Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

January 4, 2010

Mr. Michael Shaffron, P.E.
Air Quality Specialist, North Rockies
EnCana Oil & Gas (USA) Inc.
370 17th Street, Suite 1700
Denver, CO 80202

Permit No. **CT-8122**

Dear Mr. Shaffron:

The Division of Air Quality of the Wyoming Department of Environmental Quality has completed final review of EnCana Oil & Gas (USA) Incorporated's voluntary permit application to establish federally enforceable conditions for the Drill Rig Fleet located in the Jonah and Pinedale Anticline Development Area (JPDA) in Sublette County, Wyoming.

Following this agency's proposed approval of the request as published September 25, 2009 and in accordance with Chapter 6, Section 2(m) of the Wyoming Air Quality Standards and Regulations, the public was afforded a 30-day period in which to submit comments concerning the proposed new source, and an opportunity for a public hearing. Public comments were received during the comment period and public hearing held November 18, 2009 and have been considered in the final permit. Therefore, on the basis of the information provided to us, approval to construct the Drill Rig Fleet as described in the application is hereby granted pursuant to Chapter 6, Section 2 of the regulations with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 510 Meadowview Drive, Lander, WY 82520.

4. This permit only applies to the EnCana Oil & Gas (USA) Inc. Drill Rig Fleet while operating in the Jonah and Pinedale Anticline Development Area (JPDA). The permit conditions contained herein are only enforceable while operating drill rigs in the JPDA.

   i. The JPDA area consists of 109W & R110W in T34N, R109W & R110W in T33N, R108W, R109W & R110W in T32N, R108W, R109W & R110W in T31N, R107W, R108W & R109W in T30N, R107W, R108W & R109W in T29N, R108W & R109W in T28N, and R107W, R108W & R109W in T27N.

5. That written notification of the actual date of initial start-up for each drill rig/engine/boiler is required fifteen (15) days after start-up as defined in Condition 8. Such notification shall be submitted on a complete AQD-RIG Installation/Removal form. The form can be downloaded from the Air Quality website http://deq.state.wy.us/aqd or obtained from the Air Quality Division.

6. That upon removal of a drill rig/engine/boiler from the JPDA, written notification is required within fifteen (15) days of removal. Such notification shall be submitted on a complete AQD-RIG Installation/Removal form.

7. That emissions shall be limited as follows:

   i. Total actual annual $NO_x$ emissions from all drill rig engines and boilers associated with the EnCana Oil & Gas (USA) Inc. Drill Rig Fleet shall not exceed 282.0 tons per year (tpy) $NO_x$.

   ii. Emissions from the natural gas fired drill rig engines in the EnCana Oil & Gas (USA) Inc. Drill Rig Fleet shall not exceed the values in the following table.

| Equipment | $NO_x$ | CO | Formaldehyde |
|---|---|---|---|
| | g/hp-hr | g/hp-hr | g/hp-hr |
| Natural Gas Engines | 1.49 | 0.5 | 0.07 |

      1. Lean burn engines shall be equipped with oxidation catalyst.

      2. Rich burn engines shall be equipped with NSCR and an AFRC.

   iii. Total actual annual $NO_x$ emissions from engines on any diesel fired drill rig in the EnCana Oil & Gas (USA) Inc. Drill Rig Fleet shall not exceed 10 tpy per drill rig. This requirement shall be effective January 1, 2010.

      1. That should EnCana Oil & Gas (USA) Inc. elect to install add-on $NO_x$ control systems on any diesel engine(s), this permit shall be modified prior to start-up with the controls.

8. EnCana Oil & Gas (USA) Inc. shall conduct an initial performance test for each drill rig engine no later than ninety (90) days after start-up. Startup shall be defined as follows:

   i. For drill rig engines in service at the time of permit issuance, the start-up date shall be the permit issuance date.

   ii. For all other drill rig engines, the start-up date shall be the date the rig commences drilling at the first well.

9. Initial performance testing as required by Condition 8 of this permit shall be conducted on the drill rig engines as follows:

   i. Natural gas fired engines

   <u>$NO_x$ and CO Emissions</u>: Testing for $NO_x$ and CO emissions shall consist of three (3) 1-hour tests following EPA approved reference methods or the State of Wyoming's Portable Analyzer protocol to determine compliance with the g/hp-hr limits. Results shall be reported in terms of g/hp-hr. Emissions shall be calculated using the following equations:

$$g/hp\text{-}hr\ NO_X = (ppm\ NO_{X_{corrected}})(1.19x10^{-7})(F_factor)\left(\frac{20.9}{20.9 - O_2\%_{corrected}}\right)$$
$$(Brake\ Specific\ Fuel\ Consumption(Btu/hp-hr))(10^{-6})(454)$$

$$g/hp\text{-}hr\ CO = (ppm\ CO_{corrected})(7.27x10^{-8})(F_factor)\left(\frac{20.9}{20.9 - O_2\%_{corrected}}\right)$$
$$(Brake\ Specific\ Fuel\ Consumption(Btu/hp-hr))(10^{-6})(454)$$

   <u>VOC Emissions</u>: Testing for VOCs shall be conducted in accordance with a Division approved test method for one (1) engine of each engine type in the fleet.

   <u>Formaldehyde Emissions (Lean Burn Engines Only):</u> Each engine shall be tested for formaldehyde. Testing shall consist of three (3) 1-hour tests following EPA approved reference methods or a Division approved formaldehyde test method. Emissions shall be calculated using the following equation:

$$g/hp\text{-}hr\ HCHO = (ppm\ HCHO_{corrected})(7.79x10^{-8})(F_factor)\left(\frac{20.9}{20.9 - O_2\%_{corrected}}\right)$$
$$(Brake\ Specific\ Fuel\ Consumption(Btu/hp-hr))(10^{-6})(454)$$

ii. Diesel fired engines

<u>$NO_x$ Emissions</u>: Testing for $NO_x$ shall consist of three (3) 1-hour tests following EPA approved reference methods or the State of Wyoming's Portable Analyzer protocol. Emissions shall be calculated using the equation in Condition 9(i) above. Results shall be reported in terms of g/hp-hr.

<u>VOC Emissions</u>: Testing for VOCs shall be conducted in accordance with a Division approved test method for one (1) engine of each engine type in the fleet.

A test protocol shall be submitted for review and approval prior to testing. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to the Division within forty-five (45) days of completion. Engine load (%) and brake specific fuel consumption (BSFC) shall be provided in the report.

10. That each drill rig engine shall be tested annually. The first annual test is required the following calendar year after completion of the initial performance tests required under Condition 8.

i. For natural gas engines, testing for $NO_x$ and CO shall be conducted in accordance with EPA approved reference methods or the State of Wyoming's Portable Analyzer protocol. Compliance with the CO limits is considered verification that the VOC and formaldehyde emissions for the lean burn engines are controlled. Emissions shall be calculated using the equations listed in Condition 9.

ii. For diesel engines, testing for $NO_x$ shall be conducted in accordance with EPA approved reference methods or the State of Wyoming's Portable Analyzer protocol. Emissions shall be calculated using the equation listed in Condition 9.

iii. A test protocol shall be submitted for review and approval prior to testing. Notification of the test date shall be provided to the Division fifteen (15) days prior to the testing. Results shall be submitted to the Division with forty-five (45) days of completing the tests. The engine load (%) and brake specific fuel consumption (BSFC) shall be provided in the report.

iv. The Air Quality Division shall be notified within twenty-four (24) hours of the testing/monitoring required by this condition that shows operation outside the permitted emission limits. By no later than seven (7) calendar days of such testing/monitoring event, the owner or operator shall repair and retest/monitor the affected engine to demonstrate that the engine has been returned to operation within the permitted emission limits. Compliance with this permit condition regarding repair and retesting/monitoring shall not be deemed to limit the authority of the Air Quality Division to cite the owner or operator for an exceedance of the permitted emission limits for any testing/monitoring required by this condition which shows noncompliance.

11. That EnCana Oil & Gas (USA) Inc. shall follow the monitoring and maintenance requirements as follows for the natural gas fired drill rig engines equipped with an oxidation catalyst or NSCR catalyst.

    i. Operate and maintain the engine, air pollution control equipment, and monitoring equipment according to good air pollution control practices at all times, including startup, shutdown, and malfunction.

    ii. Install a thermocouple to measure the inlet catalyst temperature.

        a. The inlet temperature shall be recorded at least monthly. If the temperature is outside of the range listed below, corrective action shall be taken.

| | |
|---|---|
| NSCR Catalyst: | 750 °F to 1250 °F |
| Oxidation Catalyst: | 450 °F to 1350 °F |

    iii. Install a device to measure the pressure drop across the catalyst.

        a. The pressure drop across the catalyst shall be recorded at least monthly. If the pressure changes by more than two (2) inches of water from the pressure drop as determined below, corrective action shall be taken.

            1. During the initial performance test required by this permit, the reference pressure drop shall be established. When the catalyst is replaced, the reference pressure drop shall be reestablished during the subsequent periodic testing required by this permit.

    iv. Records of catalyst inlet temperature, pressure drop, and any maintenance or corrective actions shall be kept and maintained for a period of five (5) years and shall be made available to the Division upon request.

    v. In lieu of monitoring catalyst inlet temperature and pressure drop, EnCana Oil & Gas (USA) Inc. may submit for approval an alternative monitoring plan. If approved, the Division will administratively amend this permit to incorporate the alterative monitoring plan.

12. EnCana Oil & Gas (USA) Inc. shall keep records of the following for each well drilled.

    i. Drill Rig ID
    ii. Well API number
    iii. Well name
    iv. Well location (longitude, latitude, elevation)
    v. Drilling start and end dates
    vi. Field name
    vii. Equipment description, controls, and site rating
    viii. Brake specific fuel consumption (BSFC)
    ix. Total fuel usage for drill rig engines and boilers recorded on a daily basis
    x. Heat content and sulfur content of fuel burned recorded from supplier certification
    xi. Actual emissions for $NO_x$, CO, VOC, $SO_2$, $PM_{10}$, ammonia, and formaldehyde
        1. For engines, emissions shall be based on fuel consumption, g/hp-hr emission rates, and BSFC from the latest emissions test.
        2. For boilers, emissions shall be based on fuel consumption, lb/MMBtu rates or AP-42 factors converted to lb/MMBtu, and BSFC

    The format presented in Appendix A shall be utilized to satisfy reporting requirements for the Division's annual emission inventory, which shall be submitted by March 31 of the following calendar year.

13. That drill rigs, boilers or engines that are subject to the conditions of this permit may be replaced without modifying this permit. EnCana Oil & Gas (USA) Inc. shall provide notifications as required by Conditions 5 and 6 of this permit. The replacement drill rig/engine(s)/boiler(s) shall comply with the conditions of this permit.

14. All records required under this permit shall be kept for a period of at least five (5) years and shall be made available to the Division upon request.

15. This permit only authorizes drill rig engines and replacement engines to remain at any pad for less than twelve (12) consecutive months.

16. EnCana Oil & Gas (USA) Inc. shall comply with all local, state, and federal rules and regulations applicable to the Drill Rig Fleet.

It must be noted that this approval does not relieve you of your obligation to comply with all applicable county, state, and federal standards, regulations or ordinances. Special attention must be given to Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations. Any appeal of this permit as a final action of the Department must be made to the Environmental Quality Council within sixty (60) days of permit issuance per Section 16, Chapter I, General Rules of Practice and Procedure, Department of Environmental Quality.

If we may be of further assistance to you, please feel free to contact this office.

Sincerely,

David A. Finley
Administrator
Air Quality Division

John V. Corra
Director
Dept. of Environmental Quality

cc: Tony Hoyt

# Appendix A

Drill Rig Emission Reporting Form

# Drill Rig Locations & Emissions

(Sample data entries provided below)
List all wells drilled by each rig, showing the order of progression of wells drilled throughout the year
(Add additional rows as needed to provide data for each well drilled)
Input negative values for Rig Boilers under column heading "Site Rating"
* Use emission factors from actual test data and attach test results inclusive of tested rate
** Emission factors from manufacturer or AP-42 may be used if test data is not available

| Rig ID | Equipment Description | Controls | API # | Location (WGS84) | | | Well Name | Field Name | Well Spud Date | Formation | Drilling Start Date | Drilling End Date | Well Depth | Site Rating | Hours Operated to Drill Well | Natural Gas Use per Well | Heat Content Natural Gas | Diesel Fuel Use per Well | Heat Content Diesel Fuel | Diesel Sulfur Content | Heat Input of Fuel | BSFC | Drill Rig Emission Factors | | | | | Emissions from Drilling | | | | | | Stack Parameters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lat | Long | Elev | | | | | | | | | | | | | | | | | $NO_x$ | CO | VOC | $PM_{10}$ | HCHO | $NO_x$ | CO | VOC | $PM_{10}$ | HCHO | $SO_2$ | Height | Temp | Velocity | Diameter |
| | | | | | | feet | | | | | | | | hp or (MMBtu/hr) | | mscf | Btu/scf | gal | Btu/gal | $ppm_w$ | MMBtu | Btu/hp-hr | g/hp-hr* or (lb/MMBtu)** | | | | | Tons per Well | | | | | | ft | ° F | ft/sec | ft |
| Rig #1 - H&P 000 | Cat 3512CDITA Diesel | Tier 2 | 49-035-25936 | 42.47183 | -109.70750 | 7,179 | Stud Horse Butte 41-22 | Jonah | 12/16/07 | Lance | 2/3/08 | 2/14/08 | 11,751 | 1,476 | 288 | | 1,000 | 15,431 | 130,000 | 500 | 2,006 | 7,389 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 1.44 | 2.54 | 0.30 | 0.12 | 0.00 | 0.05 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Cat 3512CDITA Diesel | Tier 2 | | | | | | | | | | | | 1,476 | 288 | | 1,000 | 15,431 | 130,000 | 500 | 2,006 | 7,389 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 1.44 | 2.54 | 0.30 | 0.12 | 0.00 | 0.05 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Rig Boiler | None | | | | | | | | | | | | (6.3) | 144 | | 1,000 | 4,209 | 130,000 | 500 | 547 | 7,000 | (0.15) | (0.036) | (0.0022) | (0.015) | (0.00045) | 0.04 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 13.00 | 344.00 | 17.50 | 1.29 |
| Rig #1 - H&P 000 | Cat 3512CDITA Diesel | Tier 2 | 49-035-25752 | 42.47132 | -109.70708 | 7,187 | Stud Horse Butte 41-22 | Jonah | 12/13/07 | Lance | 2/24/08 | 3/6/08 | 11,679 | 1,476 | 264 | | 1,000 | 3,628 | 130,000 | 500 | 472 | 6,782 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 0.37 | 0.65 | 0.08 | 0.03 | 0.00 | 0.01 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Cat 3512CDITA Diesel | Tier 2 | | | | | | | | | | | | 1,476 | 264 | | 1,000 | 3,628 | 130,000 | 500 | 472 | 6,782 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 0.37 | 0.65 | 0.08 | 0.03 | 0.00 | 0.01 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Rig Boiler | None | | | | | | | | | | | | (6.3) | 123 | | 1,000 | 1,052 | 130,000 | 500 | 137 | 6,200 | (0.15) | (0.036) | (0.0022) | (0.015) | (0.00045) | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 13.00 | 344.00 | 17.50 | 1.29 |
| | | | 3rd well drilled using Rig #1 - H&P 000 (Continue for next well drilled using Rig #1 -- following the above format) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rig #2 - H&P 001 | Cat 3512CDITA Diesel | Tier 2 | 49-035-25045 | 42.47187 | -109.70761 | 7,179 | Stud Horse Butte 21-22 | Jonah | 12/13/07 | Lance | 2/13/08 | 2/24/08 | 11,638 | 1,476 | 288 | | 1,000 | 15,431 | 130,000 | 500 | 2,006 | 7,389 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 1.44 | 2.54 | 0.30 | 0.12 | 0.00 | 0.05 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Cat 3512CDITA Diesel | Tier 2 | | | | | | | | | | | | 1,476 | 288 | | 1,000 | 15,431 | 130,000 | 500 | 2,006 | 7,389 | 4.80 | 8.50 | 1.00 | 0.40 | 0.00 | 1.44 | 2.54 | 0.30 | 0.12 | 0.00 | 0.05 | 16.40 | 630.55 | 98.40 | 0.66 |
| | Rig Boiler | None | | | | | | | | | | | | (6.3) | 144 | | 1,000 | 4,209 | 130,000 | 500 | 547 | 7,000 | (0.15) | (0.036) | (0.0022) | (0.015) | (0.00045) | 0.04 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 13.00 | 344.00 | 17.50 | 1.29 |
| | | | 2nd well drilled using Rig #2 - H&P 001 (Continue for next well drilled using Rig #2 -- following the above format) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# Drill Rig Emissions - 2009

## Diesel Fuel Consumption

(Sample data entries provided below for January through December 2009)

### 2009 Drill Rig Diesel Fuel Consumption

| January | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,600 | 1,850 | 1,572 | 1,800 | 2,070 | 1,755 |
| 2 | 1,700 | 2,054 | 2,390 | 1,800 | 1,380 | 1,990 |
| 3 | 1,500 | 1,848 | 1,572 | 1,800 | 2,070 | 1,726 |
| 4 | 1,500 | 1,221 | 1,889 | 1,440 | 1,380 | 1,274 |
| 5 | 1,600 | 1,848 | 1,753 | 1,800 | 2,300 | 1,345 |
| 6 | 1,000 | 2,054 | 1,591 | 1,620 | 1,840 | 978 |
| 7 | 600 | 1,848 | 1,591 | 1,620 | 1,870 | 745 |
| 8 | 1,000 | 2,054 | 1,462 | 1,400 | 1,840 | 1,794 |
| 9 | 1,200 | 811 | 1,809 | 1,620 | 1,610 | 1,453 |
| 10 | 1,200 | 1,848 | 1,572 | 1,620 | 1,840 | 2,387 |
| 11 | 1,500 | 1,233 | 1,594 | 1,440 | 1,610 | 1,761 |
| 12 | 1,200 | 1,027 | 1,978 | 1,440 | 1,840 | 1,991 |
| 13 | 1,300 | 1,027 | 1,897 | 1,800 | 1,840 | 1,866 |
| 14 | 1,300 | 1,307 | 2,341 | 1,700 | 1,610 | 1,945 |
| 15 | 1,122 | 2,054 | 1,992 | 1,440 | 1,610 | 1,990 |
| 16 | 1,496 | 1,849 | 1,580 | 1,800 | 1,840 | 1,876 |
| 17 | 1,122 | 1,849 | 1,343 | 1,620 | 1,840 | 1,623 |
| 18 | 1,122 | 2,054 | 1,134 | 1,080 | 1,840 | 1,724 |
| 19 | 855 | 1,950 | 776 | 2,340 | 1,810 | 1,920 |
| 20 | 1,496 | 2,259 | 787 | 1,860 | 2,070 | 1,395 |
| 21 | 1,870 | 1,644 | 1,591 | 2,180 | 1,840 | 1,785 |
| 22 | 1,663 | 2,054 | 1,608 | 1,980 | 1,840 | 1,484 |
| 23 | 1,496 | 2,865 | 2,112 | 1,580 | 1,820 | 1,747 |
| 24 | 2,203 | 2,259 | 1,521 | 1,620 | 1,840 | 1,789 |
| 25 | 1,309 | 1,643 | 1,572 | 1,280 | 2,300 | 1,985 |
| 26 | 1,496 | 2,157 | 1,594 | 900 | 1,820 | 824 |
| 27 | 1,309 | 1,951 | 1,588 | 1,700 | 2,070 | 1,950 |
| 28 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 769 |
| 29 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 769 |
| 30 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 769 |
| 31 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 769 |
| | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) |
| Subtotal | 41,995 | 56,834 | 50,639 | 51,200 | 57,000 | 47,178 |

| Rig | Wells | Jan (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 41,995 | 41,995 |
| | Well #2 | - | - |
| | | | 41,995 |
| Rig #2 | Well #3 | 19,696 | 19,696 |
| | Well #4 | 37,138 | 37,138 |
| | Well #5 | - | - |
| | | | 56,834 |
| Rig #3 | Well #6 | 31,060 | 31,060 |
| | Well #7 | 19,579 | 19,579 |
| | Well #8 | - | - |
| | | | 50,639 |
| Rig #4 | Well #9 | 42,580 | 42,580 |
| | Well #10 | 8,620 | 8,620 |
| | Well #11 | - | - |
| | | | 51,200 |
| Rig #5 | Well #12 | 23,490 | 23,490 |
| | Well #13 | 33,510 | 33,510 |
| | Well #14 | | - |
| | | | 57,000 |
| Rig #6 | Well #15 | 9,068 | 9,068 |
| | Well #16 | 38,110 | 38,110 |
| | Well #17 | - | - |
| | Well #18 | - | - |
| | | | 47,178 |

| February | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,600 | 1,850 | 1,572 | 1,800 | 2,070 | 1,755 |
| 2 | 1,700 | 2,054 | 2,390 | 1,800 | 1,380 | 1,990 |
| 3 | 1,500 | 1,848 | 1,572 | 1,800 | 2,070 | 1,726 |
| 4 | 1,500 | 1,221 | 1,889 | 1,440 | 1,380 | 1,274 |
| 5 | 1,600 | 1,848 | 1,753 | 1,800 | 2,300 | 1,345 |
| 6 | 1,000 | 2,054 | 1,591 | 1,620 | 1,840 | 978 |
| 7 | 600 | 1,848 | 1,591 | 1,620 | 1,870 | 745 |
| 8 | 1,000 | 2,054 | 1,462 | 1,400 | 1,840 | 1,794 |
| 9 | 1,200 | 811 | 1,809 | 1,620 | 1,610 | 1,453 |
| 10 | 1,200 | 1,848 | 1,572 | 1,620 | 1,840 | 2,387 |
| 11 | 1,500 | 1,233 | 1,594 | 1,440 | 1,610 | 1,761 |
| 12 | 1,200 | 1,027 | 1,978 | 1,440 | 1,840 | 1,991 |
| 13 | 1,300 | 1,027 | 1,897 | 1,800 | 1,840 | 1,866 |
| 14 | 1,300 | 1,307 | 2,341 | 1,700 | 1,610 | 1,945 |
| 15 | 1,122 | 2,054 | 1,992 | 1,440 | 1,610 | 1,990 |
| 16 | 1,496 | 1,849 | 1,580 | 1,800 | 1,840 | 1,876 |
| 17 | 1,122 | 1,849 | 1,343 | 1,620 | 1,840 | 1,623 |
| 18 | 1,122 | 2,054 | 1,134 | 1,080 | 1,840 | 1,724 |
| 19 | 855 | 1,950 | 776 | 2,340 | 1,810 | 1,920 |
| 20 | 1,496 | 2,259 | 787 | 1,860 | 2,070 | 1,395 |
| 21 | 1,870 | 1,644 | 1,591 | 2,180 | 1,840 | 1,785 |
| 22 | 1,663 | 2,054 | 1,608 | 1,980 | 1,840 | 1,484 |
| 23 | 1,496 | 2,865 | 2,112 | 1,580 | 1,820 | 1,747 |
| 24 | 2,203 | 2,259 | 1,521 | 1,620 | 1,840 | 1,789 |
| 25 | 1,309 | 1,643 | 1,572 | 1,280 | 2,300 | 1,985 |
| 26 | 1,496 | 2,157 | 1,594 | 900 | 1,820 | 824 |
| 27 | 1,309 | 1,951 | 1,588 | 1,700 | 2,070 | 1,950 |
| 28 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 769 |
| | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) |
| Subtotal | 38,068 | 50,672 | 45,815 | 45,260 | 51,480 | 44,871 |

| Rig | Wells | Feb (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 38,068 | 38,068 |
| | Well #2 | - | - |
| | | | 38,068 |
| Rig #2 | Well #3 | 19,696 | 19,696 |
| | Well #4 | 30,976 | 30,976 |
| | Well #5 | - | - |
| | | | 50,672 |
| Rig #3 | Well #6 | 31,060 | 31,060 |
| | Well #7 | 14,755 | 14,755 |
| | Well #8 | - | - |
| | | | 45,815 |
| Rig #4 | Well #9 | 42,580 | 42,580 |
| | Well #10 | 2,680 | 2,680 |
| | Well #11 | - | - |
| | | | 45,260 |
| Rig #5 | Well #12 | 23,490 | 23,490 |
| | Well #13 | 27,990 | 27,990 |
| | Well #14 | | - |
| | | | 51,480 |
| Rig #6 | Well #15 | 9,068 | 9,068 |
| | Well #16 | 35,803 | 35,803 |
| | Well #17 | - | - |
| | Well #18 | - | - |
| | | | 44,871 |

| March | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,500 | 1,427 | 1,389 | 2,180 | 1,840 | 781 |
| 2 | 800 | 1,848 | 1,580 | 1,800 | 1,850 | 1,587 |
| 3 | 900 | 2,259 | 1,398 | 1,800 | 1,840 | 2,498 |
| 4 | 1,200 | 1,848 | 1,903 | 1,980 | 1,840 | 888 |
| 5 | 800 | 1,848 | 1,294 | 1,260 | 1,850 | 1,303 |
| 6 | 800 | 605 | 1,739 | 1,800 | 1,510 | 1,945 |
| 7 | 800 | 821 | 1,998 | 1,620 | 1,080 | 1,591 |
| 8 | 950 | 821 | 1,870 | 1,440 | 480 | 1,977 |
| 9 | 1,500 | 1,233 | 1,870 | 1,440 | 690 | 2,152 |
| 10 | 900 | 1,232 | 1,910 | 1,440 | 1,610 | 1,733 |
| 11 | 1,300 | 1,849 | 1,979 | 1,440 | 2,070 | 1,788 |
| 12 | 1,150 | 1,643 | 1,594 | 1,440 | 1,840 | 1,994 |
| 13 | 1,150 | 1,849 | 935 | 1,440 | 1,840 | 1,958 |
| 14 | 1,500 | 1,232 | 1,000 | 1,620 | 1,780 | 1,885 |
| 15 | 1,122 | 1,848 | 1,250 | 1,520 | 1,610 | 1,958 |
| 16 | 1,455 | 2,054 | 1,680 | 1,620 | 1,610 | 1,990 |
| 17 | 935 | 1,643 | 1,176 | 1,480 | 1,840 | 2,364 |
| 18 | 1,309 | 1,848 | 1,591 | 1,800 | 1,560 | 1,878 |
| 19 | 1,122 | 2,054 | 1,591 | 1,800 | 2,070 | 1,172 |
| 20 | 1,122 | 811 | 1,662 | 1,800 | 1,670 | 600 |
| 21 | 1,496 | 1,848 | 1,701 | 1,800 | 2,070 | 600 |
| 22 | 1,122 | 1,643 | 1,158 | 1,260 | 1,870 | 750 |
| 23 | 1,455 | 2,054 | 1,587 | 1,080 | 1,560 | 950 |
| 24 | 1,122 | 2,054 | 1,594 | 1,640 | 2,070 | 1,012 |
| 25 | 1,309 | 1,232 | 1,572 | 750 | 2,070 | 720 |
| 26 | 1,122 | 800 | 1,705 | 1,280 | 1,670 | 650 |
| 27 | 1,309 | 1,438 | 1,158 | 1,980 | 1,380 | 620 |
| 28 | 1,122 | 1,848 | 1,580 | 1,720 | 1,610 | 950 |
| 29 | 1,650 | 2,054 | 1,498 | 1,320 | 1,840 | 983 |
| 30 | 1,500 | 2,540 | 1,974 | 1,620 | 1,610 | 993 |
| 31 | 1,500 | 1,428 | 1,121 | 1,620 | 1,380 | 1,193 |
| Subtotal | 37,022 | 49,512 | 48,035 | 47,670 | 51,890 | 42,855 |

| Rig | Wells | Mar (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 5,200 | 5,200 |
| | Well #2 | 31,822 | 31,822 |
| | | | 37,022 |
| Rig #2 | Well #3 | - | - |
| | Well #4 | 10,656 | 10,656 |
| | Well #5 | 38,856 | 38,856 |
| | | | 49,512 |
| Rig #3 | Well #6 | - | - |
| | Well #7 | 22,447 | 22,447 |
| | Well #8 | 25,588 | 25,588 |
| | | | 48,035 |
| Rig #4 | Well #9 | - | - |
| | Well #10 | 37,400 | 37,400 |
| | Well #11 | 10,270 | 10,270 |
| | | | 47,670 |
| Rig #5 | Well #12 | - | - |
| | Well #13 | 10,730 | 10,730 |
| | Well #14 | 41,160 | 41,160 |
| | | | 51,890 |
| Rig #6 | Well #15 | - | - |
| | Well #16 | - | - |
| | Well #17 | 38,736 | 38,736 |
| | Well #18 | 4,119 | 4,119 |
| | | | 42,855 |

# Drill Rig Emissions - 2009

## Natural Gas Consumption

(Sample data entries provided below for January through December 2009)

### 2009 Drill Rig Natural Gas Consumption

| January | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,600 | 1,850 | 1,572 | 1,800 | 2,070 | 1,755 |
| 2 | 1,700 | 2,054 | 2,390 | 1,800 | 1,380 | 1,990 |
| 3 | 1,500 | 1,848 | 1,572 | 1,800 | 2,070 | 1,726 |
| 4 | 1,500 | 1,221 | 1,889 | 1,440 | 1,380 | 1,274 |
| 5 | 1,600 | 1,848 | 1,753 | 1,800 | 2,300 | 1,345 |
| 6 | 1,000 | 2,054 | 1,591 | 1,620 | 1,840 | 978 |
| 7 | 600 | 1,848 | 1,591 | 1,620 | 1,870 | 745 |
| 8 | 1,000 | 2,054 | 1,462 | 1,400 | 1,840 | 1,784 |
| 9 | 1,200 | 811 | 1,809 | 1,620 | 1,610 | 1,453 |
| 10 | 1,200 | 1,848 | 1,572 | 1,620 | 1,840 | 2,387 |
| 11 | 1,500 | 1,233 | 1,594 | 1,440 | 1,610 | 1,761 |
| 12 | 1,200 | 1,027 | 1,978 | 1,440 | 1,840 | 1,991 |
| 13 | 1,300 | 1,027 | 1,897 | 1,800 | 1,840 | 1,868 |
| 14 | 1,300 | 1,307 | 2,341 | 1,700 | 1,610 | 1,945 |
| 15 | 1,122 | 2,054 | 1,992 | 1,440 | 1,610 | 1,990 |
| 16 | 1,496 | 1,849 | 1,580 | 1,800 | 1,840 | 1,876 |
| 17 | 1,122 | 1,649 | 1,343 | 1,620 | 1,840 | 1,623 |
| 18 | 1,122 | 2,054 | 1,134 | 1,080 | 1,840 | 1,724 |
| 19 | 855 | 1,950 | 1,776 | 2,340 | 1,810 | 1,920 |
| 20 | 1,496 | 2,259 | 1,787 | 1,860 | 2,070 | 1,395 |
| 21 | 1,870 | 1,644 | 1,591 | 2,180 | 1,840 | 1,785 |
| 22 | 1,663 | 2,054 | 1,608 | 1,980 | 1,840 | 1,484 |
| 23 | 1,496 | 2,865 | 2,112 | 1,580 | 1,820 | 1,747 |
| 24 | 2,203 | 2,259 | 1,521 | 1,620 | 1,840 | 1,789 |
| 25 | 1,309 | 1,643 | 1,572 | 1,280 | 2,300 | 1,985 |
| 26 | 1,496 | 2,157 | 1,594 | 900 | 1,820 | 1,824 |
| 27 | 1,309 | 1,951 | 1,586 | 1,700 | 2,070 | 1,950 |
| 28 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 1,769 |
| 29 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 1,769 |
| 30 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 1,769 |
| 31 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 1,769 |
| | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) |
| Subtotal | 41,995 | 56,834 | 50,639 | 51,200 | 57,000 | 47,178 |

| Rig | Wells | Jan (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 41,995 | 41,995 |
| | Well #2 | - | - |
| | | | 41,995 |
| Rig #2 | Well #3 | 19,696 | 19,696 |
| | Well #4 | 37,138 | 37,138 |
| | Well #5 | - | - |
| | | | 56,834 |
| Rig #3 | Well #6 | 31,060 | 31,060 |
| | Well #7 | 19,579 | 19,579 |
| | Well #8 | - | - |
| | | | 50,639 |
| Rig #4 | Well #9 | 42,580 | 42,580 |
| | Well #10 | 8,620 | 8,620 |
| | Well #11 | - | - |
| | | | 51,200 |
| Rig #5 | Well #12 | 23,490 | 23,490 |
| | Well #13 | 33,510 | 33,510 |
| | Well #14 | | - |
| | | | 57,000 |
| Rig #6 | Well #15 | 9,068 | 9,068 |
| | Well #16 | 38,110 | 38,110 |
| | Well #17 | - | - |
| | Well #18 | - | - |
| | | | 47,178 |

| February | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,600 | 1,850 | 1,572 | 1,800 | 2,070 | 1,755 |
| 2 | 1,700 | 2,054 | 2,390 | 1,800 | 1,380 | 1,990 |
| 3 | 1,500 | 1,848 | 1,572 | 1,800 | 2,070 | 1,726 |
| 4 | 1,500 | 1,221 | 1,889 | 1,440 | 1,380 | 1,274 |
| 5 | 1,600 | 1,848 | 1,753 | 1,800 | 2,300 | 1,345 |
| 6 | 1,000 | 2,054 | 1,591 | 1,620 | 1,840 | 978 |
| 7 | 600 | 1,848 | 1,591 | 1,620 | 1,870 | 745 |
| 8 | 1,000 | 2,054 | 1,462 | 1,400 | 1,840 | 1,794 |
| 9 | 1,200 | 811 | 1,809 | 1,620 | 1,610 | 1,453 |
| 10 | 1,200 | 1,848 | 1,572 | 1,620 | 1,840 | 2,387 |
| 11 | 1,500 | 1,233 | 1,594 | 1,440 | 1,610 | 1,761 |
| 12 | 1,200 | 1,027 | 1,978 | 1,440 | 1,840 | 1,991 |
| 13 | 1,300 | 1,027 | 1,897 | 1,800 | 1,840 | 1,868 |
| 14 | 1,300 | 1,307 | 2,341 | 1,700 | 1,610 | 1,945 |
| 15 | 1,122 | 2,054 | 1,992 | 1,440 | 1,610 | 1,990 |
| 16 | 1,496 | 1,849 | 1,580 | 1,800 | 1,840 | 1,876 |
| 17 | 1,122 | 1,649 | 1,343 | 1,620 | 1,840 | 1,623 |
| 18 | 1,122 | 2,054 | 1,134 | 1,080 | 1,840 | 1,724 |
| 19 | 855 | 1,950 | 1,776 | 2,340 | 1,810 | 1,920 |
| 20 | 1,496 | 2,259 | 1,787 | 1,860 | 2,070 | 1,395 |
| 21 | 1,870 | 1,644 | 1,591 | 2,180 | 1,840 | 1,785 |
| 22 | 1,663 | 2,054 | 1,608 | 1,980 | 1,840 | 1,484 |
| 23 | 1,496 | 2,865 | 2,112 | 1,580 | 1,820 | 1,747 |
| 24 | 2,203 | 2,259 | 1,521 | 1,620 | 1,840 | 1,789 |
| 25 | 1,309 | 1,643 | 1,572 | 1,280 | 2,300 | 1,985 |
| 26 | 1,496 | 2,157 | 1,594 | 900 | 1,820 | 1,824 |
| 27 | 1,309 | 1,951 | 1,586 | 1,700 | 2,070 | 1,950 |
| 28 | 1,309 | 2,054 | 1,608 | 1,980 | 1,840 | 1,769 |
| | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) | (gallons) |
| Subtotal | 38,068 | 50,672 | 45,815 | 45,260 | 51,480 | 44,871 |

| Rig | Wells | Feb (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 38,068 | 38,068 |
| | Well #2 | - | - |
| | | | 38,068 |
| Rig #2 | Well #3 | 19,696 | 19,696 |
| | Well #4 | 30,976 | 30,976 |
| | Well #5 | - | - |
| | | | 50,672 |
| Rig #3 | Well #6 | 31,060 | 31,060 |
| | Well #7 | 14,755 | 14,755 |
| | Well #8 | - | - |
| | | | 45,815 |
| Rig #4 | Well #9 | 42,580 | 42,580 |
| | Well #10 | 2,680 | 2,680 |
| | Well #11 | - | - |
| | | | 45,260 |
| Rig #5 | Well #12 | 23,490 | 23,490 |
| | Well #13 | 27,990 | 27,990 |
| | Well #14 | | - |
| | | | 51,480 |
| Rig #6 | Well #15 | 9,068 | 9,068 |
| | Well #16 | 35,803 | 35,803 |
| | Well #17 | - | - |
| | Well #18 | - | - |
| | | | 44,871 |

| March | Rig #1 (gallons) | Rig #2 (gallons) | Rig #3 (gallons) | Rig #4 (gallons) | Rig #5 (gallons) | Rig #6 (gallons) |
|---|---|---|---|---|---|---|
| 1 | 1,500 | 1,427 | 1,389 | 2,180 | 1,840 | 781 |
| 2 | 800 | 1,848 | 1,580 | 1,800 | 1,850 | 1,587 |
| 3 | 900 | 2,259 | 1,398 | 1,800 | 1,840 | 2,498 |
| 4 | 1,200 | 1,848 | 1,903 | 1,980 | 1,840 | 1,886 |
| 5 | 800 | 1,848 | 1,294 | 1,260 | 1,850 | 1,303 |
| 6 | 800 | 1,605 | 1,739 | 1,800 | 1,510 | 1,945 |
| 7 | 800 | 1,821 | 1,986 | 1,620 | 1,080 | 1,591 |
| 8 | 950 | 1,821 | 1,870 | 1,440 | 1,460 | 1,977 |
| 9 | 1,500 | 1,233 | 1,870 | 1,440 | 1,690 | 2,152 |
| 10 | 900 | 1,232 | 1,910 | 1,440 | 1,610 | 1,733 |
| 11 | 1,300 | 1,849 | 1,970 | 1,440 | 2,070 | 1,783 |
| 12 | 1,160 | 1,843 | 1,594 | 1,440 | 1,840 | 1,594 |
| 13 | 1,160 | 1,849 | 1,935 | 1,440 | 1,840 | 1,958 |
| 14 | 1,500 | 1,232 | 1,000 | 1,620 | 1,780 | 1,985 |
| 15 | 1,122 | 1,848 | 1,250 | 1,520 | 1,610 | 1,959 |
| 16 | 1,455 | 2,054 | 1,860 | 1,620 | 1,610 | 1,990 |
| 17 | 935 | 1,643 | 1,176 | 1,480 | 1,840 | 2,384 |
| 18 | 1,309 | 1,648 | 1,591 | 1,800 | 1,560 | 1,876 |
| 19 | 1,122 | 2,054 | 1,591 | 1,800 | 2,070 | 1,172 |
| 20 | 1,122 | 811 | 1,562 | 1,800 | 1,670 | 600 |
| 21 | 1,496 | 1,849 | 1,701 | 1,800 | 2,070 | 600 |
| 22 | 1,122 | 1,643 | 1,168 | 1,260 | 1,870 | 750 |
| 23 | 1,455 | 2,054 | 1,587 | 1,080 | 1,560 | 950 |
| 24 | 1,122 | 2,054 | 1,594 | 640 | 2,070 | 1,012 |
| 25 | 1,309 | 1,232 | 1,572 | 750 | 2,070 | 720 |
| 26 | 1,122 | 800 | 1,705 | 1,260 | 1,970 | 650 |
| 27 | 1,309 | 1,436 | 1,198 | 1,980 | 1,380 | 620 |
| 28 | 1,122 | 1,848 | 1,580 | 1,720 | 1,610 | 650 |
| 29 | 1,650 | 2,054 | 1,398 | 1,320 | 1,840 | 883 |
| 30 | 1,500 | 2,640 | 1,974 | 1,620 | 1,610 | 993 |
| 31 | 1,500 | 1,428 | 1,121 | 1,620 | 1,380 | 1,193 |
| Subtotal | 37,022 | 49,512 | 48,035 | 47,670 | 51,890 | 42,855 |

| Rig | Wells | Mar (gallons) | Totals (gallons) |
|---|---|---|---|
| Rig #1 | Well #1 | 5,200 | 5,200 |
| | Well #2 | 31,822 | 31,822 |
| | | | 37,022 |
| Rig #2 | Well #3 | - | - |
| | Well #4 | 10,656 | 10,656 |
| | Well #5 | 38,856 | 38,856 |
| | | | 49,512 |
| Rig #3 | Well #6 | - | - |
| | Well #7 | 22,447 | 22,447 |
| | Well #8 | 25,588 | 25,588 |
| | | | 48,035 |
| Rig #4 | Well #9 | - | - |
| | Well #10 | 37,400 | 37,400 |
| | Well #11 | 10,270 | 10,270 |
| | | | 47,670 |
| Rig #5 | Well #12 | - | - |
| | Well #13 | 10,730 | 10,730 |
| | Well #14 | 41,160 | 41,160 |
| | | | 51,890 |
| Rig #6 | Well #15 | - | - |
| | Well #16 | - | - |
| | Well #17 | 38,736 | 38,736 |
| | Well #18 | 4,119 | 4,119 |
| | | | 42,855 |