Verification of Blue Source's Greenhouse Gas Emission Reductions for PetroSource's Terrell, Mitchell and Grey Ranch Compressor Station Geologic Carbon Sequestration Project

February 8, 2008

Prepared by

Ruby Canyon Engineering

743 Horizon Ct. Suite 385

Grand Junction, Colorado 81506

(970) 241-9298

Table of Contents

List of Tables

1.0 Executive Summary

Blue Source is an active supplier of emission reductions (ERs) sourced from geologic sequestration, conservation, transportation, and avoidance projects and companies. More recently, the company is actively involved in financing and developing these kinds of projects. PetroSource Energy Company, hereafter referred to as "PetroSource" is an active gatherer, transporter and marketer of CO_2, and related CO_2 equivalents, sourced from industrial vent stacks for use in enhanced oil recovery (EOR) projects, a process which the Intergovernmental Panel on Climate Change (IPCC) has recognized as a method of sequestering CO_2 that would otherwise be vented to the atmosphere (IPCC 1996).

PetroSource has gathered and sold vent-stack CO_2 from the Grey Ranch, Terrell, and Mitchell natural gas processing plants to EOR operators since August 1998. This vent-stack CO2 had previously been vented to the atmosphere. PetroSource entered into long-term lease of approximately 72,000 hp of compression located adjacent to the gas plants and refurbished about 30,000 hp of compression. Between 1999-2001, PetroSource expanded its pipeline and/or compression facilities to allow it to deliver directly to certain purchasers of CO2 for EOR.

The purchasers of PetroSource's vent-sourced CO_2 can obtain underground-sourced CO_2 from reserves at McElmo Dome where it is compressed and transported to the oil fields through the Cortez, Central Basin, and Canyon Reef Carriers (CRC) pipelines. Therefore, the use of vent-sourced CO_2 will replace an equivalent volume of underground-sourced CO_2 and also avoid emissions that would have resulted from its compression and transport.

Emission reductions from the project are documented in a protocol entitled *"Blue Source's Greenhouse Gas Emission Reduction Protocol for PetroSource's Capture of Vent-Stack CO2 at Terrell, Mitchell, and Grey Ranch in Combination with Enhanced Oil Recovery Operations"* which is the subject of this verification. This protocol was prepared according to Blue Source's quantification protocol that was registered with ERT in January 2007.

Mr. Ronald Collings with Ruby Canyon Engineering Inc (RCE) visited the Mitchell plant site on December 19, 2007 to view the equipment referenced in the protocol including the gas engine-driven compressors as well as the monitoring and metering equipment used to capture the volumetric and gas composition data. PetroSource's Pikes Peak gas plant and the McCamey pump station where the custody transfer of the gas takes place were also visited. The ERs associated with the Pikes Peak gas plant are documented in a separate protocol and are not included here.

This verification is based on data obtained from PetroSource and Blue Source. RCE obtained hardcopy records of metered gas volumes for both sold (injected) gas and fuel gas as well as records for electrical usage at the Terrell, Mitchell and Grey Ranch

compressor stations and the McCamey gas transfer site. These records were used to spot check values reported in the protocol.

Estimates of baseline emissions, actual (project) emissions, and ERs were verified based on established emission estimation techniques, conservative estimates, accurate/reliable data sources, and documented methodologies.

Verification findings indicate that all significant emission sources that materially affect the ERs are included within the scope of the project. Both direct emission sources that contribute to emissions within the project boundaries and indirect emission sources that contribute to emissions outside the project boundaries were included. Applicable source characteristics (e.g., fuel flow rates, heating values, electricity usage, etc.) that contribute to emissions were considered.

Emission reduction estimates by month are consistent over the creation period. Baseline emissions that are based on metered gas volumes are consistent month-by-month. Emission factors and methodology used to calculate actual emissions are also consistent by source type.

Data collection, management, and review procedures are applied at site and corporate levels. The sources of data are documented and records appropriately maintained.

This verification report documents the carbon dioxide equivalent (CO_2e) ERs from the project between August 2006 and September 2007. During this period about 1 million metric tonnes of carbon dioxide equivalent (CO2e) were created from the project. The ERs generated from August 1998 through December 2000 were registered previously with the Pilot Emissions Reduction Trading (PERT) program in Ontario by PetroSource. ERs created between January 2001 and June 2004 were registered with the Clean Air Canada (CAC) registry and those created between July 2004 –July 2006 were registered with Environmental Resources Trust (ERT) registry.

2.0 Project Description

The project system starts with the physical capture by PetroSource's compressor stations of atmospheric pressure, vent-stack CO2 which is emitted from third party natural gas processing plants. At each of PetroSource's five compressor stations (Terrell, Grey Ranch, Mitchell, Puckett, and Sierra Madera) the captured CO2 is compressed to between 1,500 psig and 1,800 psig for delivery into PetroSource's Val Verde Pipeline which terminates at the McCamey Pump Station. From the custody transfer point at McCamey, PetroSource's CO2 is delivered to the South Cross Unit lease in Crockett County, Texas, and also follows the Canyon Reef Carriers (CRC) CO2 pipeline to deliver to the Sharon Ridge lease and Sacroc lease both in Scurry County, Texas. Delivery of PetroSource's CO2 to the North and South Cross Units in Crockett County, Texas began with annual facility expansions in early 2000 and in March 2002.

3.0 Seller's Assumptions

The main assumptions used in the protocol to calculate the ERs are listed below:

- Combustion emissions from natural gas-fired engine-driven compressors were estimated from monthly fuel consumption rates fuel composition data.
- Carbon dioxide emissions were conservatively estimated by assuming all the carbon in the fuel is converted to CO_2. Methane emissions from the combustion exhaust were calculated from AP-42 emission factors that are published by the U.S. Environmental Protection Agency (EPA).
- Electricity consumption for the facilities (i.e., compressor and pump stations, and for the pump at McCamey) were based on monthly electricity usage metered at each facility.
- Electricity usage for McElmo Dome compression was estimated at 800 kW/MMscf to compress the CO_2 for pipeline injection based on previous discussions with McElmo Dome operations personnel. This value is consistent with calculation of compressor work required to compress CO_2 between Dome operating pressures of 800 psig (suction) and 2,100 psig (discharge).
- Indirect emissions from electric drive compressors and pumps used at the Terrell, Mitchell and Grey Ranch compressor stations and the CO_2 pump at McCamey were based on state-specific emission factors for emissions of CO_2, CH_4, and N_2O from electric utilities that were compiled by the U.S. Energy Information Administration (EIA). Some differences in emission rates can be expected by the use of generator-specific emission factors (i.e. factors based on the mix of fuels and technologies used for electricity generation by the supplying utility). However, the effect of this change on calculated ERs is insignificant. For e.g., a 50 percent increase in the utility CO_2 emission factor results in about 0.6 percent change in calculated ERs.
- A global warming potential (GWP) of 21 for CH4 and 310 for N_2O was used in the estimation of the total CO_2 equivalent emissions. This is consistent with current guidance from the IPCC.

4.0 Real

For the PetroSource sequestration project, the emission reduction is real because it represents an actual and recognizable action that resulted in direct reductions of CO_2 emissions, which were previously vented to the atmosphere. PetroSource purchases and secures waste CO_2 gas from the vent stacks of natural gas processing plants. PetroSource acquires the commodity CO_2 and exclusively performs the service of capturing the CO_2. The CO_2 gas is sold to crude oil producers for enhanced oil recovery, which is a recognized sequestration technology (Climate Change 1995, 1996). These same crude oil producers have viable alternative purchase opportunities of CO_2 sourced from underground CO_2 reserves, the primary source of injectant CO_2 in the Permian Basin.

To estimate baseline emissions, project emissions, and the ERs created, data obtained from PetroSource and Blue Source were verified. These included:

- monthly metered volumes of vent-sourced CO_2 gas at McCamey;
- electricity and fuel usage data for the Terrell, Mitchell and Grey Ranch compressor stations and the McCamey pump station; and
- the composition of the sold (injected) gas and the composition of the fuel gas.

Calculations of baseline emissions, project emissions, and net ERs were verified and are based on PetroSource's 100% equity interest in the project for the creation time-period. The equity interest value is based on verbal communication. A sample calculation for April 2007 is included in the following sections.

4.1 Baseline Emissions

Baseline is defined as the volume of CO_2 equivalent emissions that would have been released from the industrial vent-stacks to the atmosphere in the absence of the project's operations. In the creation report, the baseline calculation was based on the CO_2 and methane gas volumes metered further downstream in the pipeline at the point of sale for enhanced oil recovery (McCamey pump station). The approach is appropriate as the sales meter readings already account for any CO_2 gas losses that occur within the compressor stations, the pump station, and length of upstream pipeline. Because the measured volumes at the McCamey pump station include volumes from the Pikes Peak plant this volume must be removed from the calculation.

Baseline emissions also include indirect CO_2e emissions that would have occurred from electricity used to compress underground-sourced CO_2 volumes (equal to PetroSource's vent-sourced volumes) at McElmo Dome for transport to the oil fields in West Texas. These emissions are avoided in the post-project scenario but would have occurred in the absence of the project, and therefore, these emissions are included in the project baseline.

In summary, baseline emissions include the gross gas volume, which is the volume of CO_2 and methane that is sold by PetroSource for injection into the enhanced oil recovery production wells, and avoided indirect emissions from electric-drive compressors at McElmo Dome.

4.1.1 Calculation Methodology

The net emission reductions by month are calculated using the following equation:

$$\begin{aligned} ERs &= \text{Baseline Emissions} - \text{Project Emissions} \\ &= (BE) - (PE) \end{aligned} \qquad \text{(Equation 4-1)}$$

where:

ER =Net emission reduction (expressed as tonnes CO_2e per month);
BE =Baseline Emissions (tonnes CO_2e per month); and
PE = Project emissions (tonnes CO_2e per month).

Using the schematic shown in Figure 4-1 of the project protocol, baseline emissions are calculated as,

$$BE = (GV_{OCS,B} + IND_1) \qquad \text{(Equation 4-2)}$$

where:

$GV_{OCS,B}$ = Gross volume of gas for the Terrell, Mitchell, and Grey Ranch baseline (calculated from equations 4-2 and 4-3 below, tonnes CO_2e); and

IND_1 = Indirect emissions that would have occurred from electricity usage to compress underground-sourced CO_2 volume (equal to $GV_{OCS,B}$)for transport from McElmo Dome to the oil fields (expressed as tonnes CO_2e);

The baseline volumes are calculated using equations 4-3 and 4-4,

$$GV_{OCS,B} = V_{frac} \times GV \qquad \text{(Equation 4-3)}$$

and

$$V_{frac} = GV_{OCS} / (GV_{PP} + GV_{OCS}) \qquad \text{(Equation 4-4)}$$

where,

V_{frac} = Ratio of Terrell, Mitchell and Grey Ranch compressor station volumes to total volumes supplied to McCamey;

GV = Total volumes metered at sales meters at McCamey and sold for EOR (based on monthly metered volumes and converted to tonnes CO_2e);

GV_{PP} = Gross volume of gas supplied by the Pikes Peak plant (based on monthly metered volumes); and

GV_{OCS} = Total volume of gas supplied by other compressor stations (i.e., Mitchell, Terrell, and Grey Ranch, based on monthly metered volumes).

The approach for estimating PE takes into account losses and emissions associated with PetroSource's operations to capture, compress, and transport CO_2 to the injection wells, as defined below:

$$PE = CMB + IND_2 + IND_{3,OCS} \qquad \text{(Equation 4-5)}$$

where:

CMB = Combustion emissions associated with compression of CO_2, tonnes CO_2e; and

IND_2 = Indirect emissions associated with electricity usage for Terrell, Mitchell and Grey Ranch compressor stations, tonnes CO_2e;

$IND_{3,OCS}$.=Indirect emissions associated with electricity usage at McCamey that is associated with volumes from Terrell, Mitchell, and Grey Ranch, tonnes CO_2e.

The emissions associated with combustion of natural gas to compress the CO_2 for transport is estimated based on a mass balance approach, assuming all carbon in the fuel is converted to CO_2. Methane and N_2O emissions from the combustion exhaust were based on EPA AP-42 emission factors (USEPA 2000). Calculated emissions were converted to a CO_2 equivalent (CO_2e) basis, using a Global Warming Potential (GWP) of 21 for methane and 310 for N_2O.

This approach is conservative as it assumes all carbon in the fuel is converted to CO_2 while simultaneously accounting for methane emissions in the exhaust, leading to double counting the carbon that remains in the exhaust as unburned methane.

4.1.2 Sample Calculation (April 2007)

The calculation procedures and algorithms are discussed using a detailed sample calculation for the baseline volume (GV_{OCS}), avoided emissions (IND_1), project emissions (PE), and the net ERs for the month of April 2007.

The volumes supplied from the other compressor stations (GV_{OCS}) is calculated as

GV_{OCS} = 761,811 (Terrell) + 675,558 (Grey Ranch) + 0 (Mitchell)

= 1,437,369 Mscf

Using Equation 4-4, the fraction of Pikes Peak volume (744,340) is calculated as,

V_{frac} = (1,437,369)/(744,340 + 1,437,369)

= 0.6588

The total gas volumes metered at the custody transfer meters at McCamey (GV) were calculated as the sum of the CO_2e sales metered to South Cross, North Cross, Mid Cross, Yates (Pecos Connection), and the production leases served by the CRC pipeline. The CO_2 and CH_4 concentrations in the gas were based on measured values for each month. Under the baseline, the rejected gas at the Terrell, Mitchell and Grey Ranch plants would have been incinerated prior to implementing the project therefore all the methane in the gas was converted to CO_2. It is this emission that is counted as baseline emissions

GV= (Sales to South Cross + Sales to North Cross + Sales to Mid Cross + Sales to Yates + Sales to CRC[1])

= (Sales volume) × [CO_2 fraction +44/16 x CH_4 fraction]

$$= (1{,}104{,}070 + 242{,}020 + 27{,}860 + 324{,}895 + 450{,}760) \times 10^3 \text{scf gas} \times \left(0.9638 \frac{\text{scf CO}_2}{\text{scf gas}} \times \frac{\text{lb mole CO}_2}{379.3 \text{ scf CO}_2} \times 44 \frac{\text{lb CO}_2}{\text{lb mole CO}_2} \times \frac{\text{tonne}}{2205 \text{ lb}} + 0.0294 \frac{\text{scf CH}_4}{\text{scf gas}} \times \frac{\text{lb mole CH}_4}{379.3 \text{ scf CH}_4} \times 2.75 \frac{\text{lb CO}_2}{\text{lb CH}_4} \times 16 \frac{\text{lb CH}_4}{\text{lb mole CH}_4} \times \frac{\text{tonne}}{2205 \text{ lb}} \right)$$

$$= 112{,}320 \text{ tonnes CO}_2\text{e}$$

[1] Includes sales to Sharon Ridge, Oxy Cogdell, and SACROC.

Sequestered volumes associated with the Terrell, Mitchell and Grey Ranch compressor stations baseline ($GV_{OCS,B}$) were calculated using Equation 6-3,

$GV_{OCS,B}$ = 0.6588 × 112,320

= 73,996 tonnes CO_2e

Baseline Emissions that would have occurred if underground-sourced CO_2 were purchased from McElmo Dome rather than vent-sourced CO_2, were calculated based on the electricity required to drive the McElmo Dome compressors. Fresh CO_2 from McElmo Dome would have to be compressed to approximately 2,300 psig and transported to the EOR sites. Electric-drive compressors for these operations would require about 800 kW-hr/MMscf based on discussions with McElmo Dome operations personnel (personal communication with PetroSource personnel) and would generate indirect emissions (IND_1) at the power supplier's facility.

Indirect CO_2 emissions were based on the most recent data on average grid factor (lb CO_2/MWh generation) for the State of Colorado, which was obtained from EPA eGRID2006 Version 2.1 published in April 2007 (USEPA 2007). The factor is based on the mix of fuels and operating hours of generating capacity during 2004. Emission factors compiled by the U.S. Energy Information Administration (EIA) (USDOE, 2002) for the State of Colorado were used to calculate indirect CH_4, and N_2O. The total CO_2e emissions were calculated using a GWP of 21 for CH_4, and 310 for N_2O.

$$\text{IND}_1\ (\text{energy}) = 0.6588 \times (1{,}104{,}070 + 242{,}020 + 27{,}860 + 324{,}895 + 450{,}760)\ \text{Mscf gas} \times \frac{0.800\ \text{kW - hr}}{\text{Mscf gas}} \times \frac{\text{MW}}{1000\ \text{kW}} = 1133\ \text{MW - hrs}$$

$$\text{CO}_2\ \text{emissions} = 1{,}986\ \frac{\text{lb}}{\text{MW - hr}} \times \frac{\text{tonne}}{2205\ \text{lb}} \times 1133\ \text{MW - hrs} = 1020\ \text{tonnes}$$

$$\text{CH}_4\ \text{emissions} = 0.0127\ \frac{\text{lb}}{\text{MW - hr}} \times 1133\ \text{MW - hr} \times \frac{\text{tonne}}{2205\ \text{lb}} = 0.0065\ \text{tonne}$$

$$\text{N}_2\text{O}\ \text{emissions} = 0.0289\ \frac{\text{lb}}{\text{MW - hr}} \times 1133\ \text{MW - hr} \times \frac{\text{tonne}}{2205\ \text{lb}} = 0.0148\ \text{tonnes}$$

$$\text{IND}_1\ (\text{April 2007})\ \text{CO}_2\text{e} = 1020\ \text{tonnes} + \left(21 \times 0.0065\ \text{tonnes CH}_4\right) + \left(310 \times 0.0148\ \text{tonnes N}_2\text{O}\right) = 1025\ \text{tonnes CO}_2\text{e}$$

Total baseline emissions were calculated using Equation 4-2,

$$BE = 73,996 + 1025$$

$$= 75,021 \text{ tonnes } CO_2e$$

4.2 Project Emissions

As a result of the emission reduction projects and subsequent annual expansions to each project, direct and indirect emissions result from fuel and electricity for the compressors and pumps used to transport and inject waste CO_2 for EOR purposes. These emission leakages were estimated based on actual monthly fuel and electricity usage data obtained from PetroSource.

Combustion emissions (CMB) due to fuel usage in the engine compressors were calculated from the measured fuel consumption rates and fuel analysis data. The fuel analysis provided information on fuel composition (i.e., percentage of methane, ethane) of the fuel and fuel properties (i.e., density, heating value). The CO_2 emissions from fuel combustion were conservatively estimated by assuming that all the carbon in the fuel is converted to CO_2 during the combustion process and discharged to the atmosphere.

4.2.1 Sample Calculation (April 2007)

Based on the fuel analysis data, the moles of CO_2 emitted from the combustion of a mole of fuel was calculated for each month for each plant. An example calculation is shown in Table 4-1 for the April 2007 data for .

Table 4-1: CO_2 emitted from fuel combustion for fuel used for compression at the Terrell station

Component	Mole Fraction	Mole CO_2/Mole Component	Mole CO_2 in flue gas
Nitrogen	0.00629	0	0.00000
Carbon Dioxide	0.02145	1	0.02145
Methane	0.9694	1	0.96940
Ethane	0.00286	2	0.00572
Total	**1.00000**		**0.99657**

The CO_2 emissions for April 2007 for the Terrell compressor station were then calculated as shown below:

CMB = (Fuel usage) × (heating value) × (CO_2 emitted based on the carbon balance, assuming complete combustion)

$$= \left[\begin{array}{l} (49{,}986)\ \text{MMBtu} \times \dfrac{10^6\ \text{Btu}}{\text{MMBtu}} \times \dfrac{\text{scf fuel}}{983\ \text{Btu}} \times \dfrac{\text{lb mole fuel}}{379.3\ \text{scf fuel}} \\ \times 0.997\ \dfrac{\text{lb mole } CO_2}{\text{lb mole fuel}} \times 44\ \dfrac{\text{lb } CO_2}{\text{lb mole } CO_2} \times \dfrac{\text{tonne}}{2205\ \text{lb}} \end{array} \right]$$

$$= 2{,}667\ \text{tonnes } CO_2$$

The CH_4 emissions were calculated from U.S. Environmental Protection Agency (EPA) AP-42 emission factors for gas-fired engines (USEPA, 2000).

For example, the CH_4 emissions from the combustion sources for April 2007 are calculated as:

$$CH_4 \text{ Emissions} = (\text{emission factor}) \times (\text{fuel usage})$$

$$= \left[(1.45)\ \frac{\text{lb}}{\text{MMBtu}} \times (49{,}986)\ \text{MMBtu} \times \frac{\text{tonne}}{2205\ \text{lb}} \right]$$

$$= 32.9\ \text{tonnes } CH_4$$

Finally, the CO_2 equivalent (CO_2e) emissions for combustion sources were calculated using a GWP of 21 for methane.

$$\text{CMB (Terrell, April 2007) } CO_2e = CO_2 + (21 \times CH_4)$$

$$= 2{,}667 + (21 \times 32.9)$$

$$= 3{,}357\ \text{tonnes } CO_2e$$

The above results agree with those reported for April 07 in Table A-4 of the creation report. Similar calculation for Mitchell and Grey Ranch produce values of 25 and 2,967 tonne CO_2e, respectively.

$$\text{CMB (April 2007) } CO_2e = 3{,}357 + 25 + 2{,}967 = 6{,}349$$

Indirect CO_2 emissions were based on the most recent data on average grid factor (lb CO_2/MWh generation) for the State of Texas, which was obtained from EPA eGRID2006 Version 2.1 published in April 2007. Emission factors compiled by the U.S. Energy Information Administration (EIA) (USDOE 2002) for the State of Texas were used to calculate indirect CH_4, and N_2O. The total CO_2e emissions were calculated using a GWP of 21 for CH_4, and 310 for N_2O. The indirect emissions represent the emissions due to the generation of electricity required to operate the Terrell, Mitchell, and Grey Ranch compressor stations (IND_2) and a portion of the electricity usage at the McCamey pump station ($IND_{3,OCS}$). These emissions were calculated from actual electricity usage data as reflected in the electric utility bills for each station.

Emissions = (emission factor) × (electrical usage)

Electricity usage = Electricity usage at Terrell, Mitchell and Grey Ranch + Portion of McCamey station's electricity used for Terrell, Mitchell and Grey Ranch compressor station volumes
=265,290 + 22,480 + 242400 + 0.6588 × 212,776
=670,347 kWh

$$CO_2 \text{ emissions} = 1{,}472\ \frac{\text{lb}}{\text{MWh}} \times (670{,}347)\ \text{kWh} \times \frac{\text{tonne}}{2{,}205\ \text{lb}} \times \frac{\text{MW}}{1{,}000\ \text{kW}} = 447.5059\ \text{tonnes}$$

$$CH_4 \text{ emissions} = 0.0077\ \frac{\text{lbs}}{\text{MWh}} \times (670{,}347)\ \text{kWh} \times \frac{\text{tonne}}{2205\ \text{lbs}} \times \frac{\text{MW}}{1{,}000\ \text{kW}} = 0.0023\ \text{tonne}$$

$$N_2O \text{ emissions} = 0.0146\ \frac{\text{lbs}}{\text{MWh}} \times (670{,}347)\ \text{kWh} \times \frac{\text{tonne}}{2205\ \text{lbs}} \times \frac{\text{MW}}{1{,}000\ \text{kW}} = 0.0044\ \text{tonne}$$

$$\begin{aligned} IND_2 + IND_{3,\,OCS}\ (\text{April 2007}) &= 447.5059\ \text{tonnes}\ CO_2 + \left(21 \times 0.0023\ \text{tonnes}\ CH_4\right) \\ &\quad + \left(310 \times 0.0044\ \text{tonnes}\ N_2O\right) \\ &= 449\ \text{tonnes}\ CO_2e \end{aligned}$$

Project Emissions during April 2007 were calculated using Equation 4-5,

PE (April 2007) = CMB + IND_2 + $IND_{3,OCS}$
= 6,349 + 449
= 6,798 tonnes CO_2e

4.3 ERs Created

Emission reduction credits are calculated as the difference between baseline emissions and project emissions. Net ERs created by the project were obtained by multiplying the total ERs by PetroSource's equity interest in the project which happens to be 100%.

The net ER created during April 2007 were calculated using Equation 4-1,

Net ER (April 2007) = BE – PE = 75,021 – 6,798 = 68,223 tonnes CO_2e

4.4 Summary of Findings

The methodology used in the protocol is appropriate. The calculations are correct and contain no major errors. Both direct and indirect emission sources were included. The month-by-month data are also consistent.

The net emission reduction is summed over each month of operation during the creation period, Aug. 2006 through September 2007. Table 4-2 presents the annual and total GHG emission reductions (expressed as CO_2e) associated with the Terrell, Mitchell and Grey Ranch carbon sequestration project over the creation period.

Table 4-2. Baseline Emissions, Actual Emissions, and ERs by Year (tonnes CO_2e)

	Baseline Emissions			Actual Emissions (Leakages)			Net Emission Reductions (ERs)
Month – Year	Gross Volume (GV)	Avoided Emissions (IND_1)	Total	Combustion (CMB)	Indirect (IND_2, $IND_{3, OCS}$)	Total (CPL)	
2006 (Aug – Dec.)	384,533	5,341	389,874	36,629	2,344	38,973	350,901
2007 (Jan. - Sep.)	711,040	9,849	720,889	63,123	4,485	67,608	653,281
Total (Oct. 2004 - Sep. 2007)	1,095,573	15,190	1,110,763	99,752	6,829	106,581	1,004,182

5.0 Surplus

The surplus nature of these emission reduction credits is demonstrated by a review of applicable state and federal regulations associated with oil production operations. As summarized in Table 5-1, there are no external requirements for controlling or reducing CO_2 emissions. In addition, PetroSource has no voluntary obligations for reducing or controlling CO_2 emissions.

The PetroSource facilities in this study are not subject to any federal or local regulations that require CO_2 emission reductions. Table 5-1 summarizes the regulations that were considered for this analysis. A review of the Texas Natural Resource Conservation Commission (TNRCC) files for the PetroSource facilities did not indicate that any of the facilities had committed to voluntary CO_2 emission reductions.

Although PetroSource must comply with the regulations referenced in Table 5-1, none of these regulations apply to CO_2 or other greenhouse gas emissions.

Table 5-1. Regulations Potentially Requiring CO_2 Emission Reductions for PetroSource Facilities

Agency	Rule/Citation	Applicability to PetroSource
Texas Natural Resource Conservation Commission (TNRCC)	30 TAC Chapter 111 Regulation I Control of Air Pollution from Visible Emissions and Particulate Matter	This regulation does not apply to carbon dioxide emissions.
TNRCC	30 TAC Chapter 112 Regulation II Control of Air Pollution from Sulfur Compounds	This regulation does not apply to carbon dioxide emissions.
TNRCC	30 TAC Chapter 115 Regulation V Control of Air Pollution from VOCs	According to the PetroSource Title V[a] applications, the facilities being reviewed are not subject to this regulation because they are not located in a county that is subject to this rule. Also, this regulation does not apply to carbon dioxide emissions.
TNRCC	30 TAC Chapter 117	According to the PetroSource Title V[a] applications,

Agency	Rule/Citation	Applicability to PetroSource
	Regulation VII Control of Air Pollution from Nitrogen Compounds	the facilities being reviewed are not subject to this regulation because they are not located in a county that is subject to this rule. Also, this regulation does not apply to carbon dioxide emissions.
EPA	40 CFR 60 New Source Performance Standards (NSPS)	According to the PetroSource Title V[a] applications, the facilities being reviewed are not subject to any NSPS subpart. Also, this regulation does not apply to carbon dioxide emissions.
EPA	40 CFR 61 National Emission Standards for Hazardous Air Pollutants (NESHAPS)	According to the PetroSource Title V[a] applications, the facilities being reviewed are not subject to any NESHAPS subpart. Also, this regulation does not apply to carbon dioxide emissions.
EPA	40 CFR 63 National Emission Standards for Hazardous Air Pollutants for Source Categories (NESHAPS for Source Categories)	According to the PetroSource Title V[a] applications, the facilities being reviewed are not subject to any subpart of NESHAPS for Source Category. Also, this regulation does not apply to carbon dioxide emissions.

The facility operates under Texas Commission on Environmental Quality (TCEQ) permit No. 1374A (TCEQ 2005) authorized under Title 30 Texas Administrative Code § 116.116 (30 TAC § 116.116). A review of the permit indicates that the facility is subject to specific limits for emission of criteria pollutants; however, there are no limits on CO_2, CH_4, or N_2O emissions. The facility is not subject to any external requirements or voluntary obligations for controlling or reducing CO_2, CH_4, or N_2O emissions.

Since the project is not mandated by law and is not required to control GHG emissions, the project is purely voluntary and associated ERs generated by the project are deemed to be surplus in nature.

6.0 Unique

Emission Reductions from PetroSource's sequestration activities during the creation period of August 2006 through September 2007 have not previously been registered or claimed. The owners/operators of the crude oil producing fields which purchase commodity CO2 from PetroSource for injection and the owners/operators of the natural gas treating plants supplying the commodity CO2 to PetroSource have no legal ownership of the ERs, as further described in Section 4.5. PetroSource previously registered CO2e ERs for the 1998-2000 creation period with PERT, for the 2001-June 2004 period with CAC, and for the July 2004-July 2006 time-period with ERT.

7.0 Conclusions

A summary of the verifiable ERs created from the project is shown in Table 7-1. CO_2e emission reductions totaling 1,602,224 tonnes were created from the project. Our findings are consistent with the ER claims in the protocol.

Table 7-1. Summary of Baseline Emissions, Actual Emissions, and ERs (tonnes CO_2e)

	Oct. 2004 - Sep. 2007
Baseline Emissions	1,110,763
Project Emissions	106,581
Net ERs	1,004,182

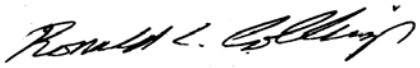
This verification is based on data obtained from PetroSource and Blue Source. RCE obtained hardcopy records of metered gas volumes for both sold (injected) gas and fuel gas as well as records for electrical usage at the Terrell, Mitchell and Grey Ranch compressor stations and the McCamey gas transfer site. These records were used to spot check values reported in the protocol.

Estimates of baseline emissions, actual (project) emissions, and ERs were verified based on established emission estimation techniques, conservative estimates, accurate/reliable data sources, and documented methodologies.

Verification findings indicate that all significant emission sources that materially affect the ERs are included within the scope of the project. Both direct emission sources that contribute to emissions within the project boundaries and indirect emission sources that contribute to emissions outside the project boundaries were included. Applicable source characteristics (e.g., fuel flow rates, heating values, electricity usage, etc.) that contribute to emissions were considered.

8.0 Verification

I hereby warrant that this report was prepared by me based on my examination of information and records provided by PetroSource and Blue Source. The findings indicate that the ERs created from the project meet the criteria as discussed in Sections 4.0 to 7.0 of this verification report.



Ronald C. Collings, P.E.
State of Colorado #31171