Verification Report for GHG Emission Reductions Reported for Sandridge's Capture of Vent-Stack CO2 at the Pikes Peak Gas Plant in Combination with Enhanced Oil Recovery Operations

December 26, 2008

Ruby Canyon Engineering
743 Horizon Ct. Suite 385
Grand Junction, Colorado 81506
(970) 241-9298

Table of Contents

General Information / Abbreviations / Formulas

GHG	Greenhouse Gas
CMM	Coal Mine Methane
kW	Kilowatt
RCE	Ruby Canyon Engineering
EOR	Enhanced Oil Recovery
UNFCCC	United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change
USEPA	Unites States Environmental Protection Agency
USBLM	United States Bureau of Land Management
ANSI	American National Standards Institute
ISO	International Standards Organization
CCX	Chicago Climate Exchange
MMscf	Million standard cubic feet @ standard temperature and pressure
CH4	Methane – a greenhouse gas
CO2	Carbon Dioxide – a greenhouse gas
CO2e	Carbon Dioxide Equivalent
N2O	Nitrous Oxide – a greenhouse gas
GWP	Global Warming Potential
CDM-PDD	Clean Development Mechanism – Project Design Document
kWh	Kilowatt hour
m^3	Cubic meter
ft^3	Cubic feet
BTU	British Thermal Unit
MJ	Mega Joule
kJ	KiloJoule
Mg	Mega gram
yr	year
L	liter
STP	Standard Temperature & Pressure

1.0 Introduction

This GHG reduction project verification is being performed by Ruby Canyon Engineering Inc (RCE) for Blue Source, LLC (Blue Source), Headquartered in Salt Lake City, Utah. The

responsible party is Sandridge Tertiary, LLC (Sandridge), headquartered in Midland, Texas. Contact information can be found in the verification statement at the end of the document.

RCE is performing this verification in accordance with ISO 14064-3 "Specification with guidance for the validation and verification of greenhouse gas assertions". RCE is participating in the American National Standards Institute (ANSI) accreditation program as a third-party greenhouse gas validation/verification body under ISO 14065 standards. Additional information on RCE's background and qualifications can be found in **Appendix A**.

1.1 Project Background

Sandridge has sold and delivered CO2 to crude oil production operators in West Texas for injection into crude production fields since 1998. The source of CO_2 supplied by Sandridge was waste CO_2 gas from natural gas processing plants which previously vented these streams to the atmosphere. In 2004, Sandridge completed the 32-mile Sierra Madera pipeline to enable transport of CO_2 captured from the vent stack of the Pikes Peak gas plant for delivery to EOR operators in the Permian basin. Sandridge installed over 13,000 hp of compression adjacent to the gas plant, including 9,000 hp of gas engine-driven compressors and about 4,500 hp of electric drive compressors.

The purchasers of Sandridge'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 replaces an equivalent volume of underground-sourced CO_2 and also avoids emissions that would have resulted from its compression and transport.

Sandridge also gathers vent-stack CO_2 from other gas plants (Grey Ranch, Terrell, and Mitchell) in the region and delivers those volumes to EOR operators at the McCamey pump station. However, the ERs associated with those volumes are documented in a separate verification report and are not included here.

2.0 Verification Plan

As part of RCE's pre-engagement process under ISO 14065, RCE and Blue Source LLC have agreed on the scope of work defined in the Validation or Verification Service Agreement (VVSA). An integral part of this VVSA includes but is not limited to addressing the following major areas:

- Reasonable level of assurance agreement (95%) will be based on data sources, detailed samples, and quantitative analysis
- Verification objectives agreement will be based on conformance requirements of a particular GHG program or registry standards (American Carbon Registry)
- Verification criteria agreement based on specific methodology or protocol used by GHG program or registry standard (American Carbon Registry)
- Emissions scope agreement based on the following assumptions:
    - organizational boundaries (Sandridge enhanced oil recovery project)
    - physical infrastructure (CO_2 pipelines, process emissions, and compressors)
    - GHG sources (process emissions, stationary combustion sources, indirect emissions)
    - GHG types (CO_2, CH_4)
    - Timeline (November-December 2008)
- Established materiality agreement based on overall and interim levels to be 5%

Additional Validation or Verification considerations specific to the Sandridge GHG reduction Project could include the following:

- complexity of the GHG assertion;
- complexity of the project or organization and its measurement/monitoring processes;
- baseline scenario for project validation and verification, including selection and quantification of GHG sources, sinks and reservoirs applicable to the baseline scenario;
- processes that deliver the information and data in the GHG assertion;
- organizational links and interactions between stakeholders, responsible parties, client, and intended users; (for definition refer to ISO14064-3); and

The verification shall include the following specifics:

- The crediting period shall be from October 1, 2007 – September 30, 2008.
- The verification objectives shall be according to the American Carbon Registry Protocol.
- A site visit will be required to assess the data management system.
- The timeline to complete the project is December 19, 2008.

Both the Emission Reduction Protocol and the GHG assertion can be found in the document titled "Blue Source's Greenhouse Gas Emission Reduction Protocol for SandRidge CO_2 LLC's capture of Vent-Stack CO_2 at Pikes Peak in Combination with Enhanced Oil Recovery Operations" dated December 2008.

Should RCE find discrepancies or suspected inaccuracies RCE will address this to Blue Source for clarification.

2.1 Level of Assurance

A reasonable level of assurance at a 95% confidence was requested by Blue Source. A reasonable level of assurance is defined as follows (ISO 14064-3):

Based on the process and procedures conducted, the GHG assertion:

- Is materially correct and is a fair representation of the GHG data and information, and
- is prepared in accordance with the relevant GHG protocol

2.2 Objectives

The goal of this GHG emission reduction verification is to ensure that the GHG assertion made by Sandridge is materially correct, that the data provided to RCE can be documented and if errors or omissions are detected, they be corrected by the client and/or responsible party.

2.3 Eligibility Criteria

Based on the relevant protocol requirement for additionality and permanence, the project must meet the following criteria:

- Real (project activities have resulted in actual GHG emission reductions)
- Regulatory Surplus (the project must not be mandated by law);
- Permanence of the GHG emission reductions.
- Unique (not previously registered as emission reductions)
- Claimable (legal ownership of the greenhouse gases)

2.4 Scope

The scope of the project must be specified through the definition and description of the following attributes:

- The project boundary
- The baseline scenario
- Infrastructure, Activities, Technologies and Processes of the GHG project
- GHG sources, sinks and/or reservoirs
- Types of Greenhouse gases
- Time period

2.5 Materiality

The accuracy of the GHG assertion is dependent upon the accuracy and completeness of the relevant data needed to calculate the GHG assertion. The relevant data includes:

- Volume of the gas delivered for sequestration
- Composition of the delivered gas
- Energy used by the project and the emission factors used to determine the GHG emissions associated with that energy use
- Identification and quantification of leakage

The materiality threshold used for this verification is +/- 5%.

3.0 Assessment of GHG Data and Information

3.1 Scope

3.1.1 Project boundary

The project activity recovers the waste gas stream from the Pikes Peak gas processing plant. The plant inlet gas contains approximately 65% CO_2 with the remainder being hydrocarbon gas and some nitrogen. The hydrocarbon gas is separated from the CO_2 and sold. The CO_2 together with a small amount of methane (~3%) is captured and compressed for transport to the McCamey pump station where the pressure is boosted from approximately 1,800 psig to approximately 2,200 psig. The McCamey station is also the custody transfer station where Sandridge sells the gas to the Pecos, CRC, North Cross, and South Cross pipelines for delivery to various EOR projects where the gas will be injected into the ground to displace oil and water, therefore being sequestered. These metered sales volumes are the volumes used in the calculation of gas sequestered (part of the GHG assertion). Any leakage downstream of the custody transfer meter is outside the project boundary.

Included within the project boundary are the compressors and associated equipment needed to transport the gas to the McCamey pump station as well as the booster pump at the McCamey station. Only the gas sold to the EOR pipelines is counted for emission reductions. Any gas lost through operational venting or leakage during the compression and transportation is therefore excluded from the emission reduction calculation.

Any GHG emissions associated with the gas processing plant but not associated with the capture of the CO_2 are not part of the project activities and are therefore outside of the project boundary.

3.1.2 Baseline scenario

The GHG assertion provided in the protocol establishes that without this project the CO_2 produced at the Pikes Peak facility would have been vented to the atmosphere. It is also asserted that this vent stack CO_2 displaces the fossil CO_2 from McElmo Dome and therefore reduces the amount of energy that would have been used to compress that gas from approximately 800 psig to approximately 2,100 psig

3.1.3 Infrastructure, activities, technologies and processes of the GHG project

Significant infrastructure has been built and maintained to transport approximately 32 MMcf/d of CO_2 to the purchasers including approximately 13,000 horsepower of compression and approximately 32 miles of 10 inch buried pipeline. This includes sophisticated monitoring and metering devices to ensure accurate accounting of CO_2 sales and natural gas fuel and electrical usage.

3.1.4 GHG sources, sinks and/or reservoirs

The GHG sources considered by this verification are:

- The CO_2 and CH_4 captured from the waste gas at the Pikes Peak facility.
- The CO_2, CH_4 and N_2O related to the energy used to compress the gas for delivery and underground injection

The sole GHG sink is the process of transferring the gas to oil and gas operators for sequestration of the CO_2 and CH_4 at several oil fields in the area.

3.1.5 Types of greenhouse gases

This verification is concerned with CO_2 and CH_4 mitigation as well as project emissions of CO_2, CH_4, and N_2O.

3.1.6 Time period

The crediting period is from October 2007 and September 2008, inclusive.

3.2 Pikes Peak Site Visit

Mr. Ronald Collings and Ms. Bonny Crews with RCE and Mr. Mahesh Gundappa with Blue Source visited the field operations at the Pikes Peak gas processing plant as well as the McCamey pump station December 9, 2008. The control rooms that the operators use to track the plant processes and volumes were also visited.

Because GHG emission reductions have been verified in previous years Sandridge has established processes and procedures to capture the information relevant to calculating the emission reductions. The verification team visited with the person in charge of collecting and compiling this information on a monthly basis and transferring this data to Blue Source for their GHG calculations. The verification team received hardcopy documentation of the monthly fuel usage, power usage and gas sales volumes during the visit.

3.2.1 Subsequent data received

Sandridge provided additional documentation to help explain the calculation separating the fuel gas and power usage used at the gas processing plant (outside the boundary) from that used at the compressor station (inside the boundary).

3.3 Sampling Plan

The limited number of months as well as the limited number of greenhouse gases and the limited sources of project emissions allowed the verification team to verify all data that was used to make the greenhouse gas assertion.

3.4 Assessment of GHG Information and Information System Controls

The gas injection volumes in standard cubic feet of total gas were based on the monthly metered volumes that compare the volumes metered by Sandridge at the McCamey station inlet with the volumes metered by the gas purchasers at the McCamey station outlet. Values from the hardcopy of these documents (**Appendix B-1**) were compared to the values in the tables used to calculate the gas delivered to the pipelines to be sequestered.

Because the gas sold for sequestration contains both CO_2 and CH_4 the composition of that gas must be determined in order to calculate the total GHG emission reductions. The average gas composition for each month is determined by gas chromatograph using an average sample accumulated over that month. A small volume of gas is injected into a pressure vessel several times a day at the McCamey station. The composition of this gas provides an accurate average for determining the content of CO_2 and CH_4 in the sales gas over that time period. **Appendix B-2** is an example of an accumulated gas sample from the McCamey station.

The Pikes Peak processing plant sells the residual gas as natural gas to several gas purchasers including the CO_2 compression plant. This sale to the compression plant is tracked for internal accounting purposes and is captured on the monthly gas sales invoice (**Appendix B-3**).

The electrical power sales meter is at the plant inlet of the Pikes Peak plant and therefore there is not a power sales invoice showing the power used at the CO_2 compression station. However, Sandridge has three electric meters to track the power used by the compressor station separately for internal accounting purposes. An example of how the power is split between the compressor station and the total plant is shown in **Appendix B-4**.

RCE reviewed, organized and processed all source documents and additional supporting documentation as provided by Blue Source for the period October 2007 through September 2008. The 12 month period of performance and minimal data generation points allowed for a 100% sample of the data elements. Available records and reports for sales delivery and compressor stations consisted of sales volume logs, summarization reports, fuel gas and electricity usage worksheets, supporting invoices, gas composition information, meter calibration documents, sample calculations and various other documents.

Fuel usage values reported for the Pikes Peaks compressor station indicated 0.0% variance from the GHG assertion. Electricity usage values initially provided indicated a -1.01% difference between the GHG assertion and its supporting documentation. The month of discrepancy was August, 2008. The summary report amount was 1,256,797kWH (coincidentally the same amount reported in July, 2008) and the supporting worksheet documentation indicated 1,419,524kWH. This discrepancy was corrected in the GHG assertion leaving a 0.0% variance for the electrical usage.

3.5 Assessment against Validation or Verification Criteria

The methodology used to calculate the ERs associated with the volumes captured and compressed at the Pikes Peak plant operated by Sandridge is contained in the protocol titled “Blue Source’s

Greenhouse Gas Emission Reduction Protocol for SandRidge CO_2 LLC's capture of Vent-Stack CO_2 at Pikes Peak in Combination with Enhanced Oil Recovery Operations" dated December 2008. It is against this protocol that RCE is verifying this GHG assertion.

3.5.1 Regulatory surplus

There are no regulatory requirements for controlling or reducing CO_2 emissions at this site and Sandridge has no voluntary obligations for reducing or controlling CO_2 emissions, therefore the project is deemed to be purely voluntary and therefore the associated GHG emission reductions are surplus in nature.

3.5.2 Implementation barriers

Blue Source makes the case that there was significant price competition from existing EOR CO_2 suppliers at the time that Sandridge made the commitment to the GHG emission reduction activities at the Pikes Peak plant. It is well known that there are significant supplies of underground sourced CO_2 at the McElmo Dome, Sheep Mountain and Bravo Dome gas fields that have been supplying CO_2 for EOR from the early 1980's. This gas is almost entirely CO_2 and would not be produced without the demand from the EOR projects in West Texas. Blue Source makes the assertion that without the prospects of GHG reduction credits that the project would have only provided a 9% rate of return, well below the economic hurdle rate of 20% expected by the local oil and gas industry. RCE has no way of checking those values but finds them credible because Sandridge (originally Petrosource) was an early mover in the U.S. voluntary GHG emission reduction market and knew that value could be added to the project through this market.

3.5.3 Common practice

Enhanced oil recovery using CO_2 is not a common improved oil recovery process because of the relative scarcity of large volumes of high purity CO_2 near to significant oil accumulations that are amenable to this type of recovery. Most CO_2 EOR projects are located in the Permian basin of West Texas and New Mexico where there exist large oil fields and where the oil has the required chemical composition and are within the appropriate temperatures and pressure ranges. This, together with the availability of very large naturally occurring reservoirs of high purity CO_2 within a reasonable pipeline distance makes these operations economically viable.

3.5.4 Permanence

The best argument for the permanent storage of CO_2 in an oil field is the proven capacity of the geologic structure to store hydrocarbons including a natural gas cap over millions of years. The ability of these structures to contain this oil is related to the structural stability of the geologic province and the very thick very low permeability of the overlying shale seal.

The primary risk of CO_2 release is related to the wellbores that have penetrated this seal. These wells will need to be properly plugged and periodically monitored to ensure that CO_2 is not leaking from them.

It is not within the scope of this verification to affirm or dispute the validity of the assertion that the CO_2 will be permanently sequestered.

3.6 Evaluation of the GHG Assertion

3.6.1 Baseline emissions calculation

The assertion makes a good case for the baseline as no other beneficial use could be found for the CO_2 and CH_4 normally vented at the Pikes Peak plant.

Baseline emissions represents the gross volume of gas for Pikes Peak plus the indirect emissions that would have occurred from the electricity usage to compress underground-sourced CO_2 volume equivalent to $GV_{PP,B}$ for transport from McElmo Dome to the oil fields.

$$BE = (GV_{PP,B} + IND_1)$$

Where $GV_{PP,B}$ represents the baseline volume, IND_1 represents avoided emissions.

Because the inlet volume metered at the McCamey station is a combination of the gas from four compressor stations and because the gas sales includes a small amount of gas that is sold for purposes not related to sequestration the fraction of gas sold to the EOR purchasers must be allocated back to the Pikes Peak plant. To do this the fraction of inlet gas that is from the Pikes Peak plant is determined by the following formula.

$$GV_{PP,B} = PP_{frac} \text{ x } GV$$

$$PP_{frac} = \frac{GV_{PP}}{(GV_{PP} + GV_{OCS})}$$

This fraction is then applied to the summation of the gas sold to the EOR gas purchasers to determine the amount of gas sold by the Pikes Peak plant. The following calculations were done for the month of March 2008.

The volume of metered CO_2 from the other compressor stations that feed CO_2 into the McCamey station (Terrell, Mitchell and Grey Ranch), (GV_{OCS}) is calculated as:

$$\mathbf{GV_{OCS}} = 815{,}840 + 747{,}310 + 423{,}770 = 1{,}986{,}920 \text{ Mscf}$$

The fraction of the total gas that is from Pikes Peak is calculated as:

$$PP_{frac} = 972{,}500/(972{,}500 + 1{,}986{,}920) = 0.3286$$

The calculation of the mass of CO_2 equivalent is straight forward as shown below and the spreadsheet calculations have been verified to be using this formula. The global warming potential of 21 was used for the calculation of the methane CO_2 equivalent volumes

GV = (Sales to South Cross + North Cross + Mid Cross + Yates + CRC)
= (Total sales volume) x [CO_2 fraction + 21 x CH_4 fraction]

GV = (531,530 + 1,241,140 + 152,370 + 603,500 + 352,440) x 1000 scf/Mscf = 2,880,980,000 scf x

$$\left[0.95552 \frac{\text{scf } CO_2}{\text{scf gas}} \text{x} \frac{\text{lb mole } CO_2}{379.3 \text{ scf } CO_2} \text{x} 44 \frac{\text{lb } CO_2}{\text{lb mole } CO_2} \text{x} \frac{\text{tonne}}{2205 \text{ lb}} + 21 \text{x} \right.$$
$$\left. 0.03632 \frac{\text{scf} CH_4}{\text{scfgas}} \text{x} \frac{\text{lb mole } CH_4}{379.3 \text{ scf } CH_4} \text{x} 16 \frac{\text{lb } CH_4}{\text{lb mole } CH_4} \text{x} \frac{\text{tonne}}{2205 \text{ lb}} \right]$$

= 186,861 tonnes CO_2e

$\mathbf{GV_{PP,B}}$ = 0.3286 x 186,861 = **61,403 tonnes CO_2e**

The power needed to supply the underground sourced CO_2 in absence of the vent stack sourced CO_2 is based on boosting the wellhead pressure of approximately 800 psig to the pipeline pressure of 2100 psig. Blue Source obtained the value of 800 kW-hr/MMscf from discussions with McElmo Dome operations personnel. The energy and therefore GHG emissions associated with this power consumption is also shown below.

The indirect CO_2 emissions were based on the most recent data on the average grid factor (lb CO_2/MW-hr generation) for the State of Colorado, which was obtained from the EPA eGRID2006 v. 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. Total CO_2e emissions were calculated using a GWP or 21 for CH_4 and 310 for N_2O.

$$IND_1(energy) = 0.3286 \times 2{,}880{,}980 \text{ Mscf} \times \frac{800 \text{ kW - hr}}{\text{MMscf gas}} \times \frac{\text{MMscf gas}}{1000 \text{ Mscf gas}} \times \frac{\text{MW}}{1000\text{kW}} = \mathbf{757} \text{ MW-hr}$$

Using the species emission factors for Colorado and the GWP values for each species;

$$CO_2 \text{ emissions} = 1{,}986 \frac{\text{lb}}{\text{MW - hr}} \times \frac{\text{tonne}}{2205 \text{ lb}} \times 757 \text{ MW - hrs} = 682 \text{ tonnes}$$

$$CH_4 \text{ emissions} = 0.0127 \frac{\text{lb}}{\text{MW - hr}} \times \frac{\text{tonne}}{2205 \text{ lb}} \times 757 \text{ MW - hrs} = .004 \text{ tonnes}$$

$$N_2O \text{ emissions} + 0.0289 \frac{\text{lb}}{\text{MW - hr}} \times \frac{\text{tonne}}{2205 \text{ lb}} \times 757 \text{ MW - hrs} = .010 \text{ tonnes}$$

IND_1 (March, 2008) CO_2e = 682 tonnes + (21 x .004 tonnes CH_4) + (310 x 0.010 tonnes N_2O) **= 685 tonnes CO_2 e**

Therefore the baseline emissions for March 2008 are:

BE = ($GV_{PP,B}$ + IND_1) = 61,403 + 685 = **62,088 tonnes CO_2e**

This value compares to 62,090 in the GHG assertion, a -0.0032% difference which is probably caused by rounding error.

3.6.2 Baseline materiality

Because the gas sold for sequestration is a valued commodity, its volume and composition is closely measured by both parties at the custody transfer point. Sandridge invoices for a measured volume each month and the sales meter is calibrated quarterly to within +/- 2%. If there is a significant discrepancy between this volume and the volume measured by the purchasers the problem is addressed and rectified. The weighted average percent difference of the metered outlet volume from the metered inlet the volume over period of interest was -0.97%.

Because of the stringent metering requirements imposed by the transfer of a valued product and the complete record keeping done by Sandridge the volume of gas sold for sequestration through EOR processes is materially correct. This is by far the largest component of the GHG assertion.

The other component of the baseline emissions is the energy saved by not boosting the pressure of the underground sourced CO_2 for delivery to the EOR projects. The value used to determine this number is 800 kW-hr/MMscf of gas throughput. This value was obtained by Blue Source from operations personnel at the McElmo Dome compression facility. Because there is a phase change of the fluid from gas to supercritical liquid during this process, calculating the energy requirements is complicated. Therefore RCE calculated the energy requirements assuming only a gas phase and also by assuming only a supercritical phase. Although using the gas phase only calculation increased the energy required by 31% and using the supercritical only calculation decreased the energy requirement by 57% the change in the total calculated baseline emission reductions was only 0.37% and -0.67% respectively. Therefore the calculation using 800 kW-hr/MMscf is within the bounds of materiality.

3.6.3 Project emissions calculation

Combustion emissions (CMB) due to fuel usage in the engine compressors were calculated from the measured fuel consumption rates and fuel analysis data. The sample calculation for March, 2008 is shown below:

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

$$= \left[29{,}416\ \text{MMBtu} \times \frac{10^6\ \text{Btu}}{\text{MMBtu}} \times \frac{\text{scf fuel}}{963\ \text{Btu}} \times \frac{\text{lb moles fuel}}{379.3\ \text{scf fuel}} \times 0.986 \frac{\text{lb mole } CO_2}{\text{lb mole fuel}} \times 44 \frac{\text{lb } CO_2}{\text{lb mole } CO_2} \times \frac{\text{tonne}}{2205} \right]$$

= 1585 tonnes CO_2

The CH_4 emissions were calculated from USEPA AP-42 emissions factors for gas-fired engines. For March, 2008, the methane emissions were calculated as:

CH_4 emissions = (emission factor) x (fuel usage)

$$= \left[1.45 \frac{\text{lb}}{\text{MMBtu}} \times 29{,}416\ \text{MMBtu} \times \frac{\text{tonne}}{2205\ \text{lb}} \right]$$

= 19.344 tonnes CH_4

The CO_2 equivalent emissions for combustion source were calculated using a GWP of 21 for methane.

CMB (March, 2008) CO_2e = CO_2 + (21 x CH_4)
= 1585 + (21 x 19.344)
= **1991 tonnes CO_2e**

Indirect emissions represent the emissions due to the generation of electricity required to operate the Pikes Peak compressor stations (IND_2), and a portion of the electricity usage at the McCamey pump station ($IND_{3,PP}$). These emissions were calculated from actual electricity usage data as reflected in the electric utility bills and internal metering stations as noted in Section 3.4. In this case the GHG emission factors are those for the state of Texas.

Emissions = (emission factor) x (electrical usage)

Electricity usage = Electricity usage at Pikes Peak + portion of McCamey station's electricity used for Pikes Peak volumes

= 1,393,332 + 0.3286 x 287,518
= 1,487,810 kWh

CO_2 emissions = $1472 \frac{\text{lb}}{\text{MWh}} \times 1{,}487{,}810\,\text{kWh} \times \frac{\text{tonne}}{2205\,\text{lb}} \times \frac{\text{MW}}{1000\text{kW}}$ = 993 tonnes

CH_4 emissions = $0.0077 \frac{\text{lb}}{\text{MWh}} \times 1{,}487{,}810\,\text{kWh}$ x $\frac{\text{tonne}}{2205\,\text{lb}}$ x $\frac{\text{MW}}{1000\text{kW}}$ = 0.0052 tonnes

N_2O emissions = $0.0146 \frac{\text{lb}}{\text{MWh}} \times 1{,}487{,}810\,\text{kWh}$ x $\frac{\text{tonne}}{2205\,\text{lb}}$ x $\frac{\text{MW}}{1000\text{kW}}$ = 0.0099 tonnes

IND_2 + $IND_{PP\ (March,\ 2008)}$ = 993 tonnes CO_2 + (21 x 0.0052 tonnes CH_4) + (310 x 0.0099 tonnes N_2O)
= 996 tonnes CO_2e

Project Emissions during March, 2008 were calculated as follows:

PE = CMB + IND_2 + $IND_{3,PP}$
= 1991 + 996
= **2987 tonnes CO_2e**

The net Emissions Reductions during March 2008 were calculated as:

ER = BE – PE
= 62,088 – 2987
= 59,101 tonnes CO_2e

This value compared to 59,103 tonnes CO_2e in the GHG assertion is an insignificant difference probably related to rounding error.

3.6.4 Project emissions materiality

The calculated project emissions are materially correct. The primary values used in the indirect emissions calculations are fuel gas usage and electrical power usage for compressing the gas for transport. Because these are metered values which are used to allocate costs to the CO_2 portion of the Pikes Peak plant activities and are tied to sales invoice for those two energy sources RCE believes that the project emissions are materially correct.

3.7 Verification Records

Example documents for the gas sales and fuel gas and power purchase are attached at the end of this document as appendix. Hard copies of the monthly documents used for these calculations reside at RCE's Grand Junction office.

4.0 Verification Statement

4.1 Client

Mr. Mahesh Gundappa
Vice President, Engineering
Blue Source, LLC
4020 WestChase Blvd., Suite 470
Raleigh, NC 27607
Phone: (919) 827 0322
Fax: (919) 827 0479
E-mail: mgundappa@bluesource.com

4.2 Responsible Party

Mr. Greg West
President
SandRidge Tertiary, LLC
6 Desta Drive, Suite 6300
Midland, Texas 79705
Phone: (432) 687-4242
Fax: (432) 618-0767
E-mail: gwest@sdrge.com

4.3 Introductory Statement

This verification is for ex-post emission reductions identified by Sandridge Tertiary LLC. Ruby Canyon Engineering acting as third party verifiers worked with Blue Source and Sandridge to finalize their emission reduction assertion which covers October 2007 through September 2008, inclusive. Sandridge asserts that selling CO_2 and CH_4 captured from the Pikes Peak gas separation plant for purposes of enhanced oil recovery is reducing GHG emissions. RCE, through a site visit and document collection has verified this to be the case under the Protocol provided by Blue Source and has calculated these emission reductions to be 635,447 metric tons of carbon dioxide equivalents over the crediting period. The calculated reductions are in accordance with protocol supplied by Blue Source and are backed up with documents supporting the gas sales numbers and the project energy usage number supplied by Sandridge.

It was Sandridge's responsibility to supply RCE with accurate and verifiable data. It was RCE's responsibility to accurately interpret this data and verify the calculated emission reductions. It was also RCE's responsibility to ensure that the Project met all of the associated protocol requirements.

4.4 Objectives and Scope

The goal of this GHG emission reduction verification was to ensure that the GHG assertion made by Sandridge is materially correct, that the data provided to RCE can be documented and if errors or omissions were found that they be corrected.

The scope of the project is specified though the definition and description of the following attributes:

- The project boundary

- The baseline scenario
- Infrastructure, Activities, Technologies and Processes of the GHG project
- GHG sources, sinks and/or reservoirs
- Types of Greenhouse gases
- Time period

4.5 Eligibility

Based on the relevant protocol requirements provided by Blue Source for additionality and permanence, the project meets the following criteria:

- Regulatory Surplus (the project must not be mandated by law);
- Implementation Barriers (project activity faces one or more distinct barriers compared to alternatives)
- Common Practice (project is not common practice in a sector/region); and
- Permanence of the GHG emission reductions.

4.6 Level of Assurance

This GHG emission reduction assertion meets a reasonable level of assurance as defined by ISO 14064-3. A reasonable level of assurance is defined as follows.

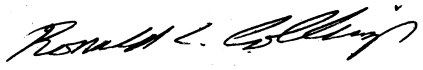
Based on the process and procedures conducted, the GHG assertion:

- Is materially correct and is a fair representation of the GHG data and information, and
- Is prepared in accordance with the relevant GHG protocol

4.7 GHG Assertion

RCE verifies that the GHG assertion of emission reductions related to Sandridge's sale of captured CO_2 and CH_4 for Carbon Sequestration/Enhanced Oil Recovery project that would otherwise have been vented is materially correct at a reasonable level of assurance. Without the Project all of the carbon dioxide and methane in the injected gas would be vented to the atmosphere. The total GHG emission reductions by month are shown in **Table 1**.

Table 1. Emission reductions by month for Pikes Peak GHG emission reductions metric tons CO_2 equivalent			
Creation Period	**Baseline Emissions (BE)**	**Project Emissions (PE)**	**Emission Reductions (ERs)**
October-07	26,518	1,767	24,751
November-07	46,169	2,169	44,000
December-07	59,524	2,769	56,755
January-08	53,513	2,840	50,673
February-08	58,724	2,746	55,978
March-08	62,090	2,979	59,111
April-08	58,862	3,434	55,428
May-08	64,184	2,725	61,459
June-08	56,856	2,166	54,690
July-08	64,392	2,951	61,441
August-08	65,444	3,168	62,276
September-08	51,624	2,849	48,775
Oct-Dec 2007	**132,211**	**6,705**	**125,506**
Jan-Sept 2008	**535,689**	**25,858**	**509,831**
TOTAL	**667,900**	**32,563**	**635,337**



Ronald C. Collings December 26, 2008
Professional Engineer, Colorado #31171

Verifier contact information
Ronald C Collings
President
Ruby Canyon Engineering
Registered Professional Engineer, Colorado, 31171
743 Horizon Ct Ste 385
Grand Junction, CO 81506
Phone: +1 (970) 241-9298
Email: rcollings@rubycanyoneng.com

5.0 Appendix A

Verifier Background

Ruby Canyon Engineering Inc. (RCE) was formed in 2005 as an organization dedicated to facilitating greenhouse gas (GHG) emission reduction projects by providing clients technical assistance services. RCE's principle focus has been providing expert technical services related to GHG project identification, completion of technical and economic feasibility studies, project implementation, and documentation and verification of GHG emission reductions projects.

RCE has contributed to developing and documenting greenhouse gas emission reduction methodologies, baselines, and inventories and has participated in implementing emission reductions projects. RCE has validated various proposed GHG projects in the waste water, coal mine and transportation sectors and has verified GHG emission reductions associated with coal mine, carbon capture and sequestration and transportation sectors. RCE prepared a baseline methodology that was integrated into the UNFCCC-approved consolidated methodology (ACM0008) for coal mine methane capture and utilization.

RCE is participating in the American National Standards Institute (ANSI) accreditation program as a third-party greenhouse gas validation/verification body under ISO 14065 standards.

Verifier Qualifications

- Ronald Collings, President of RCE, has extensive experience with CO_2 EOR projects having been a production and reservoir engineer for Chevron's Rangely Weber Sand Unit EOR project in Colorado for approximately eight years
- Ronald Collings and Michael Coté (Vice President), the verification team leaders for RCE both have ten years of experience in working with all aspects of GHG projects.
- Mr. Coté has seven years experience in working with GHG emissions inventories.
- Mr. Collings and Mr. Coté have five years experience in calculating, documenting, and verifying greenhouse gas emission reduction projects.

6.0 Appendix B: Examples of Supporting Documentation

Appendix B-1: Volumes in and Volumes Sold at McCamey Pump Station

SANDRIDGE CO_2, LLC

Val Verde CO_2 Pipeline System

VAL VERDE CO_2 PIPELINE SYSTEM
CO_2 VOLUME REPORT
MARCH 2008

	STATIONS	METERS	VOLUMES @ 14.65 PSIA/60 F
1.	Terrell	Meter 101	815,840.0 MCF
2.	Grey Ranch	Meter 201	423,770.0 MCF
3.	Mitchell	Meter 301	747,310.0 MCF
4.	Sierra Madera		972,500.0 MCF
5.		Total Received (Lines 1 + 2 + 3 + 4)	2,959,420.0 MCF
6.	Pecos Connection	Meter 100	352,442.0 MCF
7.	Val Verde Delivery	Meter 505	603,500.0 MCF
8.	North Cross Delivery	Meter 801	531,530.0 MCF
9.	South Cross Delivery	Meter 701	1,241,140.0 MCF
10.	Mid Cross Delivery	Meter 601	152,370.0 MCF
11.	Flo CO_2		60,690.0 MCF
12.		Total Delivered (Line 6+7+8+9+10+11)	2,941,672.0 MCF
13.	Unaccounted for Gas	(Lines 11 - 5)	17,748.0 MCF
14.	System Line Balance	(Lines 11 / 5) x 100	0.6 %

Misty Olivas

Misty Olivas

Fax: B. Harryman

4/1/2008

MPSCO2Vol

Received Time Apr. 1. 2008 8:37AM No. 2087

Appendix B-2: Gas Composition of a Composite Sample

MITCHELL ANALYTICAL LABORATORY

2638 Faudree
Odessa, Texas 79765-8538
(432) 561-5579

Gas Analysis

Company:	Petro Source Carbon Co. (187)		
Producer:		Sample Pressure:	500
Lease:	McCamey Stat Composite CO2	Sample Temp:	93
Station #:		Date Sampled:	3/14/2008
Date Run:	3/27/2008	Sampled by:	MW
Lab Ref #:	08-MAR-43072	Field Gravity:	
Cylinder:		Field H2S:	0.0070
Analyzed by:	David		

Physical Constants per GPA 2145-03
All values calculated @ 60.0 Deg. F.

	Mole %	14.65 psia GPM (Ideal)	14.73 psia GPM (Ideal)	14.65 psia BTU (Ideal Dry)
Nitrogen	0.017			0.000
CO2	95.552			0.000
H2S	0.007			0.000
Methane	3.632			36.600
Ethane	0.458	0.122	0.122	8.100
Propane	0.136	0.037	0.037	3.400
N-Butane	0.050	0.016	0.016	1.600
Iso-Butane	0.022	0.007	0.007	0.700
N-Pentane	0.022	0.008	0.008	0.900
Iso-Pentane	0.020	0.007	0.007	0.800
Hexane	0.023	0.010	0.010	1.100
Heptanes +	0.061	0.026	0.026	3.300
TOTALS	**100.000**	**0.232**	**0.233**	**56.500**

GROSS HEATING VALUE @ 14.65 psia

Dry	Wet	
57	57	BTU/Real Cu.Ft.
1.4854	1.4824	Specific Gravity (Real)
57	56	BTU/Ideal Cu.Ft.
1.4777	1.4628	Specific Gravity (Ideal)
Z Factor :	0.9944	

GASOLINE CONTENT (GPM/Real)

Ethane and Heavier	0.2337
Propane and Heavie	0.1113
Butane and Heavier	0.0738
Pentane and Heavie	0.0509

Notes: Adjustment made for Field H2S

Received Time Apr. 8. 2008 4:44PM No. 2137

MARCH 2008 PIKE'S PEAK RESIDUE GAS SALES INVOICING

SWING SALES

Purchaser		Astra			Garland			City of Austin (TGMC)			Magnus			Atmos							
Day	Waha GDA	Volume	Swing Price	Value	Volume	Swing Price	Value	Volume	Swing Price	Value	Volume	Swing Price	Value	Volume	Swing Price	Value	Volume	Swing Price	Value	Tot. Swing Sales Vol	Daily Swing Revenues
3/1	$8.250	10,000	$8.210	$82,100.00																10,000	$82,100.00
3/2	$8.250	10,000	$8.210	$82,100.00																10,000	$82,100.00
3/3	$8.250	10,000	$8.210	$82,100.00																10,000	$82,100.00
3/4	$8.605	12,000	$8.596	$103,140.00	2,000	$8.605	$17,210.00													14,000	$120,350.00
3/5	$8.860	7,000	$8.850	$61,950.00	2,000	$8.860	$17,720.00	5,000	$8.840	$44,200.00										14,000	$123,870.00
3/6	$9.025	15,000	$9.015	$135,225.00	2,000	$9.040	$18,080.00													17,000	$153,305.00
3/7	$9.345	10,000	$9.335	$93,350.00							7,000	$9.345	$65,415.00							17,000	$158,765.00
3/8	$9.245	10,000	$9.235	$92,350.00										2,000	$9.215	$18,430.000				12,000	$110,780.00
3/9	$9.245	10,000	$9.235	$92,350.00										2,000	$9.215	$18,430.000				12,000	$110,780.00
3/10	$9.245	10,000	$9.235	$92,350.00										2,000	$9.215	$18,430.000				12,000	$110,780.00
3/11	$8.960	10,000	$8.950	$89,500.00										2,000	$8.910	$17,820.000				12,000	$107,320.00
3/12	$9.106	10,000	$9.096	$90,950.00																10,000	$90,950.00
3/13	$8.846	10,000	$8.836	$88,350.00				5,000	$8.860	$44,300.00										15,000	$132,650.00
3/14	$8.770										10,000	$8.770	$87,700.00							10,000	$87,700.00
3/15	$8.730	10,000	$8.720	$87,200.00							3,000	$8.750	$26,250.00							13,000	$113,450.00
3/16	$8.730	10,000	$8.720	$87,200.00							3,000	$8.750	$26,250.00							13,000	$113,450.00
3/17	$8.730	10,000	$8.720	$87,200.00							3,000	$8.750	$26,250.00							13,000	$113,450.00
3/18	$8.800	10,000	$8.790	$87,900.00										5,000	$8.750	$43,750.00				15,000	$131,650.00
3/19	$8.345				2,000	$8.320	$16,640.00	5,000	$8.325	$41,625.00	8,000	$8.345	$66,760.00							15,000	$125,025.00
3/20	$8.390							10,000	$8.350	$83,500.00	5,000	$8.390	$41,950.00							15,000	$125,450.00
3/21	$7.625				1,000	$7.625	$7,625.00				10,000	$7.625	$76,250.00							11,000	$83,875.00
3/22	$7.625				1,000	$7.625	$7,625.00				10,000	$7.625	$76,250.00							11,000	$83,875.00
3/23	$7.625				1,000	$7.625	$7,625.00				10,000	$7.625	$76,250.00							11,000	$83,875.00
3/24	$7.625				1,000	$7.625	$7,625.00				10,000	$7.625	$76,250.00							11,000	$83,875.00
3/25	$8.280	10,000	$8.280	$82,800.00							7,000	$8.280	$57,960.00							17,000	$140,660.00
3/26	$8.485	10,000	$8.465	$84,650.00							4,000	$8.485	$33,940.00							14,000	$118,590.00
3/27	$8.420	10,000	$8.380	$83,800.00	4,000	$8.410	$33,640.00				3,000	$8.420	$25,260.00							17,000	$142,700.00
3/28	$8.445	10,000	$8.425	$84,250.00							5,000	$8.445	$42,225.00							15,000	$126,475.00
3/29	$8.555	5,000	$8.515	$42,575.00							10,000	$8.555	$85,550.00							15,000	$128,125.00
3/30	$8.555	5,000	$8.515	$42,575.00							10,000	$8.555	$85,550.00							15,000	$128,125.00
3/31	$8.555	5,000	$8.515	$42,575.00							10,000	$8.555	$85,550.00							15,000	$128,125.00
Tot	$8.565	229,000	$8.726	$1,998,340.00	16,000	$8.362	$133,790.00	25,000	$8.545	$213,625.00	128,000	$8.294	$1,061,610.00	13,000	$8.989	$116,860.00	0	#DIV/0!	$0.00	411,000	$3,524,225.00

Baseload Sales							Avg P	
Oneok	310,000	$7.210	$2,235,100.00	Midland County	Tot Swing Sales	411,000	$8.575	$3,524,225.00
					Total	721,000	$7.988	$5,759,325.00
					PSCC Sale	29,416	$7.988	$234,974.07
	310,000	$7.210	$2,235,100.00		Total	750,416	$7.988	$5,994,299.07
MMBtud	10,000				Less Transport	310,000	$0.040	$12,400.00
					Grand Total	750,416	$7.971	$5,981,899.07

5/7/2008

Appendix B-4: Daily Power Consumption at the Pikes Peak Plant

Mthy Elect - Daily Basis

	Plt. KWH	Daily KWH	Cat KWH	Daily KWH	CO2 KWH	Daily KWH	Elect.Cooper Daily KWH	Total Energy	Last 24 hours
2/20/2008	37987.10		75469.20		55518.25				
2/21/2008	46450.65	8463.55	80843.10	5373.90	57126.75	1608.50	40927.05	56373.00	56373
2/22/2008	54972.70	8522.05	86704.20	5861.10	58734.80	1608.05	41064.80	57056.00	57056
2/23/2008	63534.10	8561.40	92609.10	5904.90	60353.20	1618.40	41192.30	57277.00	57277
2/24/2008	72177.10	8643.00	98682.50	6073.40	61982.10	1628.90	41163.70	57509.00	57509
2/25/2008	80435.10	8258.00	103379.00	4696.50	63532.50	1550.40	34653.10	49158.00	49158
2/26/2008	89057.21	8622.11	108972.66	5593.66	65151.35	1618.85	40977.38	56812.00	56812
2/27/2008	97599.64	8542.43	114450.77	5478.11	66803.27	1651.92	41886.54	57559.00	57559
2/28/2008	106092.92	8493.28	120480.15	6029.38	68418.10	1614.83	41452.51	57590.00	57590
2/29/2008	114453.50	8360.58	126430.20	5950.05	70018.40	1600.30	41200.07	57111.00	57111
3/1/2008	123077.10	8623.60	132367.20	5937.00	71654.30	1635.90	40889.50	57086.00	57086
3/2/2008	131515.20	8438.10	138257.40	5890.20	73242.70	1588.40	40969.30	56886.00	56886
3/3/2008	140082.40	8567.20	144207.00	5949.60	74856.00	1613.30	40884.90	57015.00	57015
3/4/2008	148541.10	8458.70	150428.90	6221.90	76521.70	1665.70	41349.70	57696.00	57696
3/5/2008	156661.85	8120.75	155298.23	4869.33	78257.78	1736.08	37451.84	52178.00	52178
3/6/2008	165145.98	8484.13	161317.75	6019.52	79950.15	1692.37	37808.98	54005.00	54005
3/7/2008	173630.55	8484.57	167420.35	6102.60	81600.20	1650.05	41222.78	57460.00	57460
3/8/2008	182397.25	8766.70	173518.90	6098.55	83283.70	1683.50	41205.25	57754.00	57754
3/9/2008	190804.20	8406.95	179028.40	5509.50	84845.30	1561.60	41105.95	56584.00	56584
3/10/2008	199536.20	8732.00	185071.10	6042.70	86465.70	1620.40	41314.90	57710.00	57710
3/11/2008	208213.41	8677.21	191145.10	6074.00	88089.40	1623.70	41712.09	58087.00	58087
3/12/2008	216695.40	8481.99	196403.30	5258.20	89698.70	1609.30	41502.51	56852.00	56852
3/13/2008	225387.24	8691.84	202336.02	5932.72	91307.82	1609.12	41014.32	57248.00	57248
3/14/2008	233983.56	8596.32	206831.03	4495.01	92924.14	1616.32	40900.35	55608.00	55608
3/15/2008	242664.90	8681.34	212459.05	5628.02	94515.00	1590.86	40779.78	56680.00	56680
3/16/2008	251378.05	8713.15	218282.10	5823.05	96101.75	1586.75	40810.05	56933.00	56933
3/17/2008	259974.35	8596.30	224214.10	5932.00	97710.95	1609.20	40818.50	56956.00	56956
3/18/2008	268603.69	8629.34	229969.60	5755.50	99291.03	1580.08	41014.08	56979.00	56979
3/19/2008	277177.40	8573.71	236063.40	6093.80	100928.30	1637.27	41204.22	57509.00	57509
3/20/2008	285697.30	8519.90	242119.90	6056.50	102559.90	1631.60	41163.00	57371.00	57371
		0.00		0.00		0.00	0.00	0.00	
Total KWH		247710.20		166650.70		47041.65	1179639.45	1641042.00	1641042

(B) (A)

Pikes Peak
March

Monthly Electric

	thru Feb 20,2008	thru Mar 20,2008			
	Mthy KWH	**% of TOTAL**	**BILLING**	**ROC**	**PSCO2**
Plant KWH (5B)	247710.20 (B)	15.0947%	23024.71835	23,024.72	
CO2 (Bldg.) (5A)	47041.65	2.8666%	4372.53186		4,372.53
Cat 3616 (4A)	166650.70	10.1552%	15490.21974		15,490.22
Elect. Drive Cooper	1179639.45	71.8836%	109647.75004		109,647.75
Total Energy	**1641042.00** (A)	100.0000%	$ 152,535.22	**$23,024.72**	**$129,510.50**
			Rio Grande Electric invoice		
			$ 152,535.22		

1,393,331.8