20,025 | 18 | 1,239 | 22,192 | 15,863 |
| 4th Quarter | 19,453 | 18 | 1,230 | 21,966 | 15,237 |

## D. Adjustments to HAE

Pursuant to Section 3.22 of Rule 2201, Historical Actual Emissions must be discounted for any emissions reduction which is:

- Required or encumbered by any laws, rules, regulations, agreements, orders, or

- Attributed to a control measure noticed for workshop, or proposed or contained in a State Implementation Plan, or
- Proposed in the District Air Quality Plan for attaining the annual reductions required by the California Clean Air Act.
- Any Actual Emissions in excess of those required or encumbered by any laws, rules, regulations, orders, or permits. For units covered by a Specific Limiting Condition (SLC), the total overall HAE for all units covered by SLC must be discounted for any emissions in excess of that allowed by the SLC.

**Adjustment for Rule 2201 – New and Modified Stationary Source Review Rule:**

The 35R LOAP Gas Plant has been in operation prior to 1987 and has been subject to the District's NSR Rule when various modifications were performed. The 4,000 bhp lean-burn I.C. engines (S-2234-27 & -28) were also in existence prior to 1987 and have been subject to NSR since modifications to install a "pre-stratified charge" $NO_X$ control method was installed. The 1,834 bhp compressor engine S-2234-127 was installed new in 2005 and was subject to District NSR at the time of initial permitting. All the equipment has a history of compliance with any and all of the NSR based permit conditions. Therefore, no adjustment to the calculated HAEs above is necessary for NSR purposes (Rule 2201)

**Adjustment for Rule 4201 – Particulate Matter Concentration:**

Section 3.1 prohibits discharge of dust, fumes, or total particulate matter into the atmosphere from any single source operation in excess of 0.1 grain per dry standard cubic foot.

Particulate matter emissions from the engine will be less than or equal to the rule limit of 0.1 grain per cubic foot of gas at dry standard conditions as shown by the following:

For the 4,000 bhp engines K-9 and K-10, the permitted $PM_{10}$ emissions = 85.5 lb-$PM_{10}$/day:

(85.5 ~~lb~~-$PM_{10}$/~~day~~)(1 ~~day~~/24 hr)(453.6 g/~~lb~~)(1/4,000 bhp) = **0.404 g-$PM_{10}$/bhp-hr**

$$\frac{.404\,g-PM_{10}}{bhp-hr}\times\frac{1\,g-PM}{0.96\,g-PM_{10}}\times\frac{1\,bhp-hr}{2{,}542.5\,Btu}\times\frac{10^6\,Btu}{8{,}578\,dscf}\times\frac{0.35\,Btu_{out}}{1\,Btu_{in}}\times\frac{15.43\,grain}{g}=\ 0.10\ \frac{grain-PM}{dscf}$$

Since 0.10 grain-PM/dscf is ≤ to 0.1 grain per dscf, compliance with Rule 4201 is expected.

For the 1,834 bhp engine R-25, the permitted $PM_{10}$ emissions = 0.02 g/bhp-hr

$$\frac{.02\,g-PM_{10}}{bhp-hr}\times\frac{1\,g-PM}{0.96\,g-PM_{10}}\times\frac{1\,bhp-hr}{2{,}542.5\,Btu}\times\frac{10^6\,Btu}{8{,}578\,dscf}\times\frac{0.35\,Btu_{out}}{1\,Btu_{in}}\times\frac{15.43\,grain}{g}=\ 0.005\ \frac{grain-PM}{dscf}$$

Since 0.005 grain-PM/dscf is ≤ to 0.1 grain per dscf, compliance with Rule 4201 is expected.

The permitted emission factors used to calculate the PM emission concentration from the I.C. engines meet the requirements for this rule and no adjustment is necessary.

**Adjustment for Rule 4409 – Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities:**

The purpose of this rule is to limit VOC emissions from leaking components at light crude oil production facilities, natural gas production facilities, and natural gas processing facilities.

The facility undertakes an ongoing inspection and maintenance program, and as a federal Title V facility, partakes in frequent fugitive VOC component screenings. Any leaks discovered, either from District inspection, or from self-inspection, are repaired promptly and in compliance with the rule requirements. Because fugitive components are inspected frequently, in some cases monthly, and any leaks discovered are promptly repaired, CAPCOA Oil and Gas "screening values" will be utilized to determine HAE for the fugitive components involved with this banking action. No further adjustment to calculated HAE is necessary for Rule 4409.

**Adjustment for Rule 4702 – Internal Combustion Engines:**

The purpose of this rule is to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur oxides (SOx) from internal combustion engines.

Engines K-9 (S-2234-27) and K-10 (S-2234-28):

Both lean-burn engines K-9 and K-10 carry permit limits for $NO_X$, CO, and VOC of 136 ppmv (equivalent to 90% $NO_X$ reduction), 453 ppmv, and 436 ppmv, respectively. All ppmv values are corrected to 15% $O_2$. Compliance has been demonstrated through source testing on an ongoing basis.

Table 2 in Section 5.2.2 lists the emission limits for lean-burn engines powering gas compressors as 65 ppmv @ 15% $O_2$ or 93% reduction, 2,000 ppmv CO, and 750 ppmv VOC, all corrected to 15% $O_2$.

For the subject I.C. engies, if 136 ppmv $NO_X$ @ 15% $O_2$ is approved as a 90% reduction for these engines, then 93% reduction from uncontrolled emissons would be an emissions concentration of $NO_X$ not exceeding 95 ppmv corrected to 15% $O_2$.

The staggered compliance dates for Table 2 emission limits began on January 1, 2014. These engines were shut down and permits surrendered in March of 2013.

Being that the compliance date was pending on these engines, and the permitted $NO_X$ level for S-2234-27 & '-28 is higher than Table 2's $NO_X$ limit, no ERC will be granted above the lower $NO_X$ limit in Rule 4702 of 95 ppmv @ 15% $O_2$ (93% reduction).

The emissions source testing results for these engines during the baseline period shows emissions well within the permitted limits and in compliance with both current and future requirements of District Rule 4702. Therefore, no adjustment to HAE is required for Rule 4702.

Engine R-25 (S-2234-127):

NSCR controlled engine R-25 carries District permitted emission limits which are based on Rule 2201 BACT requirements and are well within the current and future requirements of Rule 4702.

The emissions source testing results for this engine during the baseline period shows emissions well within the permitted limits and in compliance with both current and future requirements of District Rule 4702. Therefore, no adjustment to HAE is required for Rule 4702.

## E. Actual Emissions Reductions (AERs):

The total qualifying AERs are shown in the table below:

| Qualifying AER During Baseline Period (lb/qtr) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 14,849 | 14 | 995 | 16,702 | 11,760 |
| 2nd Quarter | 12,425 | 13 | 974 | 16,311 | 12,175 |
| 3rd Quarter | 20,025 | 18 | 1,239 | 22,192 | 15,863 |
| 4th Quarter | 19,453 | 18 | 1,230 | 21,966 | 15,237 |

## F. Air Quality Improvement Deduction

The Air Quality Improvement Deduction (AQID) is 10% of the AER per Rule 2201, Sections 3.5 and 4.12.1, and is summarized as follows:

| Air Quality Improvement Deduction (AQID) lb/qtr (AQID = AER x 10%) | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 1,485 | 1 | 100 | 1,670 | 1,176 |
| 2nd Quarter | 1,243 | 1 | 97 | 1,631 | 1,218 |
| 3rd Quarter | 2,003 | 2 | 124 | 2,219 | 1,586 |
| 4th Quarter | 1,945 | 2 | 123 | 2,197 | 1,524 |

## G. Increases in Permitted Emissions (IPE)

No IPE is associated with this project.

### H. Bankable Emissions Reductions Credits

The bankable emissions reductions credits, presented in following table, are determined by subtraction of the Air Quality Improvement Deduction (discussed in Section V.F) from the AER.

| Bankable Emissions Reductions Credits | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 13,364 | 13 | 895 | 15,032 | 10,584 |
| 2nd Quarter | 11,182 | 12 | 877 | 14,680 | 10,957 |
| 3rd Quarter | 18,022 | 16 | 1,115 | 19,973 | 14,277 |
| 4th Quarter | 17,508 | 16 | 1,107 | 19,769 | 13,713 |

## VI. Compliance:

### Rule 2201 - New and Modified Stationary Source Review Rule:

To comply with the definition of Actual Emissions Reductions (Rule 2201, Section 3.2.1), the reductions must be real, enforceable, quantifiable, permanent, and surplus.

### A. Real

The emissions reductions were generated by the shutdown of the OEHI 35R LOAP Gas Plant and three I.C. engine powered gas compressors. The emissions reductions were calculated from actual historic data and recognized emission factors or source test data. The associated permits for these units have been surrendered to the District. Therefore, the emission reductions are real.

### B. Enforceable

The PTO's for OEHI's 35R Gas Plant operations and the three associated I.C. engine compressors have been surrendered to the District. Operation of any of the equipment without a valid permit would subject the Permittee to enforcement actions. Therefore, the reductions are enforceable.

### C. Quantifiable

The reductions are quantifiable since they were calculated from historic production and fuel use data, source testing data, established and accepted emission factors, permitted limits, and methods according to District Rule 2201. Therefore, the reductions are quantifiable.

**D. Permanent**

The gas plant and I.C. engines have been shut down and the PTOs have been surrendered to the District. Gas formerly processed through the 35R LOAP Gas Plant is routed to a new gas plant (see District project S1103628) for which all emissions increases for the project were fully offset. Therefore, the reductions are permanent.

**E. Surplus**

To be considered surplus, Actual Emission Reductions shall be in excess, at the time the application for an Emission Reduction Credit or an Authority to Construct authorizing such reductions is deemed complete, of any emissions reduction which:

- *Is required or encumbered by any laws, rules, regulations, agreements, orders, or*
- *Is attributed to a control measure noticed for workshop, or proposed or contained in a State Implementation Plan, or*

- *Is proposed in the APCO's adopted air quality plan pursuant to the California Clean Air Act.*

At the time of the shutdown and subsequent permit surrender, all the units involved were in compliance with current and any known future requirements of all applicable rules and regulations. Therefore, the reductions are surplus.

**F. Not used for the Approval of an Authority to Construct or as Offsets**

The emission reduction credits generated by the shutdown of the 35R LOAP Gas Plant and associated I.C. engine powered gas compressors were not used for the approval of any Authority to Construct or used as mitigating offsets for approval of other equipment.

**Rule 2301 – Emission Reduction Banking:**

Section 5.5 states that ERC certificate applications shall be submitted within 180 days after the emission reduction occurs. The applicant surrendered the PTOs and had permanently ceased operation of the equipment at this location on March 14, 2013. The ERC application was received on August 13, 2013, within the 180 day timeframe allowed. Therefore, the application was submitted in a timely fashion.

Section 6.1.2 states that if the emission reductions were created as a result of the shutdown of a permitted emissions unit, the relevant Permit(s) to Operate have been surrendered and voided. The Permits to Operate were surrendered and canceled by the District on March 14, 2013.

## VII. Recommendation:

Issue Emission Reduction Credit (ERC) Certificates S-4211-1, '-2, '-3, '-4, and '-5 in the amounts shown below and on the draft ERC certificate contained in Appendix A.

| Bankable Emissions Reductions Credits | | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | SOx | PM10 | CO | VOC |
| 1st Quarter | 13,364 | 13 | 895 | 15,032 | 10,584 |
| 2nd Quarter | 11,182 | 12 | 877 | 14,680 | 10,957 |
| 3rd Quarter | 18,022 | 16 | 1,115 | 19,973 | 14,277 |
| 4th Quarter | 17,508 | 16 | 1,107 | 19,769 | 13,713 |

### List of Appendices

A. Draft ERC Certificates
B. Surrendered Permits to Operate
C. Elk Hills Field Historical Natural Gas Production
D. 35R Gas Plant (S-2234-19) Gas Quality Analysis
E. 35R Gas Plant (S-2234-19) Fugitive VOC Component Emissions during Baseline Period
F. Engine K-9 (S-2234-27) Summary of Source Test Results and Fuel Analysis during Baseline Period
G. Engine K-9 (S-2234-27) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period
H. Engine K-10 (S-2234-28) Summary of Source Test Results and Fuel Analysis during Baseline Period
I. Engine K-10 (S-2234-28) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period
J. Engine R-25 (S-2234-127) Summary of Source Test Results and Fuel Analysis during Baseline Period
K. Engine R-25 (S-2234-127) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period

# Appendix A

## Draft ERC Certificates

San Joaquin Valley
Air Pollution Control District

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308

# Emission Reduction Credit Certificate

DRAFT

## S-4211-1

ISSUED TO: OCCIDENTAL OF ELK HILLS INC

ISSUED DATE: <DRAFT>

LOCATION OF REDUCTION: GAS PLANT
SECTION SE-35, T-30S, R-23E
TUPMAN, CA
SECTION: 35 TOWNSHIP: 30S RANGE: 23E

## For VOC Reduction In The Amount Of:

| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|
| 10,584 lbs | 10,957 lbs | 14,277 lbs | 13,713 lbs |

[ ] Conditions Attached

Method Of Reduction
[ ] Shutdown of Entire Stationary Source
[X] Shutdown of Emissions Units
[ ] Other

Shutdown of 35R Lean Oil Absorption Plant (S-2234-19) and three IC engines powering gas compressors (S-2234-27, '-28, '-127)

Use of these credits outside the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is not allowed without express written authorization by the SJVUAPCD.

Seyed Sadredin, Executive Director / APCO

DRAFT

David Warner, Director of Permit Services

Feb 14 2014 8:42AM – LEONARDS

San Joaquin Valley
Air Pollution Control District

Southern Regional Office • 34946 Flyover Court • Bakersfield, CA 93308

# Emission Reduction Credit Certificate

DRAFT

## S-4211-2

**ISSUED TO:** OCCIDENTAL OF ELK HILLS INC

**ISSUED DATE:** <DRAFT>

**LOCATION OF REDUCTION:** GAS PLANT
SECTION SE-35, T-30S, R-23E
TUPMAN, CA
SECTION: 35 TOWNSHIP: 30S RANGE: 23E

## For NOx Reduction In The Amount Of:

| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|
| 13,364 lbs | 11,182 lbs | 18,022 lbs | 17,508 lbs |

[ ] Conditions Attached

Method Of Reduction
[ ] Shutdown of Entire Stationary Source
[X] Shutdown of Emissions Units
[ ] Other

Shutdown of 35R Lean Oil Absorption Plant (S-2234-19) and three IC engines powering gas compressors (S-2234-27, '-28, '-127)

Use of these credits outside the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is not allowed without express written authorization by the SJVUAPCD.

Seyed Sadredin, Executive Director / APCO

DRAFT

David Warner, Director of Permit Services

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San Joaquin Valley
Air Pollution Control District

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# Emission Reduction Credit Certificate

## S-4211-3

DRAFT

ISSUED TO: OCCIDENTAL OF ELK HILLS INC

ISSUED DATE: <DRAFT>

LOCATION OF REDUCTION: GAS PLANT
SECTION SE-35, T-30S, R-23E
TUPMAN, CA
SECTION: 35 TOWNSHIP: 30S RANGE: 23E

## For CO Reduction In The Amount Of:

| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|
| 15,032 lbs | 14,680 lbs | 19,973 lbs | 19,769 lbs |

[ ] Conditions Attached

Method Of Reduction
[ ] Shutdown of Entire Stationary Source
[X] Shutdown of Emissions Units
[ ] Other

Shutdown of 35R Lean Oil Absorption Plant (S-2234-19) and three IC engines powering gas compressors (S-2234-27, '-28, '-127)

Use of these credits outside the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is not allowed without express written authorization by the SJVUAPCD.

Seyed Sadredin, Executive Director / APCO

DRAFT

David Warner, Director of Permit Services

Feb 14 2014 8:42AM -- LEONARDS

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Air Pollution Control District

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# Emission Reduction Credit Certificate

## S-4211-4

DRAFT

ISSUED TO: OCCIDENTAL OF ELK HILLS INC

ISSUED DATE: <DRAFT>

LOCATION OF REDUCTION: GAS PLANT
SECTION SE-35, T-30S, R-23E
TUPMAN, CA
SECTION: 35 TOWNSHIP: 30S RANGE: 23E

## For PM10 Reduction In The Amount Of:

| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|
| 895 lbs | 877 lbs | 1,115 lbs | 1,107 lbs |

[ ] Conditions Attached

Method Of Reduction
[ ] Shutdown of Entire Stationary Source
[X] Shutdown of Emissions Units
[ ] Other

**Shutdown of 35R Lean Oil Absorption Plant (S-2234-19) and three IC engines powering gas compressors (S-2234-27, '-28, '-127)**

Use of these credits outside the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is not allowed without express written authorization by the SJVUAPCD.

Seyed Sadredin, Executive Director / APCO

DRAFT

David Warner, Director of Permit Services

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Air Pollution Control District

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# Emission Reduction Credit Certificate

## S-4211-5

DRAFT

ISSUED TO: OCCIDENTAL OF ELK HILLS INC

ISSUED DATE: <DRAFT>

LOCATION OF REDUCTION: GAS PLANT
SECTION SE-35, T-30S, R-23E
TUPMAN, CA
SECTION: 35 TOWNSHIP: 30S RANGE: 23E

## For SOx Reduction In The Amount Of:

| Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|
| 13 lbs | 12 lbs | 16 lbs | 16 lbs |

[ ] Conditions Attached

Method Of Reduction
[ ] Shutdown of Entire Stationary Source
[X] Shutdown of Emissions Units
[ ] Other

Shutdown of 35R Lean Oil Absorption Plant (S-2234-19) and three IC engines powering gas compressors (S-2234-27, '-28, '-127)

Use of these credits outside the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is not allowed without express written authorization by the SJVUAPCD.

Seyed Sadredin, Executive Director / APCO

DRAFT

David Warner, Director of Permit Services

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# Appendix B

## Surrendered Permits to Operate

# San Joaquin Valley
# Air Pollution Control District

**PERMIT UNIT:** S-2234-19-13 **EXPIRATION DATE:** 10/31/2016

**SECTION:** 35 **TOWNSHIP:** 30S **RANGE:** 23E

**EQUIPMENT DESCRIPTION:**
35R GAS PLANT WITH LEAN OIL RECLAIMING STILL, FOUR AIR COMPRESSORS, ABSORBER, RICH OIL RECTIFIER, STRIPPER, DE-ETHANIZER AND DE-PROPANIZER

## PERMIT UNIT REQUIREMENTS

1. Operation shall include 3 absorption columns, rich absorption oil rectifier, absorption oil stripper, de-ethanizer, de-propanizer, de-butanizer, de-isobutanizer, 36 associated vessels, 32 heat exchangers, 31 process pumps, gas compressor K-8, and associated piping. [District Rule 2201] Federally Enforceable Through Title V Permit
2. All process vessels and lines handling volatile organic compounds shall vent only to other process vessels, District-approved flare, or substrata injection system. [District Rule 2201] Federally Enforceable Through Title V Permit
3. This operation shall comply with the requirements of District Rule 4409, as specified on facility wide permit S-2234-0. [District Rule 4409] Federally Enforceable Through Title V Permit
4. Heat exchangers utilizing cooling water shall be properly maintained to prevent VOC contamination of cooling water and resultant emissions from cooling towers. [District Rule 2201] Federally Enforceable Through Title V Permit
5. The operator shall test the circulating water from the cooling tower at least every six months to determine the concentration of hexavalent chromium. The District shall be notified 48 hours in advance of any sampling of cooling water for testing. Required testing may be discontinued and an exemption sought when two consecutive required tests show hexavalent chromium concentrations less than 0.15 mg/l. [District Rule 7012]
6. Operator shall comply with other applicable requirements of District Rule 7012 (amended 12/17/92). [District Rule 7012]
7. All required source testing shall conform to the compliance testing procedures described in District Rule 1081 (Amended December 16, 1993). [District Rule 1081] Federally Enforceable Through Title V Permit
8. The operator shall maintain all records of required monitoring data and support information for inspection at any time for a period of five years. [District Rule 2520, 9.5.2] Federally Enforceable Through Title V Permit
9. VOC emissions from absorption column C-1C, its associated piping, and components shall consist only of fugitive emissions and shall not exceed 0.8 lb/day. [District Rule 2201] Federally Enforceable Through Title V Permit
10. VOC emissions from gas compressor K-8, its associated piping, and components shall consist only of fugitive emissions and shall not exceed 6.6 lb/day. [District Rule 2201] Federally Enforceable Through Title V Permit
11. Permittee shall maintain with the permit accurate fugitive component counts and resulting emissions calculated using API Publication 450-3-83-007, Table E-3, for compressor K-8, its associated piping, and components, and for absorption column C-1C, its associated piping and components. [District Rule 2201] Federally Enforceable Through Title V Permit
12. Permittee shall maintain a written record of VOC content (sampled not less than annually) of the gas processed through absorption column C-1C, its associated piping and components. Such records available for District inspection upon request for a period of five years. [District Rule 2201] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

13. For absorption column C-1C, its associated piping, and components leak shall be defined as a reading as methane in excess of 10,000 ppm above background when measured at a distance of one (1) centimeter from the potential source. [40 CFR 60.482(b), 60.633(b)(2)] Federally Enforceable Through Title V Permit

14. Flanges and threaded connections associated with absorption column C-1C shall be inspected at least annually to detect any leaks and shall be monitored within 5 days by the method 21 if evidence of a potential leak is found by visual, audible, olfactory, or any other detection method. [40 CFR 60.482-8(a)] Federally Enforceable Through Title V Permit

15. Valves associated with absorption column C-1C shall be initially monitored monthly for leak detection and if a no leak is detected for 2 successive months valves may be monitored the first month of every quarter, beginning with the next quarter, until a leak is detected. If a leak is detected, the valves shall be monitored monthly until no leak is detected for 2 successive months. After 5 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, the inspection frequency may be changed from quarterly to annually. If the percent of valves found leaking during any annual or other inspection, is greater than 2.0, the owner or operator shall comply with the requirements as described in ⊥ 60.482-7 but can again elect to use annual monitoring. The percent of valves leaking shall be determined by dividing the sum of valves found leaking during current monitoring and valves for which repair has been delayed by the total number of valves subject to the requirements. [40 CFR 60.483-2(b)(1) & 40 CFR 60.483-1(b)(3)(4)(5)] Federally Enforceable Through Title V Permit

16. An owner or operator must keep a record of the percent of valves found leaking during each leak detection period. [40 CFR 60.483(b)(6)] Federally Enforceable Through Title V Permit

17. Each pressure relief device associated with absorption column C-1C shall be monitored at least quarterly for leak detection and shall be inspected within one (1) working day after venting to atmosphere. [40 CFR 60.633(b)(1)] Federally Enforceable Through Title V Permit

18. For absorption column C-1C, its associated piping, and components, a leaking component shall be identified by affixing a weatherproof and readily visible tag, marked with the equipment identification number and date on which leak is detected. The leak shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected. The first attempt at repair shall be made no later than 5 calendar days after each leak is detected. First attempts at repair include, but are not limited to, the following best practices where practicable: (1) Tightening of bonnet bolts; (2) Replacement of bonnet bolts; (3) Tightening of packing gland nuts; (4) Injection of lubricant into lubricated packing. [40 CFR 60.482-7(d)(2), (e), 40 CFR 60.486(b)(1), 40 CFR 60.635(b)(1)] Federally Enforceable Through Title V Permit

19. For absorption column C-1C, delay of repair for valves will be allowed until the next process unit turnaround, but in no case later than one year from the date of the original leak detection, if: (1) The owner or operator demonstrates that emissions of purged material resulting from immediate repair are greater than the fugitive emissions likely to result from delay of repair, and (2) When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with ⊥ 60.482-10. [40 CFR 60.482-9(c)] Federally Enforceable Through Title V Permit

20. For absorption column C-1C, the identification on a valve may be removed after it has been monitored for 2 successive months as specified in ⊥ 60.482-7(c) and no leaks has been detected during those 2 months. [40 CFR 60.486(b)(3)] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

21. For absorption column C-1C, the following information shall be recorded in a log and shall be kept for 5 years in a readily accessible location: (1) A schedule of monitoring. (2) The percent of valves found leaking during each monitoring period. (3) The instrument and operator identification numbers and the equipment identification number. (4) The date the leak was detected and the dates of each attempt to repair the leak. (5) Repair methods applied in each attempt to repair the leak. (6) "Above 10,000" if the maximum instrument reading measured by the methods specified in ⊥ 60.485(a) after each repair attempt is equal to or greater than 10,000 ppm. (7) "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak. (8) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown. (9) The expected date of successful repair of the leak if a leak is not repaired within 15 days. (10) Dates of process unit shutdown that occur while the equipment is un-repaired. (11) The date of successful repair of the leak. [40 CFR 60.486(c), (g)] Federally Enforceable Through Title V Permit

22. For absorption column C-1C, semi-annual reporting must include following for the reporting period. (1) Process unit identification. (2) Number of pressure relief devices for which leaks were detected as required in ⊥ 60.633(b)(2) and (3) Number of pressure relief devices for which leaks were not repaired as required in ⊥ 60.633(b)(3). (4) Number of valves for which leaks were detected as described in ⊥ 60.482(7)(b) or ⊥ 60.483-2, (5) Number of valves for which leaks were not repaired as required in ⊥ 60.482-7(d)(1). (6) The facts that explain each delay of repair and, where appropriate, why a process unit shutdown was technically infeasible. (7) Dates of process unit shutdowns which occurred within the semiannual reporting period. [40 CFR 60.636(c) & 60.487(c)] Federally Enforceable Through Title V Permit

23. EPA Method 21 shall be used to determine the presence of leaking sources. The instrument shall be calibrated before use each day of its use by the procedures specified in Method 21. The following calibration gases shall be used: (i) Zero air (less than 10 ppm of hydrocarbon in air); and (ii) A mixture of methane or n-hexane and air at a concentration of about, but less than, 10,000 ppm methane or n-hexane. [40 CFR 60.485(b)] Federally Enforceable Through Title V Permit

24. The requirements of 40 CFR 60 Subpart LLL do not apply to this source. A permit shield is granted from these requirements. [District Rule 2520, 13.2] Federally Enforceable Through Title V Permit

# San Joaquin Valley
# Air Pollution Control District

**PERMIT UNIT:** S-2234-27-7 **EXPIRATION DATE:** 10/31/2016

**EQUIPMENT DESCRIPTION:**
4,000 BHP DELAVAL MODEL HVA12 LEAN-BURN NATURAL GAS-FIRED IC ENGINE WITH PRE-COMBUSTION CHAMBER POWERING A GAS COMPRESSOR (K-9 UNX #11726)

## PERMIT UNIT REQUIREMENTS

1. Approved locations for this equipment: any site within facility S-2234. [District Rule 2201] Federally Enforceable Through Title V Permit
2. By October 19, 2012, the owner/operator shall submit an Authority to Construct (ATC) permit application to the District to comply with 40 CFR 63, ZZZZ. [District Rule 2010] Federally Enforceable Through Title V Permit
3. By July 1, 2012, the operator shall submit to the APCO an APCO-approvable emission control plan of all actions to be taken to satisfy the emission requirements of Section 5.2 of District Rule 4702. If there is no change to the previously-approved emission control plan, the operator shall submit a letter to the District indicating that the previously approved plan is still valid. [District Rule 4702, 6.1 and 7.5] Federally Enforceable Through Title V Permit
4. The operator shall notify the District in writing at least two weeks prior to starting operations at a new location. [District Rule 1070] Federally Enforceable Through Title V Permit
5. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702] Federally Enforceable Through Title V Permit
6. Emissions rates shall not exceed any of the following limits: NOx (as NO2): 14.55 lb/hr, 1.65 gr/hp-hr and 136 ppmv @ 15% O2 (equivalent to 90% NOx reduction), SOx (as SO2): 10 lb/day, PM10: 85.5 lb/day, CO: 453 ppmv @ 15% O2, or VOC: 436 ppmv @ 15% O2. [District Rules 2201, 4201, and 4702; Kern County Rule 407] Federally Enforceable Through Title V Permit
7. Percent emission reductions, if used to comply with NOx emission limits, shall be calculated as follows: For engines with external control devices that are not operated in combination with a second emission control device or technique, percent reduction shall be calculated using emission samples taken at the inlet and outlet of the control device. For engines without external control devices and for engines with an external control device in combination with a second emission control device or technique, percent reduction shall be based on source test results for the uncontrolled engine and the engine after the control device or technique has been employed. The engine's typical operating parameters, loading, and duty cycle shall be documented and repeated at each successive post-control source test to ensure the engine is meeting the percent reduction limit. When representative source sampling prior to the application of an emissions control technology or technique is not available, the APCO may approve the use of a manufacturer's uncontrolled emissions information or source sampling from a similar, uncontrolled engine. [District Rule 4702, 5.4] Federally Enforceable Through Title V Permit
8. The operator of an internal combustion engine that uses percent emission reduction to comply with the NOx emission limits shall provide an accessible inlet and outlet on the external control device or the engine as appropriate for taking emission samples and as approved by the APCO. [District Rule 4705, 5.5] Federally Enforceable Through Title V Permit
9. Sulfur compound emissions shall not exceed 0.2% by volume, 2000 ppmv, on a dry basis averaged over 15 consecutive minutes. [Kern County Rule 407] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

10. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201 and Kern County Rule 404] Federally Enforceable Through Title V Permit

11. Unit shall be fired only on PUC quality natural gas with a sulfur content of less than or equal to 0.017% by weight. [Kern County Rule 407] Federally Enforceable Through Title V Permit

12. If the IC engine is fired on PUC-regulated natural gas, then maintain on file copies of all natural gas bills. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

13. If the engine is not fired on PUC-regulated natural gas, then the sulfur content (as hydrogen sulfide) of the natural gas being fired in the IC engine shall be calculated using a continuous monitor averaged over a daily basis in accordance with SCAQMD Rule 431.1 Attachment A (as amended June 12, 1998). [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

14. If the engine is not fired on PUC-regulated natural gas, the sulfur content (as hydrogen sulfide) of each fuel source shall be tested. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

15. For emissions source testing, the aritlimetic average of three 30-consecutive-minute test runs shall apply. This average shall be multiplied by the appropriate factor to determine compliance with the hourly emission limits. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. VOC, NOx, and CO concentrations shall be reported in ppmv, corrected to 15% oxygen. For engines that comply with a percent reduction limit, the percent reduction of NOx emissions shall also be reported. [District Rules 2520, 9.4.2 and 4702, 6.3.3] Federally Enforceable Through Title V Permit

16. The following test methods shall be used: NOx (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100, and VOC (ppmv) - EPA Method 25A or 25B, or ARB Method 100. Methane and ethane, which are exempt compounds, shall be excluded from the result of the VOC test. EPA approved alternative test methods may also be used to satisfy the source testing requirements of this permit with prior written approval from the APCO. [District Rules 1081 and 4702] Federally Enforceable Through Title V Permit

17. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081] Federally Enforceable Through Title V Permit

18. Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702] Federally Enforceable Through Title V Permit

19. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081] Federally Enforceable Through Title V Permit

20. This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified on the Inspection and Monitoring (I&M) plan submitted to the District. [District Rules 4702 and 2520, 9.4.2] Federally Enforceable Through Title V Permit

21. The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rules 4702 and 2520, 9.4.2] Federally Enforceable Through Title V Permit

22. NOx, CO, and VOC emissions shall be measured (source tested) not less than every 12 months. If compliance with the emission limits is demonstrated for 2 consecutive years, testing frequency may be reduced to every 24 months. If the unit fails to demonstrate compliance with the emission limits, the testing frequency shall return to not less than every 12 months. NOx percent reduction compliance shall be demonstrated every 24 months. [District Rules 2201, 2520 9.4.2, and 4702, 6.3.2] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

23. Permittee shall monitor the nitrogen oxides (NOx) concentration in the engine exhaust with a facility conducted noncertified self test at least on a monthly basis. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

24. The permittee shall monitor and record the stack concentration of NOx, CO, and O2, using a portable emission monitor that meets District specifications, at least once every calendar quarter (in which a source test is not performed and the engine is operated) or, if the engine is operated less than 120 calendar days in a calendar year, at least once during that calendar year (in which a source test is not performed and the engine is operated). Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last calendar quarter. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 4702] Federally Enforceable Through Title V Permit

25. If either the NOx or CO concentrations corrected to 15% O2, as measured by the portable analyzer, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rule 4702] Federally Enforceable Through Title V Permit

26. All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702] Federally Enforceable Through Title V Permit

27. The permittee shall maintain records of: (1) the date and time of NOx, CO, and O2 measurements, (2) the O2 concentration in percent and the measured NOx and CO concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, and (5) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rule 4702] Federally Enforceable Through Title V Permit

28. The facility conducted noncertified self test shall be performed for NOx according to ARB Method 100 (or EPA Method 7E). [District Rules 2201 and 2520, 9.4.2] Federally Enforceable Through Title V Permit

29. The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. [District Rule 4702, 6.2.1] Federally Enforceable Through Title V Permit

30. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following applicable requirements of SJVUAPCD Rule 4201; Kern County Rule 407. A permit shield is granted from these requirements. [District Rule 2520, 13.2] Federally Enforceable Through Title V Permit

31. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following subsumed requirements: Kern County Rule 404. A permit shield is granted from these requirements. [District Rule 2520, 13.2] Federally Enforceable Through Title V Permit

# San Joaquin Valley
# Air Pollution Control District

**PERMIT UNIT:** S-2234-28-8 **EXPIRATION DATE:** 10/31/2016

**EQUIPMENT DESCRIPTION:**
4,000 BHP DELAVAL MODEL HVA12 LEAN-BURN NATURAL GAS-FIRED IC ENGINE WITH PRE-COMBUSTION CHAMBER POWERING A GAS COMPRESSOR (K-10 UNX #11718)

## PERMIT UNIT REQUIREMENTS

1. Approved locations for this equipment: any site within facility S-2234. [District Rule 2201] Federally Enforceable Through Title V Permit
2. By October 19, 2012, the owner/operator shall submit an Authority to Construct (ATC) permit application to the District to comply with 40 CFR 63, ZZZZ. [District Rule 2010] Federally Enforceable Through Title V Permit
3. By July 1, 2012, the operator shall submit to the APCO an APCO-approvable emission control plan of all actions to be taken to satisfy the emission requirements of Section 5.2 of District Rule 4702. If there is no change to the previously-approved emission control plan, the operator shall submit a letter to the District indicating that the previously approved plan is still valid. [District Rule 4702, 6.1 and 7.5] Federally Enforceable Through Title V Permit
4. The operator shall notify the District in writing at least two weeks prior to starting operations at a new location. [District Rule 1070] Federally Enforceable Through Title V Permit
5. This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702] Federally Enforceable Through Title V Permit
6. Emissions rates shall not exceed any of the following limits: NOx (as NO2): 14.55 lb/hr, 1.65 gr/hp-hr and 136 ppmv @ 15% O2 (equivalent to 90% NOx reduction), SOx (as SO2): 10 lb/day, PM10: 85.5 lb/day, CO: 453 ppmv @ 15% O2, or VOC: 436 ppmv @ 15% O2. [District Rules 2201, 4201, and 4702; Kern County Rule 407] Federally Enforceable Through Title V Permit
7. Percent emission reductions, if used to comply with NOx emission limits, shall be calculated as follows: For engines with external control devices that are not operated in combination with a second emission control device or technique, percent reduction shall be calculated using emission samples taken at the inlet and outlet of the control device. For engines without external control devices and for engines with an external control device in combination with a second emission control device or technique, percent reduction shall be based on source test results for the uncontrolled engine and the engine after the control device or technique has been employed. The engine's typical operating parameters, loading, and duty cycle shall be documented and repeated at each successive post-control source test to ensure the engine is meeting the percent reduction limit. When representative source sampling prior to the application of an emissions control technology or technique is not available, the APCO may approve the use of a manufacturer's uncontrolled emissions information or source sampling from a similar, uncontrolled engine. [District Rule 4702, 5.4] Federally Enforceable Through Title V Permit
8. The operator of an internal combustion engine that uses percent emission reduction to comply with the NOx emission limits shall provide an accessible inlet and outlet on the external control device or the engine as appropriate for taking emission samples and as approved by the APCO. [District Rule 4702, 5.5] Federally Enforceable Through Title V Permit
9. Sulfur compound emissions shall not exceed 0.2% by volume, 2000 ppmv, on a dry basis averaged over 15 consecutive minutes. [Kern County Rule 407] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

10. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201 and Kern County Rule 404] Federally Enforceable Through Title V Permit

11. Unit shall be fired only on PUC quality natural gas with a sulfur content of less than or equal to 0.017% by weight. [Kern County Rule 407] Federally Enforceable Through Title V Permit

12. If the IC engine is fired on PUC-regulated natural gas, then maintain on file copies of all natural gas bills. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

13. If the engine is not fired on PUC-regulated natural gas, then the sulfur content (as hydrogen sulfide) of the natural gas being fired in the IC engine shall be calculated using a continuous monitor averaged over a daily basis in accordance with SCAQMD Rule 431.1 Attachment A (as amended June 12, 1998). [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

14. If the engine is not fired on PUC-regulated natural gas, the sulfur content (as hydrogen sulfide) of each fuel source shall be tested. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

15. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. This average shall be multiplied by the appropriate factor to determine compliance with the hourly emission limits. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. VOC, NOx, and CO concentrations shall be reported in ppmv, corrected to 15% oxygen. For engines that comply with a percent reduction limit, the percent reduction of NOx emissions shall also be reported. [District Rules 2520, 9.4.2 and 4702, 6.3.3] Federally Enforceable Through Title V Permit

16. The following test methods shall be used: NOx (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100, and VOC (ppmv) - EPA Method 25A or 25B, or ARB Method 100. Methane and ethane, which are exempt compounds, shall be excluded from the result of the VOC test. EPA approved alternative test methods may also be used to satisfy the source testing requirements of this permit with prior written approval from the APCO. [District Rules 1081 and 4702] Federally Enforceable Through Title V Permit

17. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081] Federally Enforceable Through Title V Permit

18. Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702] Federally Enforceable Through Title V Permit

19. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081] Federally Enforceable Through Title V Permit

20. This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified on the Inspection and Monitoring (I&M) plan submitted to the District. [District Rules 4702 and 2520, 9.4.2] Federally Enforceable Through Title V Permit

21. The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rules 2520, 9.4.2 and 4702] Federally Enforceable Through Title V Permit

22. NOx, CO, and VOC emissions shall be measured (source tested) not less than every 12 months. If compliance with the emission limits is demonstrated for 2 consecutive years, testing frequency may be reduced to every 24 months. If the unit fails to demonstrated compliance with the emission limits, the testing frequency shall return to not less than every 12 months. NOx percent reduction compliance shall be demonstrated every 24 months. [District Rules 2201, 2520 9.4.2, and 4702, 6.3.2] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

23. Permittee shall monitor the nitrogen oxides (NOx) concentration in the engine exhaust with a facility conducted noncertified self test at least on a monthly basis. [District Rule 2520, 9.4.2] Federally Enforceable Through Title V Permit

24. The permittee shall monitor and record the stack concentration of NOx, CO, and O2, using a portable emission monitor that meets District specifications, at least once every calendar quarter (in which a source test is not performed and the engine is operated) or, if the engine is operated less than 120 calendar days in a calendar year, at least once during that calendar year (in which a source test is not performed and the engine is operated). Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last calendar quarter. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 4702] Federally Enforceable Through Title V Permit

25. If either the NOx or CO concentrations corrected to 15% O2, as measured by the portable analyzer, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rule 4702] Federally Enforceable Through Title V Permit

26. All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702] Federally Enforceable Through Title V Permit

27. The permittee shall maintain records of: (1) the date and time of NOx, CO, and O2 measurements, (2) the O2 concentration in percent and the measured NOx and CO concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, and (5) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rule 4702] Federally Enforceable Through Title V Permit

28. The facility conducted noncertified self test shall be performed for NOx according to ARB Method 100 (or EPA Method 7E). [District Rules 2201 and 2520, 9.4.2] Federally Enforceable Through Title V Permit

29. The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: total hours of operation, type of fuel used, maintenance or modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. [District Rule 4702, 6.2.1] Federally Enforceable Through Title V Permit

30. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following applicable requirements of SJVUAPCD Rule 4201; Kern County Rule 407. A permit shield is granted from these requirements. [District Rule 2520, 13.2] Federally Enforceable Through Title V Permit

31. Compliance with permit conditions in the Title V permit shall be deemed compliance with the following subsumed requirements: Kern County Rule 404. A permit shield is granted from these requirements. [District Rule 2520, 13.2] Federally Enforceable Through Title V Permit

# San Joaquin Valley
# Air Pollution Control District

**PERMIT UNIT:** S-2234-127-2 **EXPIRATION DATE:** 10/31/2016

**SECTION:** 26 **TOWNSHIP:** 30S **RANGE:** 23E

**EQUIPMENT DESCRIPTION:**
1,834 BHP WAUKESHA MODEL #7042 NATURAL GAS-FIRED IC ENGINE DRIVING A GAS COMPRESSOR (R-25) EQUIPPED WITH NON-SELECTIVE CATALYTIC REDUCTION, AIR/FUEL RATIO CONTROLLER, POSITIVE CRANKCASE VENTILATION, AND OPERATES AT VARIOUS UNSPECIFIED LOCATIONS WITHIN FACILITY S-2234

## PERMIT UNIT REQUIREMENTS

1. By October 19, 2012, the owner/operator shall submit an Authority to Construct (ATC) permit application to the District to comply with 40 CFR 63, ZZZZ. [District Rule 2010] Federally Enforceable Through Title V Permit
2. By July 1, 2012, the operator shall submit to the APCO an APCO-approvable emission control plan of all actions to be taken to satisfy the emission requirements of Section 5.2 of District Rule 4702. If there is no change to the previously-approved emission control plan, the operator shall submit a letter to the District indicating that the previously approved plan is still valid. [District Rule 4702, 6.1 and 7.5] Federally Enforceable Through Title V Permit
3. Operator shall notify the District by letter or fax at least 48-hours in advance of the re-location of this unit. [District Rule 2201] Federally Enforceable Through Title V Permit
4. Operator shall maintain records of compressor skid location and dates spent at each location and make such records available for District inspection upon request. [District Rule 2201] Federally Enforceable Through Title V Permit
5. This unit shall not operate within 1,000 feet of a kindergarten through 12 grade school. [CH&SC 42301.6] Federally Enforceable Through Title V Permit
6. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201] Federally Enforceable Through Title V Permit
7. IC engine shall be equipped with air/fuel ratio controller which readily indicates air/fuel ratio setting within tolerance limits as recommended by the catalyst system supplier. [District Rule 2201] Federally Enforceable Through Title V Permit
8. The engine shall be equipped with a positive crankcase ventilation (PCV) system or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201] Federally Enforceable Through Title V Permit
9. Emissions from this IC engine shall not exceed any of the following limits: NOx (as NO2) - 5 ppmv @ 15% O2, VOC - 25 ppmv @ 15% O2, CO - 56 ppmv @ 15% O2, PM10 - 0.02 g/hp-hr, or SOx (as SO2) - 0.011 g/hp-hr. [District Rules 2201 and 4702, 5.1] Federally Enforceable Through Title V Permit
10. Fugitive emissions, calculated using CAPCOA California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities, Table IV-2c (Feb 1999), with no leaks greater than or equal to 10,000 ppm, shall not exceed 0.7 lb VOC/day. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The fuel consumption limit for this engine shall not exceed 241,600 scf/day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The engine shall only burn natural gas with fuel gas sulfur concentration (as H2S) not exceeding 1.0 grains/100 dscf. [District Rule 2201] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

13. If the IC engine is fired on PUC-regulated natural gas, the permittee shall retain on file, copies of all natural gas bills. [District Rule 2201] Federally Enforceable Through Title V Permit

14. If the engine is fired on non-PUC-regulated natural gas, then the sulfur content of the natural gas being fired in the IC engine shall be determined using ASTM method D 1072, D 3031, D 4084, D 3246 or double GC. [District Rule 2201] Federally Enforceable Through Title V Permit

15. If the engine is fired on non-PUC-regulated natural gas, the sulfur content of each fuel source shall be tested weekly except that if compliance with the fuel sulfur content limit has been demonstrated for 8 consecutive weeks for a fuel source, then the testing frequency shall be quarterly. If a test shows noncompliance with the sulfur content requirement, the source must return to weekly testing until eight consecutive weeks show compliance. [District Rule 2201] Federally Enforceable Through Title V Permit

16. The permittee shall install and operate a nonresettable elapsed operating time meter. The elapsed operating time meter shall be properly maintained in accordance with the manufacturer's specifications. [District Rule 4702, 5.6.6] Federally Enforceable Through Title V Permit

17. Source testing to measure the stack NOx, CO, and VOC emissions from this unit shall be conducted not less than once every twelve (12) months. [District Rules 2201 and 4702] Federally Enforceable Through Title V Permit

18. Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rule 4702, 6.3.3] Federally Enforceable Through Title V Permit

19. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081] Federally Enforceable Through Title V Permit

20. The following test methods shall be used: NOx (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100, and VOC (ppmv) - EPA Method 25A or 25B, or ARB Method 100, ASTM D3246 or double GC for H2S and mercaptans, and EPA Method 21 for fugitive components. Methane and ethane, which are exempt compounds, shall be excluded from the result of the VOC test. EPA approved alternative test methods may also be used to satisfy the source testing requirements of this permit with prior written approval from the APCO. [District Rule 4702, 6.4] Federally Enforceable Through Title V Permit

21. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. NOx, CO and VOC concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rule 4702, 6.3.3] Federally Enforceable Through Title V Permit

22. Source testing shall be by District witnessed, or authorized, sample collection by ARB certified testing laboratory. [District Rule 1080] Federally Enforceable Through Title V Permit

23. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1080] Federally Enforceable Through Title V Permit

24. This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified on the Inspection and Monitoring (I&M) plan submitted to the District. [District Rule 4702, 6.5] Federally Enforceable Through Title V Permit

25. The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rule 4702, 6.5.9] Federally Enforceable Through Title V Permit

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

26. The permittee shall monitor and record the stack concentration of NOx, CO, and O2, using a portable emission monitor that meets District specifications, at least once every calendar quarter (in which a source test is not performed and the engine is operated) or, if the engine is operated less than 120 calendar days in a calendar year, at least once during that calendar year (in which a source test is not performed and the engine is operated). Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last calendar quarter. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 4702] Federally Enforceable Through Title V Permit

27. If either the NOx or CO concentrations corrected to 15% O2, as measured by the portable analyzer, exceed the allowable emission concentration, the permittee shall return the emissions to within the acceptable range as soon as possible, but no longer than 8 hours after detection. If the portable analyzer readings continue to exceed the allowable emissions concentration after 8 hours, the permittee shall notify the District within the following 1 hour, and conduct a certified source test within 60 days of the first exceedance. In lieu of conducting a source test, the permittee may stipulate a violation has occurred, subject to enforcement action. The permittee must then correct the violation, show compliance has been re-established, and resume monitoring procedures. If the deviations are the result of a qualifying breakdown condition pursuant to Rule 1100, the permittee may fully comply with Rule 1100 in lieu of performing the notification and testing required by this condition. [District Rule 4702] Federally Enforceable Through Title V Permit

28. All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 4702] Federally Enforceable Through Title V Permit

29. The permittee shall maintain records of: (1) the date and time of NOx, CO, and O2 measurements, (2) the O2 concentration in percent and the measured NOx and CO concentrations corrected to 15% O2, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, and (5) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rule 4702, 6.2.1] Federally Enforceable Through Title V Permit

30. The results of the measurements taken with the District approved analyzer shall be retained on-site at all times. [District Rule 1070] Federally Enforceable Through Title V Permit

31. This operation shall comply with the requirements of District Rule 4409, as specified on facility wide permit S-2234-0. [District Rule 4409] Federally Enforceable Through Title V Permit

32. The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: total hours of operation, type, quantity (cubic feet of gas or gallons of liquid) and sulfur content of fuel used, maintenance or modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. [District Rules 2201 and 4702, 6.2.1] Federally Enforceable Through Title V Permit

33. All records shall be maintained, retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rules 1070, 2201, and 4702, 6.2.1 and 6.2.2] Federally Enforceable Through Title V Permit

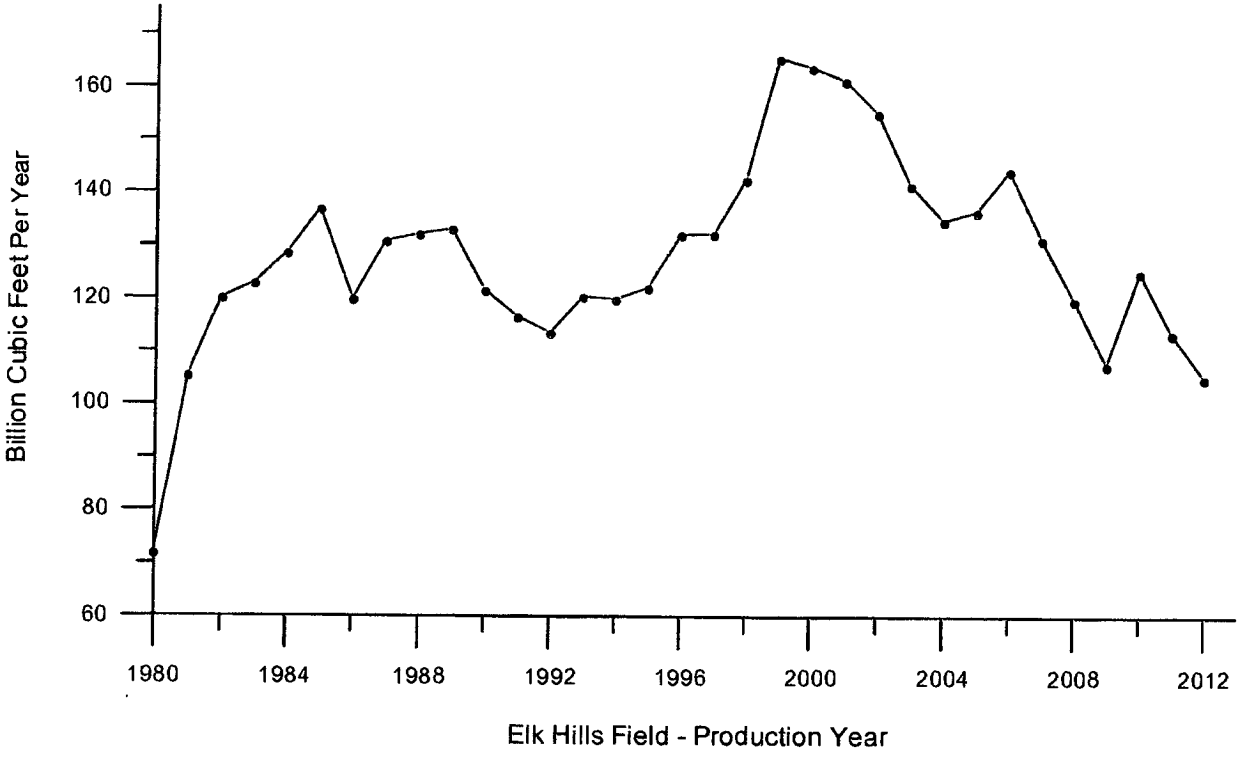
# Appendix C

## Elk Hills Field Historical Natural Gas Production

Figure-1

Elk Hills Field Natural Gas Production

(From California Division of Oil, Gas and Geothermal Resources)



# Appendix D

## 35R Gas Plant (S-2234-19) Gas Quality Analysis

## Gas Analysis for 35R Plant 2010

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| O2 | 31.999 | 0.000 | 0.000 | 0.000 | 0.000 |
| N2 | 28.014 | 0.323 | 0.090 | 0.434 | 0.434 |
| CO2 | 44.010 | 3.483 | 1.533 | 7.359 | 7.359 |
| C1 | 16.042 | 80.673 | 12.942 | 62.128 | 62.128 |
| C2 | 30.069 | 8.239 | 2.477 | 11.893 | 11.893 |
| C3 | 44.096 | 4.473 | 1.972 | 9.469 | 9.469 |
| IC4 | 58.122 | 0.605 | 0.352 | 1.688 | 1.688 |
| NC4 | 58.122 | 1.240 | 0.721 | 3.460 | 3.460 |
| IC5 | 72.149 | 0.325 | 0.234 | 1.126 | 1.126 |
| NC5 | 72.149 | 0.297 | 0.214 | 1.029 | 1.029 |
| C6+ | 86.175 | 0.342 | 0.295 | 1.415 | 1.415 |
| Totals | - | 100.000 | 20.831 | 100.000 | 100.000 |

## Total Organic Gases (TOG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C1 | 16.042 | 80.673 | 12.942 | 62.128 | 67.379 |
| C2 | 30.069 | 8.239 | 2.477 | 11.893 | 12.898 |
| C3 | 44.096 | 4.473 | 1.972 | 9.469 | 10.269 |
| IC4 | 58.122 | 0.605 | 0.352 | 1.688 | 1.831 |
| NC4 | 58.122 | 1.240 | 0.721 | 3.460 | 3.752 |
| IC5 | 72.149 | 0.325 | 0.234 | 1.126 | 1.221 |
| NC5 | 72.149 | 0.297 | 0.214 | 1.029 | 1.116 |
| C6+ | 86.175 | 0.342 | 0.295 | 1.415 | 1.534 |
| Total VOC | - | 7.282 | 3.788 | 18.186 | 19.723 |
| Totals | - | 96.194 | 19.207 | 92.207 | 100.000 |

## Volatile Organic Compounds (VOC) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C3 | 44.096 | 4.473 | 1.972 | 9.469 | 52.067 |
| IC4 | 58.122 | 0.605 | 0.352 | 1.688 | 9.282 |
| NC4 | 58.122 | 1.240 | 0.721 | 3.460 | 19.025 |
| IC5 | 72.149 | 0.325 | 0.234 | 1.126 | 6.190 |
| NC5 | 72.149 | 0.297 | 0.214 | 1.029 | 5.657 |
| C6+ | 86.175 | 0.342 | 0.295 | 1.415 | 7.780 |
| Totals | - | 7.282 | 3.788 | 18.186 | 100.000 |

## Greenhouse Gases (GHG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| CO2 | 44.010 | 1.610 | 0.709 | 3.402 | 4.673 |
| C1 | 16.042 | 90.100 | 14.454 | 69.388 | 95.327 |
| Totals | - | 91.710 | 15.162 | 72.789 | 100.000 |

| Note: Lb/CO2 to Lb/TOG: | 0.0829637 |
|---|---|

## Gas Analysis for 35R Plant 2011

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| O2 | 31.999 | 0.000 | 0.000 | 0.000 | 0.000 |
| N2 | 28.014 | 0.651 | 0.182 | 0.766 | 0.766 |
| CO2 | 44.010 | 3.619 | 1.593 | 6.690 | 6.690 |
| C1 | 16.042 | 69.073 | 11.081 | 46.546 | 46.546 |
| C2 | 30.069 | 12.752 | 3.834 | 16.107 | 16.107 |
| C3 | 44.096 | 8.570 | 3.779 | 15.874 | 15.874 |
| IC4 | 58.122 | 1.209 | 0.703 | 2.952 | 2.952 |
| NC4 | 58.122 | 2.740 | 1.593 | 6.690 | 6.690 |
| IC5 | 72.149 | 0.599 | 0.432 | 1.815 | 1.815 |
| NC5 | 72.149 | 0.492 | 0.355 | 1.491 | 1.491 |
| C6+ | 86.175 | 0.295 | 0.254 | 1.068 | 1.068 |
| Totals | - | 100.000 | 23.806 | 100.000 | 100.000 |

## Total Organic Gases (TOG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C1 | 16.042 | 69.073 | 11.081 | 46.546 | 50.297 |
| C2 | 30.069 | 12.752 | 3.834 | 16.107 | 17.405 |
| C3 | 44.096 | 8.570 | 3.779 | 15.874 | 17.153 |
| IC4 | 58.122 | 1.209 | 0.703 | 2.952 | 3.190 |
| NC4 | 58.122 | 2.740 | 1.593 | 6.690 | 7.229 |
| IC5 | 72.149 | 0.599 | 0.432 | 1.815 | 1.962 |
| NC5 | 72.149 | 0.492 | 0.355 | 1.491 | 1.611 |
| C6+ | 86.175 | 0.295 | 0.254 | 1.068 | 1.154 |
| Total VOC | - | 13.905 | 7.116 | 29.890 | 32.299 |
| Totals | - | 95.730 | 22.031 | 92.544 | 100.000 |

## Volatile Organic Compounds (VOC) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C3 | 44.096 | 8.570 | 3.779 | 15.874 | 53.109 |
| IC4 | 58.122 | 1.209 | 0.703 | 2.952 | 9.875 |
| NC4 | 58.122 | 2.740 | 1.593 | 6.690 | 22.381 |
| IC5 | 72.149 | 0.599 | 0.432 | 1.815 | 6.074 |
| NC5 | 72.149 | 0.492 | 0.355 | 1.491 | 4.989 |
| C6+ | 86.175 | 0.295 | 0.254 | 1.068 | 3.573 |
| Totals | - | 13.905 | 7.116 | 29.890 | 100.000 |

## Greenhouse Gases (GHG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| CO2 | 44.010 | 3.619 | 1.593 | 6.690 | 12.567 |
| C1 | 16.042 | 69.073 | 11.081 | 46.546 | 87.433 |
| Totals | - | 72.692 | 12.673 | 53.237 | 100.000 |

| Note: Lb/CO2 to Lb/TOG: | 0.0755194 |
|---|---|

## Gas Analysis for 35R Plant Average

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| O2 | 31.999 | 0.000 | 0.000 | 0.000 | 0.000 |
| N2 | 28.014 | 0.487 | 0.136 | 0.611 | 0.611 |
| CO2 | 44.010 | 3.551 | 1.563 | 7.002 | 7.002 |
| C1 | 16.042 | 74.873 | 12.011 | 53.818 | 53.818 |
| C2 | 30.069 | 10.496 | 3.156 | 14.140 | 14.140 |
| C3 | 44.096 | 6.522 | 2.876 | 12.885 | 12.885 |
| IC4 | 58.122 | 0.907 | 0.527 | 2.362 | 2.362 |
| NC4 | 58.122 | 1.990 | 1.157 | 5.182 | 5.182 |
| IC5 | 72.149 | 0.462 | 0.333 | 1.494 | 1.494 |
| NC5 | 72.149 | 0.395 | 0.285 | 1.275 | 1.275 |
| C6+ | 86.175 | 0.319 | 0.274 | 1.230 | 1.230 |
| Totals | - | 100.000 | 22.318 | 100.000 | 100.000 |

## Total Organic Gases (TOG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C1 | 16.042 | 74.873 | 12.011 | 53.818 | 58.253 |
| C2 | 30.069 | 10.496 | 3.156 | 14.140 | 15.306 |
| C3 | 44.096 | 6.522 | 2.876 | 12.885 | 13.947 |
| IC4 | 58.122 | 0.907 | 0.527 | 2.362 | 2.557 |
| NC4 | 58.122 | 1.990 | 1.157 | 5.182 | 5.610 |
| IC5 | 72.149 | 0.462 | 0.333 | 1.494 | 1.617 |
| NC5 | 72.149 | 0.395 | 0.285 | 1.275 | 1.380 |
| C6+ | 86.175 | 0.319 | 0.274 | 1.230 | 1.331 |
| Total VOC | - | 10.594 | 5.452 | 24.428 | 26.441 |
| Totals | - | 95.962 | 20.619 | 92.386 | 100.000 |

## Volatile Organic Compounds (VOC) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| C3 | 44.096 | 6.522 | 2.876 | 12.885 | 52.747 |
| IC4 | 58.122 | 0.907 | 0.527 | 2.362 | 9.669 |
| NC4 | 58.122 | 1.990 | 1.157 | 5.182 | 21.215 |
| IC5 | 72.149 | 0.462 | 0.333 | 1.494 | 6.114 |
| NC5 | 72.149 | 0.395 | 0.285 | 1.275 | 5.221 |
| C6+ | 86.175 | 0.319 | 0.274 | 1.230 | 5.034 |
| Totals | - | 10.594 | 5.452 | 24.428 | 100.000 |

## Greenhouse Gases (GHG) for 35R Plant

| Compounds | Molecular Weight | Mole % | Weight of Constituent | Weight Percent | |
|---|---|---|---|---|---|
| | | | | As Measured | Normalized |
| CO2 | 44.010 | 3.551 | 1.563 | 7.002 | 11.513 |
| C1 | 16.042 | 74.873 | 12.011 | 53.818 | 88.487 |
| Totals | - | 78.424 | 13.574 | 60.820 | 100.000 |

| Note: Lb/CO2 to Lb/TOG: | 0.0789825 |
|---|---|

# Appendix E

## 35R Gas Plant (S-2234-19) Fugitive VOC Component Emissions during Baseline Period

## Occidental of Elk Hills

**S-1133368, 35R LOAP S-2234-19**

## Fugitive Emissions Using Screening Emission Factors

California Implementation Guidelines for Estimating Mass Emissions
of Fugitive Hydrocarbon Leaks at Petroleum Facilities
*Table IV-2c. Oil and Gas Production*
*Screening Value Ranges Emission Factors*

| | |
|---|---|
| Percentage of components with ≥ 10,000 ppmv leaks allowed? | 0 % |
| Weight percentage of VOC in the total organic compounds in gas (neglect non-organics)? | 26.44 % |
| Weight percentage of VOC in the total organic compounds in oil (neglect non-organics)? | 100 % |

| Equipment Type | Service | Component Count | Total allowable leaking components | Screening Value EF - TOC < 10,000 ppmv (lb/day/source) | Screening Value EF - TOC ≥ 10,000 ppmv (lb/day/source) | VOC emissions (lb/day) |
|---|---|---|---|---|---|---|
| Valves | Gas/Light Liquid | 3,635 | 0 | 1.852E-03 | 7.333E+00 | 1.78 |
| | Light Crude Oil | 2,656 | 0 | 1.005E-03 | 3.741E+00 | 2.67 |
| | Heavy Crude Oil | 0 | 0 | 7.408E-04 | N/A* | 0.00 |
| Pump Seals | Gas/Light Liquid | 0 | 0 | 5.270E-02 | 4.709E+00 | 0.00 |
| | Light Crude Oil | 15 | 0 | 1.402E-02 | 4.709E+00 | 0.21 |
| | Heavy Crude Oil | 0 | 0 | N/A | N/A | N/A |
| Others | Gas/Light Liquid | 953 | 0 | 7.778E-03 | 7.281E+00 | 1.96 |
| | Light Crude Oil | 678 | 0 | 6.931E-03 | 3.757E-01 | 4.70 |
| | Heavy Crude Oil | 0 | 0 | 3.016E-03 | N/A* | 0.00 |
| Connectors | Gas/Light Liquid | 14,659 | 0 | 6.349E-04 | 1.370E+00 | 2.46 |
| | Light Crude Oil | 8,878 | 0 | 5.291E-04 | 1.238E+00 | 4.70 |
| | Heavy Crude Oil | 0 | 0 | 4.233E-04 | 4.233E-04 | 0.00 |
| Flanges | Gas/Light Liquid | 3,156 | 0 | 1.482E-03 | 3.228E+00 | 1.24 |
| | Light Crude Oil | 1,858 | 0 | 1.270E-03 | 1.376E+01 | 2.36 |
| | Heavy Crude Oil | 0 | 0 | 1.217E-03 | N/A* | 0.00 |
| Open-ended Lines | Gas/Light Liquid | 0 | 0 | 1.270E-03 | 2.905E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 9.524E-04 | 1.175E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.937E-04 | 3.762E+00 | 0.00 |

* Emission factor not available. All components from equipment type and service will be assessed as < 10,000 ppmv

**Total VOC Emissions = 22.1 lb/day**

# Appendix F

## Engine K-9 (S-2234-27) Summary of Source Test Results and Fuel Analysis during Baseline Period

Engine K9
February 24, 2010
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Measured BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 02/24/10 | K 9 | S-2234-27 | 517.00 | 24.3830 | 8,537.65 | 13.27 | 3,167.00 | 0.9548 | 7,699.09 |
| 02/24/10 | K 9 | S-2234-27 | 515.00 | 24.2887 | 8,537.65 | 15.49 | 3,160.00 | 0.9498 | 7,686.29 |
| 02/24/10 | K 9 | S-2234-27 | 516.00 | 24.3359 | 8,537.65 | 13.47 | 3,128.00 | 0.9374 | 7,780.00 |
| Test Average | | | 516.00 | 24.3359 | 8,537.65 | 14.08 | 3,151.67 | 0.9473 | 7,721.79 |

| Test Date | Engine ID | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 02/24/10 | K 9 | 29.91 | 110.00 | 183.00 | 0.04 | ------ | 1,237.99 | 2.88 | ------ |
| 02/24/10 | K 9 | 62.24 | 139.00 | 128.00 | 0.03 | ------ | 1,564.97 | 2.88 | ------ |
| 02/24/10 | K 9 | 39.82 | 118.00 | 97.02 | 0.04 | ------ | 1,241.94 | 2.88 | ------ |
| Test Average | | 43.99 | 122.33 | 136.01 | 0.04 | ------ | 1,348.30 | 2.88 | ------ |

| Test Date | Engine ID | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 g/MMBtu | CO2 Kg/MMBtu | N2O g/MMBtu |
|---|---|---|---|---|---|---|---|---|---|
| | | NOx | VOC | CO | SOx | PM10 | | | |
| 02/24/10 | K 9 | 0.3828 | 0.4897 | 1.4257 | 0.0008 | 0.0349 | 715.2876 | 45.8015 | 0.1000 |
| 02/24/10 | K 9 | 0.7953 | 0.6178 | 0.9956 | 0.0005 | 0.0348 | 904.2084 | 45.7980 | 0.1000 |
| 02/24/10 | K 9 | 0.5150 | 0.5308 | 0.7638 | 0.0008 | 0.0352 | 717.5660 | 45.7620 | 0.1000 |
| Test Average | | 0.5644 | 0.5461 | 1.0617 | 0.0007 | 0.0350 | 779.0207 | 45.7872 | 0.1000 |

Engine K9
April 13, 2011
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Measured BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 04/13/11 | K 9 | S-2234-27 | 448.00 | 21.5301 | 8,544.55 | 15.86 | 2,982.00 | 0.8911 | 7,220.03 |
| 04/13/11 | K 9 | S-2234-27 | 443.00 | 21.2898 | 8,544.55 | 14.04 | 2,929.00 | 0.8788 | 7,268.64 |
| 04/13/11 | K 9 | S-2234-27 | 443.00 | 21.2898 | 8,544.55 | 13.72 | 2,930.00 | 0.8769 | 7,266.16 |
| Test Average | | | 444.67 | 21.3699 | 8,544.55 | 14.54 | 2,947.00 | 0.8823 | 7,251.61 |

| Test Date | Engine ID | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 04/13/11 | K 9 | 104.00 | 52.11 | 68.43 | 0.01 | ------ | 1,752.44 | 2.82 | ------ |
| 04/13/11 | K 9 | 60.27 | 41.82 | 89.43 | 0.01 | ------ | 1,401.90 | 2.82 | ------ |
| 04/13/11 | K 9 | 69.47 | 39.59 | 92.87 | 0.01 | ------ | 1,235.88 | 2.83 | ------ |
| Test Average | | 77.91 | 44.51 | 83.58 | 0.01 | ------ | 1,463.40 | 2.82 | ------ |

| Test Date | Engine ID | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 g/MMBtu | CO2 Kg/MMBtu | N2O g/MMBtu |
|---|---|---|---|---|---|---|---|---|---|
| | | NOx | VOC | CO | SOx | PM10 | | | |
| 04/13/11 | K 9 | 1.2493 | 0.2177 | 0.5003 | 0.0001 | 0.0327 | 1013.3413 | 44.8727 | 0.1000 |
| 04/13/11 | K 9 | 0.7289 | 0.1759 | 0.6583 | 0.0002 | 0.0329 | 810.6399 | 44.8587 | 0.1000 |
| 04/13/11 | K 9 | 0.8398 | 0.1665 | 0.6834 | 0.0002 | 0.0329 | 714.6409 | 44.9502 | 0.1000 |
| Test Average | | 0.9393 | 0.1867 | 0.6140 | 0.0001 | 0.0329 | 846.2073 | 44.8939 | 0.1000 |

S-2234-27-7

Fuel Analysis

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
P.O. Box 80847
Bakersfield, CA 93380-0847
Telephone (661) 324-1317
Fax (661) 324-2746

Environmental Services & Testing
P.O. Box 2525
Gilbert, AZ 85233

Sampled: 2/24/2010
Submitted: 2/28/2010
Analyzed: 2/28/2010
Reported: 3/2/2010

## Gas Analysis by Chromatography - ASTM D 1945/D 3588

Company: Oxy
Location: Fuel Gas
Description: K-11 K-09, K-10, K-11, K-13

Lab No.: 100233-10
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPM |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.24 | 0.34 | |
| Carbon Dioxide | 2.39 | 5.39 | |
| Hydrogen | ND | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 85.36 | 70.22 | |
| Ethane | 5.84 | 9.01 | |
| Propane | 4.99 | 11.28 | 1.377 |
| iso-Butane | 0.42 | 1.25 | 0.138 |
| n-Butane | 0.52 | 1.55 | 0.164 |
| iso-Pentane | 0.11 | 0.41 | 0.040 |
| n-Pentane | 0.05 | 0.18 | 0.018 |
| Hexanes Plus | 0.08 | 0.35 | 0.033 |
| Totals | 100.00 | 100.00 | 1.771 |

| | | Values Corrected for Compressibility |
|---|---|---|
| Specific Volume, ft3/lb | 19.46 | |
| Compressibility (Z) Factor | 0.9971 | |
| Specific Gravity, Calculated | 0.6733 | 0.6750 |
| GROSS | | |
| BTU/ft3 Dry | 1131.9 | 1135.2 |
| Wet | 1112.1 | 1115.3 |
| BTU/lb Dry | 22023.1 | 22087.6 |
| BTU/lb Wet | 21637.7 | 21701.1 |
| NET | | |
| BTU/ft3 Dry | 1024.0 | 1027.0 |
| Wet | 1006.1 | 1009.0 |
| BTU/lb Dry | 19924.4 | 19982.8 |
| BTU/lb Wet | 19575.8 | 19633.1 |

| CHONS | Weight % |
|---|---|
| Carbon | 73.667 |
| Hydrogen | 22.166 |
| Oxygen | 3.922 |
| Nitrogen | 0.345 |
| Sulfur | 0.000 |
| F FACTOR @ 68 deg F dscf/MMBTU | 8669 |
| F FACTOR @ 60 deg F dscf/MMBTU | 8539 |

| | | Method |
|---|---|---|
| Hydrogen Sulfide, ppm | Not Tested | |
| Total Sulfur, ppm | 0.32 | GC/FPD |
| Dew Point, deg F | Not Tested | GC/FPD |
| Moisture, lbs H2O/MMCF | Not Tested | Bureau of Mines |
| | | Bureau of Mines |

ND = None Detected
Tr = Trace

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
P.O. Box 60547
Bakersfield, CA 93386-0547
Telephone (661) 324-1317
Fax (661) 324-2749

Environmental Services & Testing
P.O. Box 2525
Gilbert, AZ 85233

Sampled: 4/13/2011
Submitted 4/15/2011
Analyzed: 4/16/2011
Reported: 4/18/2011

## Gas Analysis by Chromotography - ASTM D 3588-91

Company: Ox;
Location: Fuel Gas
Description: K-8

Lab No.: 110355-4
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPM@ |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.58 | 0.82 | |
| Carbon Dioxide | 2.09 | 4.63 | |
| Hydrogen | ND | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 84.87 | 68.37 | |
| Ethane | 4.82 | 7.29 | |
| Propane | 6.33 | 14.05 | 1.747 |
| Iso-Butane | 0.42 | 1.23 | 0.138 |
| n-Butane | 0.80 | 1.76 | 0.190 |
| Iso-Pentane | 0.22 | 0.60 | 0.081 |
| n-Pentane | 0.16 | 0.58 | 0.058 |
| Hexanes Plus | 0.11 | 0.49 | 0.045 |
| Totals | 100.00 | 100.00 | 2.259 |

| | | | | | |
|---|---|---|---|---|---|
| Specific Volume, ft3/lb | | 19.16 | Values Corrected for Compressibility | | |
| Compressibility (Z) Factor | | 0.9970 | | CHONS | Weight % |
| Specific Gravity, Calculated | | 0.6860 | 0.6878 | Carbon | 73.771 |
| | | | | Hydrogen | 22.045 |
| GROSS | | | | Oxygen | 3.366 |
| BTU/ft3 | Dry | 1153.4 | 1156.9 | Nitrogen | 0.818 |
| | Wet | 1133.2 | 1136.7 | Sulfur | 0.000 |
| BTU/lb | Dry | 22025.7 | 22092.8 | | |
| BTU/lb | Wet | 21640.2 | 21706.2 | F FACTOR @ 68deg F, 60%RH/MBTU | 8676 |
| NET | | | | | |
| BTU/ft3 | Dry | 1044.1 | 1047.3 | | |
| | Wet | 1025.8 | 1029.0 | F FACTOR @ 60deg F, 60%RH/MBTU | 9546 |
| BTU/lb | Dry | 19938.5 | 19990.3 | | |
| BTU/lb | Wet | 19589.6 | 19649.3 | | |

| | | | | |
|---|---|---|---|---|
| | Hydrogen Sulfide, ppm | Not Tested | Method | GC/FPD |
| | Total Sulfur, ppm | 3.00 | Method | GC/FPD |
| | Dew Point, deg F | Not Tested | Method | Bureau of Mines |
| | Moisture, lbs H2O/MMCF | Not Tested | Method | Bureau of Mines |

All tests performed in accordance with ASTM D-3588-91 unless otherwise noted.

# Appendix G

## Engine K-9 (S-2234-27) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period

## S-2234-27-7
## Criteria Pollutant Monthly Calculations
## Engine: K-9

| 2010 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 11.84 | 1,131.90 | 7,721.79 | 2,160.25 | 2,090.32 | 4,063.80 | 2.64 | 133.89 |
| February | 14.82 | 1,131.90 | 7,721.79 | 2,703.20 | 2,615.70 | 5,085.19 | 3.30 | 167.55 |
| March | 9.55 | 1,131.90 | 7,721.79 | 1,742.25 | 1,685.85 | 3,277.47 | 2.13 | 107.99 |
| April | 15.44 | 1,131.90 | 7,721.79 | 2,815.95 | 2,724.80 | 5,297.29 | 3.44 | 174.54 |
| May | 9.51 | 1,131.90 | 7,721.79 | 1,734.15 | 1,678.02 | 3,262.23 | 2.12 | 107.48 |
| June | 14.71 | 1,131.90 | 7,721.79 | 2,681.99 | 2,595.18 | 5,045.29 | 3.27 | 166.23 |
| July | 16.01 | 1,131.90 | 7,721.79 | 2,919.25 | 2,824.76 | 5,491.62 | 3.56 | 180.94 |
| August | 16.12 | 1,131.90 | 7,721.79 | 2,939.77 | 2,844.61 | 5,530.22 | 3.59 | 182.21 |
| September | 14.88 | 1,131.90 | 7,721.79 | 2,714.42 | 2,626.56 | 5,106.29 | 3.31 | 168.24 |
| October | 15.25 | 1,131.90 | 7,721.79 | 2,781.72 | 2,691.68 | 5,232.89 | 3.39 | 172.41 |
| November | 16.06 | 1,131.90 | 7,721.79 | 2,928.95 | 2,834.15 | 5,509.87 | 3.57 | 181.54 |
| December | 15.19 | 1,131.90 | 7,721.79 | 2,771.19 | 2,681.49 | 5,213.10 | 3.38 | 171.76 |
| **Total** | 169.39 | - | - | 30,893.08 | 29,893.12 | 58,115.26 | 37.69 | 1,914.79 |

| 2011 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 15.22 | 1,153.40 | 7,251.61 | 5,014.39 | 996.67 | 3,277.80 | 0.80 | 175.37 |
| February | 10.54 | 1,153.40 | 7,251.61 | 3,470.40 | 689.79 | 2,268.52 | 0.55 | 121.37 |
| March | 11.71 | 1,153.40 | 7,251.61 | 3,855.60 | 766.35 | 2,520.32 | 0.61 | 134.84 |
| April | 13.83 | 1,153.40 | 7,251.61 | 4,554.06 | 905.18 | 2,976.89 | 0.72 | 159.27 |
| May | 14.38 | 1,153.40 | 7,251.61 | 4,736.17 | 941.37 | 3,095.93 | 0.75 | 165.64 |
| June | 14.80 | 1,153.40 | 7,251.61 | 4,874.54 | 968.88 | 3,186.38 | 0.77 | 170.48 |
| July | 15.02 | 1,153.40 | 7,251.61 | 4,946.45 | 983.17 | 3,233.38 | 0.79 | 172.99 |
| August | 15.83 | 1,153.40 | 7,251.61 | 5,215.08 | 1,036.56 | 3,408.98 | 0.83 | 182.39 |
| September | 15.09 | 1,153.40 | 7,251.61 | 4,970.92 | 988.03 | 3,249.38 | 0.79 | 173.85 |
| October | 15.96 | 1,153.40 | 7,251.61 | 5,256.65 | 1,044.83 | 3,436.15 | 0.83 | 183.84 |
| November | 13.49 | 1,153.40 | 7,251.61 | 4,443.33 | 883.17 | 2,904.50 | 0.71 | 155.39 |
| December | 16.68 | 1,153.40 | 7,251.61 | 5,492.38 | 1,091.68 | 3,590.24 | 0.87 | 192.08 |
| **Total** | 172.54 | - | - | 56,829.97 | 11,295.68 | 37,148.46 | 9.02 | 1,987.49 |

## 2010 Criteria Pollutant Quarterly Emissions
## S-2234-27-7

| | 2010 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 2,160.25 | 2,090.32 | 4,063.80 | 2.64 | 133.89 | 6,605.69 | 6,391.88 | 12,426.46 | 8.06 | 409.43 |
| February | 2,703.20 | 2,615.70 | 5,085.19 | 3.30 | 167.55 | | | | | |
| March | 1,742.25 | 1,685.85 | 3,277.47 | 2.13 | 107.99 | | | | | |
| April | 2,815.95 | 2,724.80 | 5,297.29 | 3.44 | 174.54 | 7,232.09 | 6,998.00 | 13,604.81 | 8.82 | 448.25 |
| May | 1,734.15 | 1,678.02 | 3,262.23 | 2.12 | 107.48 | | | | | |
| June | 2,681.99 | 2,595.18 | 5,045.29 | 3.27 | 166.23 | | | | | |
| July | 2,919.25 | 2,824.76 | 5,491.62 | 3.56 | 180.94 | 8,573.44 | 8,295.93 | 16,128.13 | 10.46 | 531.39 |
| August | 2,939.77 | 2,844.61 | 5,530.22 | 3.59 | 182.21 | | | | | |
| September | 2,714.42 | 2,626.56 | 5,106.29 | 3.31 | 168.24 | | | | | |
| October | 2,781.72 | 2,691.68 | 5,232.89 | 3.39 | 172.41 | 8,481.86 | 8,207.32 | 15,955.86 | 10.35 | 525.72 |
| November | 2,928.95 | 2,834.15 | 5,509.87 | 3.57 | 181.54 | | | | | |
| December | 2,771.19 | 2,681.49 | 5,213.10 | 3.38 | 171.76 | | | | | |
| Total | 30,893.08 | 29,893.12 | 58,115.26 | 37.69 | 1,914.79 | 30,893.08 | 29,893.12 | 58,115.26 | 37.69 | 1,914.79 |

## 2011 Criteria Pollutant Quarterly Emissions
## S-2234-27-7

| | 2011 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 5,014.39 | 996.67 | 3,277.80 | 0.53 | 175.37 | 12,340.39 | 2,452.81 | 8,066.63 | 1.31 | 431.58 |
| February | 3,470.40 | 689.79 | 2,268.52 | 0.37 | 121.37 | | | | | |
| March | 3,855.60 | 766.35 | 2,520.32 | 0.41 | 134.84 | | | | | |
| April | 4,554.06 | 905.18 | 2,976.89 | 0.48 | 159.27 | 14,164.78 | 2,815.43 | 9,259.20 | 1.51 | 495.38 |
| May | 4,736.17 | 941.37 | 3,095.93 | 0.50 | 165.64 | | | | | |
| June | 4,874.54 | 968.88 | 3,186.38 | 0.52 | 170.48 | | | | | |
| July | 4,946.45 | 983.17 | 3,233.38 | 0.53 | 172.99 | 15,132.44 | 3,007.76 | 9,891.74 | 1.61 | 529.22 |
| August | 5,215.08 | 1,036.56 | 3,408.98 | 0.56 | 182.39 | | | | | |
| September | 4,970.92 | 988.03 | 3,249.38 | 0.53 | 173.85 | | | | | |
| October | 5,256.65 | 1,044.83 | 3,436.15 | 0.56 | 183.84 | 15,192.36 | 3,019.67 | 9,930.90 | 1.62 | 531.32 |
| November | 4,443.33 | 883.17 | 2,904.50 | 0.47 | 155.39 | | | | | |
| December | 5,492.38 | 1,091.68 | 3,590.24 | 0.58 | 192.08 | | | | | |
| Total | 56,829.97 | 11,295.68 | 37,148.46 | 6.05 | 1,987.49 | 56,829.97 | 11,295.68 | 37,148.46 | 6.05 | 1,987.49 |

## Two Year Criteria Pollutant Average Quarterly Emissions
## S-2234-27-7

| | 2 Year Average (lb/month) | | | | | QTR 2yr Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 3,587.32 | 1,543.50 | 3,670.80 | 1.58 | 154.63 | 9,473.04 | 4,422.34 | 10,246.55 | 4.69 | 420.50 |
| February | 3,086.80 | 1,652.74 | 3,676.86 | 1.83 | 144.46 | | | | | |
| March | 2,798.92 | 1,226.10 | 2,898.89 | 1.27 | 121.41 | | | | | |
| April | 3,685.01 | 1,814.99 | 4,137.09 | 1.96 | 166.90 | 10,698.43 | 4,906.71 | 11,432.00 | 5.17 | 471.82 |
| May | 3,235.16 | 1,309.70 | 3,179.08 | 1.31 | 136.56 | | | | | |
| June | 3,778.27 | 1,782.03 | 4,115.83 | 1.90 | 168.35 | | | | | |
| July | 3,932.85 | 1,903.96 | 4,362.50 | 2.04 | 176.96 | 11,852.94 | 5,651.85 | 13,009.93 | 6.03 | 530.31 |
| August | 4,077.43 | 1,940.59 | 4,469.60 | 2.07 | 182.30 | | | | | |
| September | 3,842.67 | 1,807.29 | 4,177.83 | 1.92 | 171.04 | | | | | |
| October | 4,019.18 | 1,868.25 | 4,334.52 | 1.98 | 178.13 | 11,837.11 | 5,613.50 | 12,943.38 | 5.98 | 528.52 |
| November | 3,686.14 | 1,858.66 | 4,207.19 | 2.02 | 168.47 | | | | | |
| December | 4,131.79 | 1,886.59 | 4,401.67 | 1.98 | 181.92 | | | | | |
| Total | 43,861.53 | 20,594.40 | 47,631.86 | 21.87 | 1,951.14 | 43,861.53 | 20,594.40 | 47,631.86 | 21.87 | 1,951.14 |

## Occidental of Elk Hills
**S-1133368, S-2234-27**

## Fugitive Emissions Using Screening Emission Factors

California Implementation Guidelines for Estimating Mass Emissions
of Fugitive Hydrocarbon Leaks at Petroleum Facilities
*Table IV-2c. Oil and Gas Production*
*Screening Value Ranges Emission Factors*

| | |
|---|---|
| Percentage of components with ≥ 10,000 ppmv leaks allowed? | 0 % |
| Weight percentage of VOC in the total organic compounds in gas (neglect non-organics)? | 26.44 % |
| Weight percentage of VOC in the total organic compounds in oil (neglect non-organics)? | 100 % |

| Equipment Type | Service | Component Count | Total allowable leaking components | Screening Value EF - TOC < 10,000 ppmv (lb/day/source) | Screening Value EF - TOC ≥ 10,000 ppmv (lb/day/source) | VOC emissions (lb/day) |
|---|---|---|---|---|---|---|
| Valves | Gas/Light Liquid | 22 | 0 | 1.852E-03 | 7.333E+00 | 0.01 |
| | Light Crude Oil | 4 | 0 | 1.005E-03 | 3.741E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.408E-04 | N/A* | 0.00 |
| Pump Seals | Gas/Light Liquid | 0 | 0 | 5.270E-02 | 4.709E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 1.402E-02 | 4.709E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | N/A | N/A | N/A |
| Others | Gas/Light Liquid | 0 | 0 | 7.778E-03 | 7.281E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 6.931E-03 | 3.757E-01 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 3.016E-03 | N/A* | 0.00 |
| Connectors | Gas/Light Liquid | 154 | 0 | 6.349E-04 | 1.370E+00 | 0.03 |
| | Light Crude Oil | 40 | 0 | 5.291E-04 | 1.238E+00 | 0.02 |
| | Heavy Crude Oil | 0 | 0 | 4.233E-04 | 4.233E-04 | 0.00 |
| Flanges | Gas/Light Liquid | 46 | 0 | 1.482E-03 | 3.228E+00 | 0.02 |
| | Light Crude Oil | 6 | 0 | 1.270E-03 | 1.376E+01 | 0.01 |
| | Heavy Crude Oil | 0 | 0 | 1.217E-03 | N/A* | 0.00 |
| Open-ended Lines | Gas/Light Liquid | 0 | 0 | 1.270E-03 | 2.905E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 9.524E-04 | 1.175E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.937E-04 | 3.762E+00 | 0.00 |

* Emission factor not available. All components from equipment type and service will be assessed as < 10,000 ppmv

**Total VOC Emissions = 0.1 lb/day**

# Appendix H

## Engine K-10 (S-2234-28) Summary of Source Test Results and Fuel Analysis during Baseline Period

Engine K10
February 24, 2010
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Measured BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 02/24/10 | K10 | S-2234-28 | 474.00 | 22.3550 | 8,537.65 | 13.27 | 3,020.00 | 0.9072 | 7,402.33 |
| 02/24/10 | K10 | S-2234-28 | 476.00 | 22.4494 | 8,537.65 | 15.49 | 3,101.00 | 0.9287 | 7,239.39 |
| 02/24/10 | K10 | S-2234-28 | 479.00 | 22.5908 | 8,537.65 | 13.47 | 3,128.00 | 0.9388 | 7,222.13 |
| Test Average | | | 476.33 | 22.4651 | 8,537.65 | 14.08 | 3,083.00 | 0.9249 | 7,287.95 |

| Test | Engine | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 02/24/10 | K10 | 78.97 | 268.00 | 224.00 | 0.04 | ------ | 1,237.99 | 2.88 | ------ |
| 02/24/10 | K10 | 95.78 | 285.00 | 21.25 | 0.03 | ------ | 1,564.97 | 2.88 | ------ |
| 02/24/10 | K10 | 94.99 | 240.00 | 125.00 | 0.04 | ------ | 1,241.94 | 2.88 | ------ |
| Test Average | | 89.91 | 264.33 | 123.42 | 0.04 | ------ | 1,348.30 | 2.88 | ------ |

| Test | Engine | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 | CO2 | N2O |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | g/MMBtu | Kg/MMBtu | g/MMBtu |
| 02/24/10 | K10 | 0.9718 | 1.1471 | 1.6779 | 0.0007 | 0.0335 | 715.2876 | 45.8015 | 0.1000 |
| 02/24/10 | K10 | 1.1527 | 1.1930 | 0.1557 | 0.0005 | 0.0328 | 904.2084 | 45.7980 | 0.1000 |
| 02/24/10 | K10 | 1.1405 | 1.0023 | 0.9135 | 0.0007 | 0.0327 | 717.5660 | 45.7620 | 0.1000 |
| Test Average | | 1.0883 | 1.1141 | 0.9157 | 0.0007 | 0.0330 | 779.0207 | 45.7872 | 0.1000 |

Engine K10
August 2, 2011
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Measured BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 08/02/11 | K10 | S-2234-28 | 429.00 | 20.2381 | 8,544.55 | 15.86 | 3,109.00 | 0.9196 | 6,509.51 |
| 08/02/11 | K10 | S-2234-28 | 425.00 | 20.0494 | 8,544.55 | 14.04 | 3,110.00 | 0.9189 | 6,446.74 |
| 08/02/11 | K10 | S-2234-28 | 425.00 | 20.0494 | 8,544.55 | 13.72 | 3,112.00 | 0.9201 | 6,442.60 |
| Test Average | | | 426.33 | 20.1123 | 8,544.55 | 14.54 | 3,110.33 | 0.9195 | 6,466.29 |

| Test | Engine | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 08/02/11 | K10 | 3.46 | 2.73 | 63.74 | 0.02 | ------ | 1,752.44 | 2.82 | ------ |
| 08/02/11 | K10 | 3.49 | 4.55 | 56.22 | 0.03 | ------ | 1,401.90 | 2.82 | ------ |
| 08/02/11 | K10 | 3.61 | 3.98 | 42.39 | 0.03 | ------ | 1,235.88 | 2.83 | ------ |
| Test Average | | 3.52 | 3.75 | 54.12 | 0.03 | ------ | 1,463.40 | 2.82 | ------ |

| Test | Engine | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 | CO2 | N2O |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | g/MMBtu | Kg/MMBtu | g/MMBtu |
| 08/02/11 | K10 | 0.0375 | 0.0103 | 0.4202 | 0.0004 | 0.0295 | 1,013.3413 | 44.8727 | 0.1000 |
| 08/02/11 | K10 | 0.0374 | 0.0170 | 0.3670 | 0.0005 | 0.0292 | 810.6399 | 44.8587 | 0.1000 |
| 08/02/11 | K10 | 0.0387 | 0.0148 | 0.2766 | 0.0005 | 0.0292 | 714.6409 | 44.9502 | 0.1000 |
| Test Average | | 0.0379 | 0.0140 | 0.3546 | 0.0005 | 0.0293 | 846.2073 | 44.8939 | 0.1000 |

S-2234-28-8

Fuel Analysis

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
P.O. Box 80847
Bakersfield, CA 93380-0847
Telephone (661) 324-1317
Fax (661) 324-2746

Environmental Services & Testing
P.O. Box 2526
Gilbert, AZ 85233

Sampled: 2/24/2010
Submitted: 2/26/2010
Analyzed: 2/28/2010
Reported: 3/2/2010

## Gas Analysis by Chromatography - ASTM D 1945/D 3588

Company: Oxy
Location: Fuel Gas
Description: K-11 K-09, K-10, K-11, K-13

Lab No.: 100233-10
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPM/CF |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.24 | 0.34 | |
| Carbon Dioxide | 2.38 | 5.39 | |
| Hydrogen | ND | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 85.36 | 70.22 | |
| Ethane | 5.84 | 9.01 | |
| Propane | 4.89 | 11.28 | 1.377 |
| iso-Butane | 0.42 | 1.25 | 0.138 |
| n-Butane | 0.52 | 1.55 | 0.164 |
| iso-Pentane | 0.11 | 0.41 | 0.040 |
| n-Pentane | 0.05 | 0.18 | 0.018 |
| Hexanes Plus | 0.08 | 0.35 | 0.033 |
| Totals | 100.00 | 100.00 | 1.771 |

| | | | | | |
|---|---|---|---|---|---|
| Specific Volume, ft3/lb | | 19.48 | Values Corrected for Compressibility | | |
| Compressibility (Z) Factor | | 0.9971 | | CHONS | Weight % |
| Specific Gravity, Calculated | | 0.6733 | 0.6750 | Carbon | 73.667 |
| | | | | Hydrogen | 22.166 |
| GROSS | | | | Oxygen | 3.922 |
| BTU/ft3 | Dry | 1131.9 | 1135.2 | Nitrogen | 0.345 |
| | Wet | 1112.1 | 1115.3 | Sulfur | 0.000 |
| BTU/lb | Dry | 22023.1 | 22087.8 | | |
| BTU/lb | Wet | 21637.7 | 21701.1 | F FACTOR @ 60 deg F, 30in/Hg*U | 8659 |
| NET | | | | | |
| BTU/ft3 | Dry | 1024.0 | 1027.0 | | |
| | Wet | 1006.1 | 1009.0 | F FACTOR @ 60 deg F, 30in/Hg*U | 8539 |
| BTU/lb | Dry | 19924.4 | 19982.8 | | |
| BTU/lb | Wet | 19575.8 | 19633.1 | | |

| | | | | |
|---|---|---|---|---|
| | Hydrogen Sulfide, ppm | Not Tested | Method | GC/FPD |
| | Total Sulfur, ppm | 0.32 | Method | GC/FPD |
| | Dew Point, deg F | Not Tested | Method | Bureau of Mines |
| | Moisture, lbs H2O/MMCF | Not Tested | Method | Bureau of Mines |

VD Ratio Direction: Tr Trace

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
PO. Box 80947
Bakersfield, CA 93380-0947

Telephone (661) 324-1317
Fax (661) 324-2746

Environmental Services & Testing
P.O. Box 2525
Gilbert, AZ 85233

Sampled 8/2/2011
Submitted 8/3/2011
Analyzed 8/3/2011
Reported 8/3/2011

## Gas Analysis by Chromatography - ASTM D 3588-91

Company: Oxy
Location: Fuel Gas
Description: K-10

Lab No.: 110725-4
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPM@F |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.79 | 1.14 | |
| Carbon Dioxide | 1.98 | 4.47 | |
| Hydrogen | ND | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 84.23 | 69.37 | |
| Ethane | 7.24 | 11.17 | |
| Propane | 4.91 | 11.11 | 1.355 |
| iso-Butane | 0.22 | 0.66 | 0.072 |
| n-Butane | 0.39 | 1.18 | 0.123 |
| iso-Pentane | 0.07 | 0.26 | 0.026 |
| n-Pentane | 0.13 | 0.48 | 0.047 |
| Hexanes Plus | 0.04 | 0.18 | 0.016 |
| Totals | 100.00 | 100.00 | 1.640 |

| | | | | | |
|---|---|---|---|---|---|
| Specific Volume, ft3/lb | | 19.48 | Values Corrected for Compressibility | CHONS | Weight % |
| Compressibility (Z) Factor | | 0.9971 | | | |
| Specific Gravity Calculated | | 0.6726 | 0.6743 | Carbon | 73.431 |
| | | | | Hydrogen | 22.181 |
| GROSS | | | | Oxygen | 3.252 |
| BTU/ft3 | Dry | 1132.2 | 1135.5 | Nitrogen | 1.136 |
| | Wet | 1112.4 | 1115.6 | Sulfur | 0.000 |
| BTU/lb | Dry | 22052.8 | 22117.0 | | |
| BTU/lb | Wet | 21666.8 | 21729.9 | F FACTOR @ | 8670 |
| NET | | | | | |
| BTU/ft3 | Dry | 1024.3 | 1027.3 | | |
| | Wet | 1006.4 | 1009.3 | F FACTOR @ | 8540 |
| BTU/lb | Dry | 19952.4 | 20010.5 | | |
| BTU/lb | Wet | 19603.3 | 19660.4 | | |

| | | | | |
|---|---|---|---|---|
| Hydrogen Sulfide, ppm | Not Tested | Method | GS/FPD |
| Total Sulfur, ppm | 0.27 | Method | GC/FPD |
| Dew Point, deg F | Not Tested | Method | Bureau of Mines |
| Moisture lbs H2O/MMCF | Not Tested | Method | Bureau of Mines |

ND - None Detected

T - Trace

# Appendix I

## Engine K-10 (S-2234-28) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period

## S-2234-28-8
## Criteria Pollutant Monthly Calculations
## Engine: K-10

| 2010 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 4.12 | 1,131.90 | 7,287.95 | 1,534.62 | 1,571.02 | 1,291.19 | 0.92 | 46.55 |
| February | 8.93 | 1,131.90 | 7,287.95 | 3,327.25 | 3,406.17 | 2,799.46 | 1.99 | 100.94 |
| March | 14.30 | 1,131.90 | 7,287.95 | 5,328.38 | 5,454.75 | 4,483.15 | 3.18 | 161.64 |
| April | 4.25 | 1,131.90 | 7,287.95 | 1,583.17 | 1,620.72 | 1,332.04 | 0.95 | 48.03 |
| May | 8.73 | 1,131.90 | 7,287.95 | 3,254.70 | 3,331.89 | 2,738.42 | 1.94 | 98.74 |
| June | 14.21 | 1,131.90 | 7,287.95 | 5,294.95 | 5,420.53 | 4,455.03 | 3.16 | 160.63 |
| July | 14.44 | 1,131.90 | 7,287.95 | 5,380.95 | 5,508.57 | 4,527.39 | 3.21 | 163.24 |
| August | 13.77 | 1,131.90 | 7,287.95 | 5,129.39 | 5,251.04 | 4,315.73 | 3.06 | 155.61 |
| September | 13.88 | 1,131.90 | 7,287.95 | 5,172.84 | 5,295.52 | 4,352.29 | 3.09 | 156.92 |
| October | 14.73 | 1,131.90 | 7,287.95 | 5,487.04 | 5,617.18 | 4,616.65 | 3.28 | 166.46 |
| November | 14.81 | 1,131.90 | 7,287.95 | 5,519.76 | 5,650.67 | 4,644.18 | 3.30 | 167.45 |
| December | 9.40 | 1,131.90 | 7,287.95 | 3,501.76 | 3,584.81 | 2,946.29 | 2.09 | 106.23 |
| **Total** | 135.56 | - | - | 50,514.82 | 51,712.87 | 42,501.82 | 30.17 | 1,532.42 |

| 2011 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 12.42 | 1,132.20 | 6,466.29 | 181.53 | 67.27 | 1,699.89 | 2.17 | 140.42 |
| February | 7.19 | 1,132.20 | 6,466.29 | 105.15 | 38.96 | 984.64 | 1.26 | 81.34 |
| March | 9.67 | 1,132.20 | 6,466.29 | 141.38 | 52.39 | 1,323.91 | 1.69 | 109.37 |
| April | 2.83 | 1,132.20 | 6,466.29 | 41.36 | 15.33 | 387.30 | 0.49 | 31.99 |
| May | 0.00 | 1,132.20 | 6,466.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| June | 3.22 | 1,132.20 | 6,466.29 | 47.13 | 17.46 | 441.34 | 0.56 | 36.46 |
| July | 9.87 | 1,132.20 | 6,466.29 | 144.20 | 53.44 | 1,350.39 | 1.72 | 111.55 |
| August | 12.98 | 1,132.20 | 6,466.29 | 189.71 | 70.30 | 1,776.55 | 2.26 | 146.76 |
| September | 12.35 | 1,132.20 | 6,466.29 | 180.45 | 66.87 | 1,689.83 | 2.15 | 139.59 |
| October | 11.19 | 1,132.20 | 6,466.29 | 163.58 | 60.62 | 1,531.83 | 1.95 | 126.54 |
| November | 14.90 | 1,132.20 | 6,466.29 | 217.76 | 80.70 | 2,039.23 | 2.60 | 168.46 |
| December | 14.17 | 1,132.20 | 6,466.29 | 207.08 | 76.74 | 1,939.16 | 2.47 | 160.19 |
| **Total** | 110.78 | - | - | 1,619.32 | 600.08 | 15,164.09 | 19.33 | 1,252.67 |

## 2010 Criteria Pollutant Quarterly Emissions
## S-2234-28-8

| | 2010 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 1,534.62 | 1,571.02 | 1,291.19 | 0.92 | 46.55 | 10,190.25 | 10,431.93 | 8,573.80 | 6.09 | 309.13 |
| February | 3,327.25 | 3,406.17 | 2,799.46 | 1.99 | 100.94 | | | | | |
| March | 5,328.38 | 5,454.75 | 4,483.15 | 3.18 | 161.64 | | | | | |
| April | 1,583.17 | 1,620.72 | 1,332.04 | 0.95 | 48.03 | 10,132.83 | 10,373.15 | 8,525.49 | 6.05 | 307.39 |
| May | 3,254.70 | 3,331.89 | 2,738.42 | 1.94 | 98.74 | | | | | |
| June | 5,294.95 | 5,420.53 | 4,455.03 | 3.16 | 160.63 | | | | | |
| July | 5,380.95 | 5,508.57 | 4,527.39 | 3.21 | 163.24 | 15,683.18 | 16,055.14 | 13,195.41 | 9.37 | 475.77 |
| August | 5,129.39 | 5,251.04 | 4,315.73 | 3.06 | 155.61 | | | | | |
| September | 5,172.84 | 5,295.52 | 4,352.29 | 3.09 | 156.92 | | | | | |
| October | 5,487.04 | 5,617.18 | 4,616.65 | 3.28 | 166.46 | 14,508.56 | 14,852.66 | 12,207.12 | 8.67 | 440.13 |
| November | 5,519.76 | 5,650.67 | 4,644.18 | 3.30 | 167.45 | | | | | |
| December | 3,501.76 | 3,584.81 | 2,946.29 | 2.09 | 106.23 | | | | | |
| **Total** | **50,514.82** | **51,712.87** | **42,501.82** | **30.17** | **1,532.42** | **50,514.82** | **51,712.87** | **42,501.82** | **30.17** | **1,532.42** |

## 2011 Criteria Pollutant Quarterly Emissions
## S-2234-28-8

| | 2011 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 181.53 | 67.27 | 1,699.89 | 2.17 | 140.42 | 428.05 | 158.62 | 4,008.45 | 5.11 | 331.13 |
| February | 105.15 | 38.96 | 984.64 | 1.26 | 81.34 | | | | | |
| March | 141.38 | 52.39 | 1,323.91 | 1.69 | 109.37 | | | | | |
| April | 41.36 | 15.33 | 387.30 | 0.49 | 31.99 | 88.49 | 32.79 | 828.64 | 1.06 | 68.45 |
| May | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | |
| June | 47.13 | 17.46 | 441.34 | 0.56 | 36.46 | | | | | |
| July | 144.20 | 53.44 | 1,350.39 | 1.72 | 111.55 | 514.36 | 190.61 | 4,816.77 | 6.14 | 397.90 |
| August | 189.71 | 70.30 | 1,776.55 | 2.26 | 146.76 | | | | | |
| September | 180.45 | 66.87 | 1,689.83 | 2.15 | 139.59 | | | | | |
| October | 163.58 | 60.62 | 1,531.83 | 1.95 | 126.54 | 588.42 | 218.05 | 5,510.23 | 7.02 | 455.19 |
| November | 217.76 | 80.70 | 2,039.23 | 2.60 | 168.46 | | | | | |
| December | 207.08 | 76.74 | 1,939.16 | 2.47 | 160.19 | | | | | |
| **Total** | **1,619.32** | **600.08** | **15,164.09** | **19.33** | **1,252.67** | **1,619.32** | **600.08** | **15,164.09** | **19.33** | **1,252.67** |

## Two Year Criteria Pollutant Average Quarterly Emissions
## S-2234-28-8

| | 2 Year Average (lb/month) | | | | | QTR 2yr Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 858.07 | 819.14 | 1,495.54 | 1.54 | 93.49 | 5,309.15 | 5,295.28 | 6,291.13 | 5.60 | 320.13 |
| February | 1,716.20 | 1,722.57 | 1,892.05 | 1.62 | 91.14 | | | | | |
| March | 2,734.88 | 2,753.57 | 2,903.53 | 2.44 | 135.50 | | | | | |
| April | 812.27 | 818.02 | 859.67 | 0.72 | 40.01 | 5,110.66 | 5,202.97 | 4,677.07 | 3.55 | 187.92 |
| May | 1,627.35 | 1,665.95 | 1,369.21 | 0.97 | 49.37 | | | | | |
| June | 2,671.04 | 2,719.00 | 2,448.19 | 1.86 | 98.54 | | | | | |
| July | 2,762.58 | 2,781.01 | 2,938.89 | 2.47 | 137.39 | 8,098.77 | 8,122.87 | 9,006.09 | 7.75 | 436.83 |
| August | 2,659.55 | 2,660.67 | 3,046.14 | 2.66 | 151.18 | | | | | |
| September | 2,676.64 | 2,681.20 | 3,021.06 | 2.62 | 148.26 | | | | | |
| October | 2,825.31 | 2,838.90 | 3,074.24 | 2.62 | 146.50 | 7,548.49 | 7,535.36 | 8,858.67 | 7.85 | 447.66 |
| November | 2,868.76 | 2,865.68 | 3,341.71 | 2.95 | 167.95 | | | | | |
| December | 1,854.42 | 1,830.77 | 2,442.72 | 2.28 | 133.21 | | | | | |
| **Total** | **26,067.07** | **26,156.47** | **28,832.95** | **24.75** | **1,392.54** | **26,067.07** | **26,156.47** | **28,832.95** | **24.75** | **1,392.54** |

## Occidental of Elk Hills
**S-1133368, S-2234-28**

## Fugitive Emissions Using Screening Emission Factors

California Implementation Guidelines for Estimating Mass Emissions
of Fugitive Hydrocarbon Leaks at Petroleum Facilities
*Table IV-2c. Oil and Gas Production*
*Screening Value Ranges Emission Factors*

| | |
|---|---|
| Percentage of components with ≥ 10,000 ppmv leaks allowed? | 0 % |
| Weight percentage of VOC in the total organic compounds in gas (neglect non-organics)? | 26.44 % |
| Weight percentage of VOC in the total organic compounds in oil (neglect non-organics)? | 100 % |

| Equipment Type | Service | Component Count | Total allowable leaking components | Screening Value EF - TOC < 10,000 ppmv (lb/day/source) | Screening Value EF - TOC ≥ 10,000 ppmv (lb/day/source) | VOC emissions (lb/day) |
|---|---|---|---|---|---|---|
| Valves | Gas/Light Liquid | 22 | 0 | 1.852E-03 | 7.333E+00 | 0.01 |
| | Light Crude Oil | 4 | 0 | 1.005E-03 | 3.741E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.408E-04 | N/A* | 0.00 |
| Pump Seals | Gas/Light Liquid | 0 | 0 | 5.270E-02 | 4.709E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 1.402E-02 | 4.709E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | N/A | N/A | N/A |
| Others | Gas/Light Liquid | 0 | 0 | 7.778E-03 | 7.281E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 6.931E-03 | 3.757E-01 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 3.016E-03 | N/A* | 0.00 |
| Connectors | Gas/Light Liquid | 154 | 0 | 6.349E-04 | 1.370E+00 | 0.03 |
| | Light Crude Oil | 40 | 0 | 5.291E-04 | 1.238E+00 | 0.02 |
| | Heavy Crude Oil | 0 | 0 | 4.233E-04 | 4.233E-04 | 0.00 |
| Flanges | Gas/Light Liquid | 46 | 0 | 1.482E-03 | 3.228E+00 | 0.02 |
| | Light Crude Oil | 6 | 0 | 1.270E-03 | 1.376E+01 | 0.01 |
| | Heavy Crude Oil | 0 | 0 | 1.217E-03 | N/A* | 0.00 |
| Open-ended Lines | Gas/Light Liquid | 0 | 0 | 1.270E-03 | 2.905E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 9.524E-04 | 1.175E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.937E-04 | 3.762E+00 | 0.00 |

* Emission factor not available. All components from equipment type and service will be assessed as < 10,000 ppmv

**Total VOC Emissions = 0.1 lb/day**

# Appendix J

## Engine R-25 (S-2234-127) Summary of Source Test Results and Fuel Analysis during Baseline Period

Engine R25
March 16, 2010
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Calculated BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 03/16/10 | R25 | S-2234-127 | 204.00 | 9.0823 | 8,647.00 | 0.19 | 1,250.26 | 0.6817 | 7,264.29 |
| 03/16/10 | R25 | S-2234-127 | 208.00 | 9.2603 | 8,647.00 | 0.13 | 1,274.78 | 0.6951 | 7,264.29 |
| 03/16/10 | R25 | S-2234-127 | 209.00 | 9.3049 | 8,647.00 | 0.13 | 1,280.90 | 0.6984 | 7,264.29 |
| Test Average | | | 207.00 | 9.2158 | 8,647.00 | 0.15 | 1,268.65 | 0.6917 | 7,264.29 |

| Test | Engine | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 03/16/10 | R25 | 1.24 | 0.00 | 8.56 | 0.05 | ------ | 26.49 | 3.06 | ------ |
| 03/16/10 | R25 | 0.98 | 0.00 | 4.60 | 0.05 | ------ | 25.57 | 3.06 | ------ |
| 03/16/10 | R25 | 1.67 | 0.00 | 3.10 | 0.05 | ------ | 29.26 | 3.06 | ------ |
| Test Average | | 1.30 | 0.00 | 5.42 | 0.05 | ------ | 27.11 | 3.06 | ------ |

| Test | Engine | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 | CO2 | N2O |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | g/MMBtu | Kg/MMBtu | g/MMBtu |
| 03/16/10 | R25 | 0.0152 | 0.0000 | 0.0637 | 0.0008 | 0.0640 | 15.5040 | 49.2030 | 0.1000 |
| 03/16/10 | R25 | 0.0120 | 0.0000 | 0.0342 | 0.0008 | 0.0640 | 14.9605 | 49.1869 | 0.1000 |
| 03/16/10 | R25 | 0.0204 | 0.0000 | 0.0231 | 0.0008 | 0.0640 | 17.1215 | 49.1869 | 0.1000 |
| Test Average | | 0.0159 | 0.0000 | 0.0404 | 0.0008 | 0.0640 | 15.8620 | 49.1923 | 0.1000 |

Engine R25
March 10, 2010
Sumary of Source Test Results

| Test Date | Engine ID | Engine PTO | Fuel Rate MCFD | Heat Input MMBtu/Hr | F-Factor (60F) SDCF/MMBtu | Excess O2 % | Calculated BHP*Hr | Engine Load | BSFC Btu/Bhp*hr |
|---|---|---|---|---|---|---|---|---|---|
| 03/10/11 | R25 | S-2234-127 | 172.00 | 7.7637 | 8,653.00 | 0.09 | 1,068.74 | 0.5827 | 7,264.29 |
| 03/10/11 | R25 | S-2234-127 | 172.00 | 7.7637 | 8,653.00 | 0.08 | 1,068.74 | 0.5827 | 7,264.29 |
| 03/10/11 | R25 | S-2234-127 | 172.00 | 7.7637 | 8,653.00 | 0.08 | 1,068.74 | 0.5827 | 7,264.29 |
| Test Average | | | 172.00 | 7.7637 | 8,653.00 | 0.08 | 1,068.74 | 0.5827 | 7,264.29 |

| Test | Engine | Criterera Pollutants (ppmv @15% O2) | | | | | GHG (@15% O2) | | |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | CH4 ppmv | CO2 % | N2O |
| 03/10/11 | R25 | 1.25 | 0.00 | 8.05 | 0.06 | ------ | 52.16 | 3.00 | ------ |
| 03/10/11 | R25 | 1.63 | 0.00 | 3.87 | 0.06 | ------ | 25.79 | 3.00 | ------ |
| 03/10/11 | R25 | 1.54 | 0.00 | 5.05 | 0.06 | ------ | 22.95 | 3.00 | ------ |
| Test Average | | 1.47 | 0.00 | 5.66 | 0.06 | ------ | 33.64 | 3.00 | ------ |

| Test | Engine | Process Emission Factors (g/Bhp*Hr) | | | | | CH4 | CO2 | N2O |
|---|---|---|---|---|---|---|---|---|---|
| Date | ID | NOx | VOC | CO | SOx | PM10 | Kg/MMBtu | Kg/MMBtu | Kg/MMBtu |
| 03/10/11 | R25 | 0.0153 | 0.0000 | 0.0600 | 0.0010 | 0.0640 | 30.5454 | 48.4023 | 0.1000 |
| 03/10/11 | R25 | 0.0200 | 0.0000 | 0.0288 | 0.0010 | 0.0640 | 15.1031 | 48.3796 | 0.1000 |
| 03/10/11 | R25 | 0.0188 | 0.0000 | 0.0376 | 0.0010 | 0.0640 | 13.4415 | 48.3727 | 0.1000 |
| Test Average | | 0.0180 | 0.0000 | 0.0421 | 0.0010 | 0.0640 | 19.6967 | 48.3849 | 0.1000 |

S-2234-127-2

Fuel Analysis

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
P.O. Box 80847
Bakersfield, CA 93380-0847
Telephone (661) 324-1317
Fax (661) 324-2746

Environmental Services & Testing
P.O Box 2923
Gilbert, AZ 85233

Sampled: 3/11/2010
Submitted: 3/12/2010
Analyzed: 3/15/2010
Reported: 3/17/2010

## Gas Analysis by Chromotography - ASTM D 3588-91

Company: Oxy
Location: Fuel Gas
Description: R-28

Lab No.: 100313-4
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPMCF |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.46 | 0.72 | |
| Carbon Dioxide | 1.61 | 3.93 | |
| Hydrogen | ND | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 90.10 | 80.21 | |
| Ethane | 5.73 | 9.56 | |
| Propane | 1.62 | 3.96 | 0.447 |
| iso-Butane | 0.18 | 0.58 | 0.059 |
| n-Butane | 0.23 | 0.74 | 0.073 |
| iso-Pentane | 0.03 | 0.12 | 0.011 |
| n-Pentane | 0.02 | 0.08 | 0.007 |
| Hexanes Plus | 0.02 | 0.10 | 0.008 |
| Totals | 100.00 | 100.00 | 0.605 |

| | | | | | |
|---|---|---|---|---|---|
| Specific Volume, ft3/lb | | 21.08 | Values Corrected for Compressibility | CHONS | Weight % |
| Compressibility (Z) Factor | | 0.9975 | | | |
| Specific Gravity, Calculated | | 0.6222 | 0.6235 | Carbon | 73.342 |
| | | | | Hydrogen | 23.084 |
| GROSS | | | | Oxygen | 2.859 |
| BTU/ft3 | Dry | 1088.5 | 1071.1 | Nitrogen | 0.715 |
| | Wet | 1049.8 | 1052.4 | Sulfur | 0.000 |
| BTU/lb | Dry | 22498.9 | 22554.6 | | |
| BTU/lb | Wet | 22105.2 | 22159.9 | F FACTOR @ | 8647 |
| NET | | | | 68 deg F, dscf/MMBTU | |
| BTU/ft3 | Dry | 984.7 | 987.1 | | |
| | Wet | 947.8 | 950.1 | F FACTOR @ | 8517 |
| BTU/lb | Dry | 20313.1 | 20363.3 | 60 deg F, dscf/MMBTU | |
| BTU/lb | Wet | 19957.6 | 20007.0 | | |

| | | | |
|---|---|---|---|
| Hydrogen Sulfide, ppm | Not Tested | Method | GC/FPD |
| Total Sulfur, ppm | 0.13 | Method | ASTM D3246 |
| Dew Point, deg F | Not Tested | Method | Bureau of Mines |
| Moisture, lbs H2O/MMCF | Not Tested | Method | Bureau of Mines |

ND - None Detected — Tr - Trace

PGT
Pacific Gas Technology, Inc.

E-mail pgtech@earthlink.net

4100 Burr Street
P.O. Box 80847
Bakersfield, CA 93380-0847
Telephone (661) 324-1317
Fax (661) 324-2746

Environmental Services & Testing
P.O. Box 2626
Gilbert, AZ 85233

Sampled: 3/8/2011
Submitted 3/11/2011
Analyzed 3/14/2011
Reported: 3/16/2011

## Gas Analysis by Chromotography - ASTM D 3588-91

Company: Dry
Location: Fuel Gas
Description: R-25 R-25

Lab No.: 110326-4
Sample Time:
Sample Type:

| Component | Mole % | Weight % | GPMCF |
|---|---|---|---|
| Oxygen | ND | 0.00 | |
| Nitrogen | 0.37 | 0.56 | |
| Carbon Dioxide | 1.66 | 4.45 | |
| Hydrogen | NC | 0.00 | |
| Carbon Monoxide | ND | 0.00 | |
| Hydrogen Sulfide | ND | | |
| Methane | 89.06 | 77.71 | |
| Ethane | 5.42 | 8.86 | |
| Propane | 2.75 | 6.59 | 0.758 |
| iso-Butane | 0.15 | 0.47 | 0.049 |
| n-Butane | 0.30 | 0.95 | 0.095 |
| iso-Pentane | 0.05 | 0.20 | 0.018 |
| n-Pentane | 0.03 | 0.12 | 0.011 |
| Hexanes Plus | 0.02 | 0.09 | 0.008 |
| Totals | 100.00 | 100.00 | 0.940 |

| | | | | | |
|---|---|---|---|---|---|
| Specific Volume, ft3/lb | | 20.64 | Values Corrected for Compressibility | | |
| Compressibility (Z) Factor | | 0.9974 | | CHONS | Weight % |
| Specific Gravity, Calculated | | 0.6346 | 0.6352 | Carbon | 73.371 |
| | | | | Hydrogen | 22.631 |
| GROSS | | | | Oxygen | 3.235 |
| BTU/ft3 | Dry | 1083.3 | 1086.1 | Nitrogen | 0.563 |
| | Wet | 1064.3 | 1067.1 | Sulfur | 0.000 |
| BTU/lb | Dry | 23358.2 | 22415.9 | | |
| BTU/lb | Wet | 21987.0 | 22023.6 | F FACTOR @ 60 deg F, dry/MBTU | 8853 |
| NET | | | | | |
| BTU/ft3 | Dry | 978.5 | 981.1 | | |
| | Wet | 961.4 | 963.9 | F FACTOR @ 60 deg F, dry/MBTU | 8523 |
| BTU/lb | Dry | 20186.4 | 20246.5 | | |
| BTU/lb | Wet | 19043.0 | 19094.1 | | |

| | | | | |
|---|---|---|---|---|
| | Hydrogen Sulfide, ppm | Not Tested | Method | GC/FPD |
| | Total Sulfur, ppm | 0.16 | Method | ASTM D3246 |
| | Dew Point, deg F | Not Tested | Method | Bureau of Mines |
| | Moisture, lbs H2O/MMCF | Not Tested | Method | Bureau of Mines |

ND - None Detected — Dr. Tang

# Appendix K

## Engine R-25 (S-2234-127) Summary of Historical Actual Emissions and Gas Compressor Fugitive VOC Emissions during Baseline Period

## S-2234-127
## Criteria Pollutant Monthly Calculations
## Engine: R-25

| 2010 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 2.39 | 1,068.50 | 7,264.29 | 12.27 | 0.00 | 31.21 | 0.61 | 49.46 |
| February | 4.23 | 1,068.50 | 7,264.29 | 21.76 | 0.00 | 55.35 | 1.08 | 87.73 |
| March | 5.83 | 1,068.50 | 7,264.29 | 30.00 | 0.00 | 76.32 | 1.49 | 120.97 |
| April | 5.63 | 1,068.50 | 7,264.29 | 28.98 | 0.00 | 73.73 | 1.44 | 116.87 |
| May | 5.54 | 1,068.50 | 7,264.29 | 28.48 | 0.00 | 72.46 | 1.41 | 114.85 |
| June | 5.19 | 1,068.50 | 7,264.29 | 26.68 | 0.00 | 67.87 | 1.32 | 107.58 |
| July | 4.51 | 1,068.50 | 7,264.29 | 23.19 | 0.00 | 59.00 | 1.15 | 93.52 |
| August | 3.04 | 1,068.50 | 7,264.29 | 15.62 | 0.00 | 39.74 | 0.78 | 62.99 |
| September | 3.72 | 1,068.50 | 7,264.29 | 19.11 | 0.00 | 48.61 | 0.95 | 77.05 |
| October | 4.07 | 1,068.50 | 7,264.29 | 20.94 | 0.00 | 53.27 | 1.04 | 84.44 |
| November | 3.31 | 1,068.50 | 7,264.29 | 17.02 | 0.00 | 43.30 | 0.84 | 68.63 |
| December | 2.54 | 1,068.50 | 7,264.29 | 13.05 | 0.00 | 33.20 | 0.65 | 52.62 |
| **Total** | 49.99 | - | - | 257.07 | 0.00 | 654.07 | 12.77 | 1,036.71 |

| 2011 | Fuel Use MMCF | Heating Value | BSFC BTU/BHP*HR | lb/month | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | NOx | VOC | CO | SOx | PM10 |
| January | 4.80 | 1,083.30 | 7,264.29 | 28.43 | 0.00 | 66.45 | 1.52 | 100.85 |
| February | 3.84 | 1,083.30 | 7,264.29 | 22.77 | 0.00 | 53.21 | 1.22 | 80.75 |
| March | 3.27 | 1,083.30 | 7,264.29 | 19.41 | 0.00 | 45.36 | 1.04 | 68.85 |
| April | 3.28 | 1,083.30 | 7,264.29 | 19.45 | 0.00 | 45.45 | 1.04 | 68.97 |
| May | 5.21 | 1,083.30 | 7,264.29 | 30.88 | 0.00 | 72.18 | 1.66 | 109.54 |
| June | 5.23 | 1,083.30 | 7,264.29 | 31.01 | 0.00 | 72.47 | 1.66 | 109.98 |
| July | 4.66 | 1,083.30 | 7,264.29 | 27.63 | 0.00 | 64.56 | 1.48 | 97.99 |
| August | 5.27 | 1,083.30 | 7,264.29 | 31.24 | 0.00 | 73.00 | 1.67 | 110.78 |
| September | 4.86 | 1,083.30 | 7,264.29 | 28.81 | 0.00 | 67.33 | 1.54 | 102.19 |
| October | 4.97 | 1,083.30 | 7,264.29 | 29.47 | 0.00 | 68.87 | 1.58 | 104.52 |
| November | 4.08 | 1,083.30 | 7,264.29 | 24.17 | 0.00 | 56.49 | 1.30 | 85.74 |
| December | 5.24 | 1,083.30 | 7,264.29 | 31.07 | 0.00 | 72.61 | 1.67 | 110.19 |
| 4 | 54.71 | - | - | 324.34 | 0.00 | 757.98 | 17.39 | 1,150.34 |

## 2010 Criteria Pollutant Quarterly Emissions
## S-2234-127-1

| | 2010 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 12.27 | 0.00 | 31.21 | 0.61 | 49.46 | 64.02 | 0.00 | 162.88 | 3.18 | 258.17 |
| February | 21.76 | 0.00 | 55.35 | 1.08 | 87.73 | | | | | |
| March | 30.00 | 0.00 | 76.32 | 1.49 | 120.97 | | | | | |
| April | 28.98 | 0.00 | 73.73 | 1.44 | 116.87 | 84.13 | 0.00 | 214.06 | 4.18 | 339.29 |
| May | 28.48 | 0.00 | 72.46 | 1.41 | 114.85 | | | | | |
| June | 26.68 | 0.00 | 67.87 | 1.32 | 107.58 | | | | | |
| July | 23.19 | 0.00 | 59.00 | 1.15 | 93.52 | 57.92 | 0.00 | 147.36 | 2.88 | 233.56 |
| August | 15.62 | 0.00 | 39.74 | 0.78 | 62.99 | | | | | |
| September | 19.11 | 0.00 | 48.61 | 0.95 | 77.05 | | | | | |
| October | 20.94 | 0.00 | 53.27 | 1.04 | 84.44 | 51.00 | 0.00 | 129.77 | 2.53 | 205.69 |
| November | 17.02 | 0.00 | 43.30 | 0.84 | 68.63 | | | | | |
| December | 13.05 | 0.00 | 33.20 | 0.65 | 52.62 | | | | | |
| **Total** | **257.07** | **0.00** | **654.07** | **12.77** | **1,036.71** | **257.07** | **0.00** | **654.07** | **12.77** | **1,036.71** |

## 2011 Criteria Pollutant Quarterly Emissions
## S-2234-127-1

| | 2011 | | | | | QTR Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 28.43 | 0.00 | 66.45 | 1.52 | 100.85 | 70.61 | 0.00 | 165.02 | 3.79 | 250.44 |
| February | 22.77 | 0.00 | 53.21 | 1.22 | 80.75 | | | | | |
| March | 19.41 | 0.00 | 45.36 | 1.04 | 68.85 | | | | | |
| April | 19.45 | 0.00 | 45.45 | 1.04 | 68.97 | 81.34 | 0.00 | 190.09 | 4.36 | 288.49 |
| May | 30.88 | 0.00 | 72.18 | 1.66 | 109.54 | | | | | |
| June | 31.01 | 0.00 | 72.47 | 1.66 | 109.98 | | | | | |
| July | 27.63 | 0.00 | 64.56 | 1.48 | 97.99 | 87.67 | 0.00 | 204.89 | 4.70 | 310.96 |
| August | 31.24 | 0.00 | 73.00 | 1.67 | 110.78 | | | | | |
| September | 28.81 | 0.00 | 67.33 | 1.54 | 102.19 | | | | | |
| October | 29.47 | 0.00 | 68.87 | 1.58 | 104.52 | 84.71 | 0.00 | 197.97 | 4.54 | 300.45 |
| November | 24.17 | 0.00 | 56.49 | 1.30 | 85.74 | | | | | |
| December | 31.07 | 0.00 | 72.61 | 1.67 | 110.19 | | | | | |
| **Total** | **324.34** | **0.00** | **757.98** | **17.39** | **1,150.34** | **324.34** | **0.00** | **757.98** | **17.39** | **1,150.34** |

## Two Year Criteria Pollutant Average Quarterly Emissions
## S-2234-127-1

| | 2 Year Average (lb/month) | | | | | QTR 2yr Average (lb/QTR) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NOx | VOC | CO | SOx | PM10 | NOx | VOC | CO | SOx | PM10 |
| January | 20.35 | 0.00 | 48.83 | 1.07 | 75.16 | 67.31 | 0.00 | 163.95 | 3.48 | 254.30 |
| February | 22.26 | 0.00 | 54.28 | 1.15 | 84.24 | | | | | |
| March | 24.70 | 0.00 | 60.84 | 1.27 | 94.91 | | | | | |
| April | 24.21 | 0.00 | 59.59 | 1.24 | 92.92 | 82.74 | 0.00 | 202.08 | 4.27 | 313.89 |
| May | 29.68 | 0.00 | 72.32 | 1.53 | 112.19 | | | | | |
| June | 28.84 | 0.00 | 70.17 | 1.49 | 108.78 | | | | | |
| July | 25.41 | 0.00 | 61.78 | 1.32 | 95.76 | 72.79 | 0.00 | 176.13 | 3.79 | 272.26 |
| August | 23.43 | 0.00 | 56.37 | 1.23 | 86.89 | | | | | |
| September | 23.96 | 0.00 | 57.97 | 1.25 | 89.62 | | | | | |
| October | 25.20 | 0.00 | 61.07 | 1.31 | 94.48 | 67.86 | 0.00 | 163.87 | 3.54 | 253.07 |
| November | 20.60 | 0.00 | 49.89 | 1.07 | 77.18 | | | | | |
| December | 22.06 | 0.00 | 52.90 | 1.16 | 81.41 | | | | | |
| **Total** | **290.70** | **0.00** | **706.02** | **15.08** | **1,093.53** | **290.70** | **0.00** | **706.02** | **15.08** | **1,093.53** |

## Occidental of Elk Hills
**S-1133368, S-2234-127**

## Fugitive Emissions Using Screening Emission Factors

California Implementation Guidelines for Estimating Mass Emissions
of Fugitive Hydrocarbon Leaks at Petroleum Facilities
*Table IV-2c. Oil and Gas Production*
*Screening Value Ranges Emission Factors*

| | |
|---|---|
| Percentage of components with ≥ 10,000 ppmv leaks allowed? | 0 % |
| Weight percentage of VOC in the total organic compounds in gas (neglect non-organics)? | 26.44 % |
| Weight percentage of VOC in the total organic compounds in oil (neglect non-organics)? | 100 % |

| Equipment Type | Service | Component Count | Total allowable leaking components | Screening Value EF - TOC < 10,000 ppmv (lb/day/source) | Screening Value EF - TOC ≥ 10,000 ppmv (lb/day/source) | VOC emissions (lb/day) |
|---|---|---|---|---|---|---|
| Valves | Gas/Light Liquid | 10 | 0 | 1.852E-03 | 7.333E+00 | 0.00 |
| | Light Crude Oil | 40 | 0 | 1.005E-03 | 3.741E+00 | 0.04 |
| | Heavy Crude Oil | 0 | 0 | 7.408E-04 | N/A* | 0.00 |
| Pump Seals | Gas/Light Liquid | 0 | 0 | 5.270E-02 | 4.709E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 1.402E-02 | 4.709E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | N/A | N/A | N/A |
| Others | Gas/Light Liquid | 2 | 0 | 7.778E-03 | 7.281E+00 | 0.00 |
| | Light Crude Oil | 1 | 0 | 6.931E-03 | 3.757E-01 | 0.01 |
| | Heavy Crude Oil | 0 | 0 | 3.016E-03 | N/A* | 0.00 |
| Connectors | Gas/Light Liquid | 198 | 0 | 6.349E-04 | 1.370E+00 | 0.03 |
| | Light Crude Oil | 201 | 0 | 5.291E-04 | 1.238E+00 | 0.11 |
| | Heavy Crude Oil | 0 | 0 | 4.233E-04 | 4.233E-04 | 0.00 |
| Flanges | Gas/Light Liquid | 135 | 0 | 1.482E-03 | 3.228E+00 | 0.05 |
| | Light Crude Oil | 85 | 0 | 1.270E-03 | 1.376E+01 | 0.11 |
| | Heavy Crude Oil | 0 | 0 | 1.217E-03 | N/A* | 0.00 |
| Open-ended Lines | Gas/Light Liquid | 0 | 0 | 1.270E-03 | 2.905E+00 | 0.00 |
| | Light Crude Oil | 0 | 0 | 9.524E-04 | 1.175E+00 | 0.00 |
| | Heavy Crude Oil | 0 | 0 | 7.937E-04 | 3.762E+00 | 0.00 |

* Emission factor not available. All components from equipment type and service will be assessed as < 10,000 ppmv

**Total VOC Emissions = 0.4 lb/day**