CERTIFIED MAIL – 91 7108 2133 3934 2480 9803

November 8, 2016

RED WILLOW PRODUCTION CO.
AN AFFILIATE OF THE SOUTHERN UTE INDIAN TRIBE

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

RE: Notification of Change of Ownership and Administrative Permit Revision

Red Willow Production Company respectfully submits this Administrative Permit Revision for permit transfer of the three SMNSR permits listed below. Transfer of ownership of these facilities from Samson Resources Company to Red Willow Production Company becomes effective on November 14, 2016. These facilities will be operated by Red Cedar Gathering Company.

Jaques Compressor Station	-	SMNSR-SU-000043-2015.002
South Ignacio Central Delivery Point	-	SMNSR-SU-000031-2015.002
Spring Creek Compressor Station	-	SMNSR-SU-000053-2013.001

This letter also serves as Notification of Change of Ownership for eight MNSR registered facilities from Samson Resources Company to Red Willow Production Company. These facilities are listed by attachment.

Enclosures:

- Change in Company Ownership Notifications (Form OWN) for SMNSR permits and registrations
  - Spreadsheet listing the names of the purchased facilities
- Written agreement containing a specific date for transfer of permit responsibility, coverage and liability between the current and new permittee
  - "Notification of Asset sale" from Samson Resources for SMNSR permits
  - "Notification of Asset sale" from Samson Resources for MNSR registrations
  - Asset Purchase Agreement

Should you have any question or need additional information, please do not hesitate to contact me at (970) 563-5287 or khunderman@rwpc.us.

Sincerely,

Kyle Hunderman
Environmental Compliance Specialist III
Red Willow Production Company

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Change in Company Ownership Notification

(Form OWN)

Use of this information request form is voluntary and not approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your change in ownership notification. While submittal of this form is not required, it does offer details on the information we will use to process the change in ownership. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

For more information, visit:
http://www.epa.gov/caa-permitting/tribal-nsr-permitting-region-8

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact R8airpermitting@epa.gov.

FACILITY INFORMATION

Facility Name and Description **Multiple Sites – See Attached**			
Minor Source Permit To Construct Number **Multiple Minor Source Permits – See Attached**			
Physical Address (home base for portable sources) **Multiple Sites – See Attached**			
Reservation: **Southern Ute Tribe**	**County:*** **La Plata**	**Latitude** (decimal format)* **Multiple Sites – See Attached**	**Longitude** (decimal format)* **Multiple Sites – See Attached**
Quarter Quarter Section* **Multiple Sites – See Attached**	**Section*** **Multiple Sites – See Attached**	**Township*** **Multiple Sites – See Attached**	**Range*** **Multiple Sites – See Attached**

*Provide all proposed locations of operation for portable sources

NEW COMPANY	PREVIOUS COMPANY
Company Name (Who owns this facility?) **Red Willow Production Company** **14933 Highway 172** **P.O. Box 369** **Ignacio, CO 81137**	**Company Name** (Who was the previous owner?) **Samson Resources Company** **Two West Second Street** **Tulsa, OK 74103**
New Company Contact/Title (Who is the primary contact for the new company that owns this facility?) **John Larkin**	
Mailing Address **Red Willow Production Company** **14933 Highway 172** **P.O. Box 369** **Ignacio, CO 81137**	
Email Address jlarkin@rwpc.com	
Telephone Number (970) 563-5100	
Facsimile Number (970) 563-5101	

INFORMATION ON HOW TO HANDLE MULTIPLE SITES

On a separate piece of paper continue the list of the facility source name, permit number, and location descriptions for each facility/source for which ownership has changed.

The undersigned, as an authorized representative of the company, acknowledges that the above information is correct, and requests that the name change be made in all Air Permitting records.

AUTHORIZATION

New Company Red Willow Production Company	Previous Company Samson Resources Company
Company Owner's Signature	Previous Company Owner's Signature
Name (Please Print) John Larkin	Name (Please Print) Sean Woolverton
Title VP of Operations	Title Executive Vice-President & Chief Operating Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Quarter Quarter Section* **Multiple Sites – See Attached**	**Section*** **Multiple Sites – See Attached**	**Township*** **Multiple Sites – See Attached**	**Range*** **Multiple Sites – See Attached**

*Provide all proposed locations of operation for portable sources

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Company Owner's Signature	Previous Company Owner's Signature
Name (Please Print) John Larkin	Name (Please Print) Sean Woolverton
Title VP of Operations	Title Executive Vice-President & Chief Operating Officer

Facility Name	Permit Name/Permit ID	Physical Address	County	Latitude	Longitude	Quarter/Quarter	Section	Township	Range
JAQUES COMPRESSOR STATION	SMNSR-SU-000043-2015.002	**The Jaques Compressor Station is located southwest of Ignacio, Colorado. To get to** the Jaques Compressor Station from Ignacio, take Highway 172 south out of town and follow for approximately 0.75 miles. Turn west onto Indian Route 110. Follow Indian Route 110 for 2.75 miles. Turn south onto Jaques Road. Follow Jaques Road for 0.9 miles south curving around a hill to the east.	La Plata	N 37.077944	W 107.691	NW	26	33N	8W
SOUTH IGNACIO CDP	SMNSR-SU-000031-2015.002	The South Ignacio Central Delivery Point (CDP) is located about nine miles southeast of Durango, Colorado. To get to the South Ignacio CDP, take US Highway 550 south from Durango to the intersection with County Road 318. Go east onto County Road 318 until the tee in the road at State Highway 172. Turn right (south) at the tee and drive to a guardrail in between mile markers 5 and 6. Turn at the first right (west) past the guardrail and follow the road to the South Ignacio CDP.	La Plata	N 37.053917	W 107.625222	SE	32	33N	7W
SPRING CREEK	SMNSR-SU-000053-2013.001	The Spring Creek Compressor Station is located southeast of Ignacio, Colorado. To get to the facility from Ignacio, go east on County Road 151 at the intersection of Highway 172 and County Road 151. Follow County Road 151 east for 3.3 miles and turn south onto County Road 324. Follow County Road 324 for approximately 0.9 miles. The facility is located on the east side of the road at 1000 County Road 324.	La Plata	N 37.092389	W 107.576028	SW/NE	23	33N	7W
MNSR Registrations									
SOUTHERN UTE (EPA) 32-1 SWD	REG-SU-000152-2014.001	To get to the Southern Ute 32-1 SWD from Ignacio, CO: follow 172 south out of Ignacio for approximately 3.5 miles. Turn right (west) onto a dirt road. Bear right **at the fork in the road and travel northwest for approximately 0.25 miles. Bear left** at the next fork in the road and travel 0.1 miles before bearing left again at the **next fork. Follow the road to the south for approximately 0.2 miles and you should** see the facility.	La Plata	N 37.05643	W 107.62563	SE/SE	32	33N	7W
DEADHORSE	REG-SU-000369-2013.001	SWSW Section 12U, Township 34 North, Range 7 W Approximately 2.7 miles Southeast of Bayfield Colorado in La Plata County	La Plata	N 37.1996	W 107.5649	SW/SW	12	34N	7W
UTE 33-7-25-1	REG-SU-000407-2014.001	SENW of Section 25, Township 33 North, Range 7 West	La Plata	N 37.078639	W 107.561035	SE/NW	25	33N	7W
UTE 33-7-25-2	REG-SU-000408-2014.001	NWSE of Section 25, Township 33 North, Range 7 West	La Plata	N 37.074767	W 107.559386	NW/SE	25	33N	7W
SOUTHERN UTE 32-7 #9-5	REG-SU-000409-2014.001	**SENW of Section 9, Township 32 North, Range 7 West, approximately 5 miles south of Ignacio, CO**	La Plata	N 37.03503	W 107.61618	SE/NW	9	32N	7W
COLORADO 32-7 #9-12	REG-SU-000410-2014.001	NENE of Section 9, Township 32 North, Range 7 West, approximately 3 miles **southeast of Ignacio, CO**	La Plata	N 37.03571	W 107.60905	NE/NE	9	32N	7W
UTE 33-8-29 #5 & #6	REG-SU-000413-2015.001	NWSW of Section 29, Township 33 North, Range 8 West	La Plata	N 37.07358	W 107.74689	NW/SW	29	33N	8W
SOUTHERN UTE 32-7 #4-4	Application Dated October 2014	SWSE of Section 4, Township 32 North, Range 7 West, approximately 4 miles south **of Ignacio, CO**	La Plata	N 37.041741	W 107.61356	SW/SE	4	32N	7W

Samson Resources

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
918/591-1791

Sent Via Federal Express

November 8, 2016

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

RE: Samson Resources Company
Notification of Asset Sale of Air Permit Registrations to
Red Willow Production Company

Gentlemen:

Please be advised, the U.S. EPA Minor Source Registrations, per the attached listing, were purchased from Samson Resources Company, by the following company:

Red Willow Production Company
14933 Highway 172
P.O. Box 369
Ignacio, CO 81137
Telephone Number: 970-563-5273
Contact: John Larkin – VP of Operations

Upon transfer of ownership of the properties by Samson Resources Company, as Seller, to the Southern Ute Indian Tribe, doing business through its division known as Red Willow Production Company ("Red Willow"), as Buyer, on November 14, 2016, Red Willow assumes all environmental liabilities associated with the properties, whether arising prior to, at or after the Effective Date (July 1, 2016), as described in detail in that certain Asset Purchase Agreement by and between Samson Resources Company and Red Willow, dated September 6, 2016, attached hereto and fully incorporated herein.

Sincerely,

Samson Resources Company

Donnie Wallis

Donnie Wallis
Environmental Manager

cc: Southern Ute Indian Tribe
Attn: Mark Hutson
71 Mike Frost Way
Ignacio, CO 81137

Red Willow Production Company
Attn: John Larkin/Kyle Hunderman
14933 Highway 172
P.O. Box 369
Ignacio, CO 81137

Enclosure: Samson Resources Company List of Oil and Gas U.S. EPA Minor Source Registration Listing

Samson Resources

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
918/591-1791

Sent Via Federal Express

November 8, 2016

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

RE: Samson Resources Company
Notification of Asset Sale of SMNSR Permits to Red Willow Production Company

Gentlemen:

Please be advised, the U.S. Synthetic Minor New Source Review (SMNSR) permits, per the attached listing, were purchased from Samson Resources Company, by the following company:

Red Willow Production Company
14933 Highway 172
P.O. Box 369
Ignacio, CO 81137
Telephone Number: 970-563-5273
Contact: John Larkin – VP of Operations

Upon transfer of ownership of the properties by Samson Resources Company, as Seller, to the Southern Ute Indian Tribe, doing business through its division known as Red Willow Production Company ("Red Willow"),as Buyer, on November 14, 2016, Red Willow assumes all environmental liabilities associated with the properties, whether arising prior to, at or after the Effective Date (July 1, 2016), as described in detail in that certain Asset Purchase Agreement by and between Samson Resources Company and Red Willow, dated September 6, 2016, attached hereto and fully incorporated herein.

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Samson Resources Company

Donnie Wallis
Environmental Manager

cc: Southern Ute Indian Tribe
Attn: Mark Hutson
71 Mike Frost Way
Ignacio, CO 81137

Red Willow Production Company
Attn: John Larkin/Kyle Hunderman
14933 Highway 172
P.O. Box 369
Ignacio, CO 81137

Enclosure: Samson Resources Company List of Oil and Gas SMNSR Permit Listing

Execution

ASSET PURCHASE AGREEMENT

DATED AS OF SEPTEMBER 6, 2016 ,

BY AND BETWEEN

SAMSON RESOURCES COMPANY

AS SELLER,

AND

THE SOUTHERN UTE INDIAN TRIBE,
DOING BUSINESS THROUGH ITS DIVISION KNOWN AS RED WILLOW PRODUCTION COMPANY

AS BUYER

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ASSET PURCHASE AGREEMENT

THIS ASSET PURCHASE AGREEMENT (this "Agreement"), dated as of September 6, 2016 (the "Execution Date") is by and between Samson Resources Company, an Oklahoma corporation, whose address is Samson Plaza, Two West Second Street, Tulsa, Oklahoma 74103 ("Seller"), and the Southern Ute Indian Tribe, a federally-recognized Indian tribe, doing business through its division known as Red Willow Production Company, whose address is 14933 Highway 172, Ignacio, CO 81137 ("Buyer"). Capitalized terms used but not otherwise defined herein have the meanings set forth in Article 1. Seller and Buyer are sometimes referred to collectively herein as the "Parties" and individually as a "Party".

RECITALS

WHEREAS, Seller is engaged in the business of onshore oil and natural gas exploration, development and production in the United States of America, and owns, in varying proportions, certain oil and gas leases and associated assets more particularly described in Section 2.1;

WHEREAS, on September 16, 2015, Seller commenced a voluntary case under chapter 11 of the Bankruptcy Code in the United States Bankruptcy Court for the District of Delaware (the "Bankruptcy Court");

WHEREAS, Seller desires to sell to Buyer all of the Assets, including the Assigned Contracts and the Assigned Leases and Interests, and Buyer desires to purchase from Seller all of the Assets, including the Assigned Contracts and the Assigned Leases and Interests and assume the Assumed Liabilities, upon the terms and conditions hereinafter set forth;

WHEREAS, the Parties intend to effectuate the transactions contemplated by this Agreement through a sale of the Assets, including the assumption and assignment of the Assigned Contracts and the Assigned Leases and Interests, pursuant to Sections 105, 363 and 365 of the Bankruptcy Code; and

WHEREAS, the transactions set forth in this Agreement are subject to the terms and conditions set forth herein, including the approval of the Bankruptcy Court and will be consummated only pursuant to the Sale Order to be entered in the Bankruptcy Court;

NOW, THEREFORE, in consideration of the mutual promises contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

ARTICLE 1

DEFINITIONS

1.1 Definitions.

For purposes of this Agreement, the following terms have the meanings specified or referenced below.

"Accounting Referee" has the meaning set forth in Section 8.13.

"Action" means any legal action, suit or arbitration, or any inquiry, proceeding or investigation, by or before any Governmental Authority.

"Administrative Expenses" whether initially capitalized or not, has the meaning set forth under Section 364(c)(1) of the Bankruptcy Code.

"AFEs" has the meaning set forth in Section 5.8.

"Affiliate" means, with respect to any Person, any other Person that directly or indirectly (through one or more intermediaries) Controls, is Controlled by, or is under common Control with, such specified Person; *provided* that Kohlberg Kravis Roberts & Co. L.P. and all private equity funds, portfolio companies, parallel investment entities, and alternative investment entities owned, managed, or Controlled by Kohlberg Kravis Roberts & Co. L.P. (excluding Samson Resources Corporation and its Subsidiaries) shall not be considered or otherwise deemed to be an "Affiliate" of Seller.

"Agreement" has the meaning set forth in the introductory paragraph.

"Allocated Value" has the meaning set forth in Section 8.2.

"Applicable Employees" means those employees of Seller and its Subsidiaries that are listed on Schedule 8.6(a).

"Asset Taxes" has the meaning set forth in Section 8.1(b).

"Assets" has the meaning set forth in Section 2.1(b).

"Assigned Contracts" has the meaning set forth in Section 2.1(b)(viii).

"Assigned Leases and Interests" has the meaning set forth in Section 2.1(b)(i).

"Assignment" means the Assignment and Bill of Sale substantially in the form attached hereto as **Exhibit G**.

"Assumed Liabilities" has the meaning set forth in Section 2.3.

"Assumption Agreement" has the meaning set forth in Section 2.3.

"Auction" has the meaning set forth in the Bidding Procedures.

"Avoidance Actions" means any and all claims for relief of Seller under chapter 5 of the Bankruptcy Code, including any proceeds thereof.

"Backup Bidder" has the meaning set forth in the Bidding Procedures.

"Bankruptcy Case" means the case commenced by Seller under chapter 11 of the Bankruptcy Code in the Bankruptcy Court, styled In re: Samson Resources Corporation, *et al.*, jointly administered under Case No. 15-11934, and pending before the Bankruptcy Court.

"Bankruptcy Code" means Title 11 of the United States Code, Sections 101 *et seq*.

"Bankruptcy Court" has the meaning set forth in the recitals.

"Base Purchase Price" has the meaning set forth in Section 3.1.

"Benefit Plan" has the meaning set forth in Section 5.17.

"BIA" means U.S. Bureau of Indian Affairs.

"Bid Deadline" has the meaning set forth in the Bidding Procedures Order.

"Bidding Procedures" means bid procedures in substantially the form attached hereto as **Exhibit A**, to be submitted to the Bankruptcy Court for approval pursuant to the Bidding Procedures Order.

"Bidding Procedures Order" means an Order of the Bankruptcy Court in substantially the form attached hereto as **Exhibit B**.

"Break-Up Fee" shall have the meaning set forth in Section 11.2(c).

"Business Day" means any day, other than Saturday or Sunday, on which commercial banks are open for commercial business with the public in Tulsa, Oklahoma.

"Buyer" has the meaning set forth in the introductory paragraph.

"Buyer's Employment Conditions" has the meaning set forth in Section 8.6(a)(ii).

"Buyer Parties" means Buyer, its respective Affiliates and the former, current or future equity holders and Representatives of each of the foregoing.

"Buyer Termination Notice" has the meaning set forth in Section 11.1(b)(i).

"Casualty Loss" means any loss, damage or destruction of the Assets that occurs during the period between the Execution Date and the Closing for any reason, including any act of God, fire, explosion, collision, earthquake, windstorm, flood, or other casualty or condemnation taking under the right of eminent domain, but excluding any loss, damage, or destruction as a result of depreciation, ordinary wear and tear, temporary cessations of production (including the shutting-in of any Well) in the ordinary course of business, any change in condition of the Assets for production of Hydrocarbons through normal depletion (which exclusion shall include the watering-out of any Well, collapsed casing, sand infiltration of any Well), or other reservoir changes relating to production issues.

"Closing" has the meaning set forth in Section 4.1.

"Closing Date" has the meaning set forth in Section 4.1.

"Code" means the Internal Revenue Code of 1986, as amended.

"Committee" means the official committee of unsecured creditors appointed in the Bankruptcy Case pursuant to section 1102(a) of the Bankruptcy Code.

"Contract" means any agreement, contract, obligation, promise or undertaking (in each case, whether written or oral), other than a Lease, that is legally binding and relates to the San Juan Basin Package assets or Assumed Liabilities.

"Control" means the ability (directly or indirectly through one or more intermediaries) to direct or cause the direction of the management or affairs of a Person, whether through the ownership of voting interests, by contract or otherwise.

"Copyrights" means all United States and foreign copyright rights in any original works of authorship, whether registered or unregistered, including all copyright registrations and applications.

"Cure Costs" has the meaning set forth in Section 5.23.

"Defensible Title" means that title which, as of the Effective Date and the Closing Date, and subject to any Permitted Encumbrances: (a) entitles Seller and the Transferring

Subsidiaries, in the aggregate, to receive and retain a Net Revenue Interest for each Well which is not less than the Net Revenue Interest set forth for such Well in **Exhibit D**, except for any decrease (i) caused by orders of the appropriate Governmental Authority having jurisdiction that are promulgated after the Effective Date that concern pooling, unitization, communitization or spacing matters, or (ii) caused by Buyer, its successors or assigns; (b) obligates Seller and the Transferring Subsidiaries, in the aggregate, for each Well, to bear a Working Interest for such Well which is not more than the Working Interest set forth for such Well in **Exhibit D**, except for any increase (i) caused by Buyer, its successors or assigns, (ii) that also results in the Net Revenue Interest associated with the Well proportionately increased, or (iii) caused by orders of the appropriate Governmental Authority having jurisdiction that are promulgated after the Effective Date that concern pooling, unitization, communitization or spacing matters; and (c) as to all Assets, is free and clear of all Encumbrances.

"Deposit" has the meaning set forth in Section 3.2.

"Effective Date" means 12:01 a.m. on July 1, 2016.

"Employee" means any current or former employee of Seller as of the Closing.

"Encumbrance" means any charge, lien, claim, mortgage, lease, sublease, hypothecation, deed of trust, pledge, security interest, option, right of use or possession, right of first offer or first refusal, easement, servitude, restrictive covenant, encroachment, encumbrance, third party interest, voting trust or agreement, transfer restriction under any shareholder or other agreement, or other restriction or limitation of any kind.

"Environmental Laws" means all Legal Requirements pertaining to pollution or the protection of the environment, including those pertaining to (a) the use, generation, storage, emission, discharge, clean-up, release, or threatened release of pollutants, contaminants, NORM, chemicals, or industrial, toxic or hazardous substances (collectively, "Pollutants") on or into the environment or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transportation or handling of Pollutants; (b) health; (c) the environment; or (d) wildlife or natural resources as applicable to the Assets and in effect in or for the jurisdiction in which the Assets are located, including the Clean Air Act (Air Pollution Control Act), the Clean Water Act (CWA), the Federal Water Pollution Act, the Rivers and Harbors Act, the Safe Drinking Water Act, the National Environmental Policy Act of 1969 (NEPA), the Endangered Species Act (ESA), the Fish and Wildlife Conservation Act of 1980, the Fish and Wildlife Coordination Act (FWCA), the Oil Pollution Act, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Resources Conservation and Recovery Act (RCRA), the Toxic Substance Control Act, the Occupational, Safety and Health Act (OSHA), the Emergency Planning and Community Right-To-Know Act (EPCRA), the Hazardous Materials Transportation Act, the Hazardous and Solid Waste Amendments of 1984 (HSWA).

"Equipment" has the meaning set forth in Section 2.1(b)(iv).

"ERISA" means the Employee Retirement Income Security Act of 1974, as amended.

"ERISA Affiliate" has the meaning set forth in Section 5.17.

"Escrow Agent" has the meaning set forth in Section 3.2.

"Excluded Assets" has the meaning set forth in Section 2.2.

"Excluded Contracts" means those Contracts described on Schedule 2.2(h).

"Excluded Leases and Interests" means those Leases and Mineral Interests described on Schedule 2.2(g).

"Excluded Liabilities" has the meaning set forth in Section 2.4.

"Excluded Records" means (a) the general corporate files and records of Seller or any Transferring Subsidiary, insofar as they relate to Seller's or such Transferring Subsidiary's business generally and are not required for the future ownership or operation of the Assets, (b) all legal files and records (other than title opinions), (c) Seller's and the Transferring Subsidiaries' federal or state income, franchise or margin tax files and records, (d) employee files, (e) reserve evaluation information or economic projections, (f) records relating to the sale of the Assets, including competing bids, (g) proprietary data, information and data under contractual restrictions on assignment or disclosure, (h) privileged information and (i) any other files or records to the extent relating to any of Seller's assets other than the San Juan Basin Package assets or Assumed Liabilities.

"Execution Date" has the meaning set forth in the introductory paragraph.

"Expense Reimbursement" means an amount, for which Seller shall be liable under the circumstances set forth in Section 11 equal to the reasonable documented out-of-pocket costs and expenses of Buyer (including reasonable, documented expenses of counsel, investment bankers and other outside consultants, and other reasonable, documented legal expenses) related to negotiating this Agreement and investigating Seller and the Assets in the aggregate up to a maximum amount of one percent (1%) of the Base Purchase Price, which amount, upon entry of the Bidding Procedures Order, shall constitute an administrative expense of Seller under Section 364(c)(1) of the Bankruptcy Code, and be paid as set forth in Section 11.

"Expiration Date" has the meaning set forth in Section 12.2.

"Final Order" means an Action taken or Order issued by the applicable Governmental Authority as to which: (a) no request for stay of the Action or Order is pending, no such stay is in effect, and, if any deadline for filing any such request is designated by statute or regulation, it is passed, including any extensions thereof; (b) no petition for rehearing or reconsideration of the Action or Order, or protest of any kind, is pending before the Governmental Authority and the time for filing any such petition or protest is passed; (c) the Governmental Authority does not have the Action or Order under reconsideration or review on its own motion and the time for such reconsideration or review has passed; and (d) the Action or Order is not then under judicial review, there is no notice of appeal or other application for judicial review pending, and the deadline for filing such notice of appeal or other application for judicial review has passed, including any extensions thereof.

"Final Settlement Statement" has the meaning set forth in Section 8.13.

"Good Position" means, for each applicable New Employee, a position with Buyer which (a) does not provide for a material diminution in such employee's annual base rate of pay (as Seller has advised Buyer in writing no later than five (5) days after the Execution Date) was in effect immediately prior to such Employee's receipt of notice of termination of his or her employment from Seller, (b) does not require relocation of such Employee's primary place of

employment to a location that is more than 50 miles away from the Employee's primary place of employment (as identified by Seller to Buyer in writing no later than five (5) days after the Execution Date) as of the date of such Employee's receipt of notice of termination of his or her employment from Seller, (c) provides benefits consistent with those otherwise provided by Buyer to its similarly situated non-executive employees, including enrollment in Buyer's employee benefit plans (as defined in section 3(3) of ERISA) and for which such Employees shall receive vacation and sick leave benefits consistent with Buyer's similarly situated non-executive employees, (d) reimburses Employee for COBRA premiums actually incurred by Employee for the 90-day waiting period commencing with the first day of Employee's employment with Buyer and ending on the date when Employee is eligible to participate in Buyer's health insurance plan, and (e) subject to satisfaction of Buyer's Employment Conditions as set forth in Section 8.6(a), either (i) continues for at least three (3) months after Closing or (ii) provides for severance benefits equivalent or better than those provided by Seller to such New Employee.

"Governmental Authority" means any court or tribunal (including an arbitrator or arbitral panel) in any jurisdiction (domestic or foreign) or any federal, tribal, state, county, municipal or other governmental or quasi-governmental body, agency, authority, department, board, commission, bureau, official or other authority or instrumentality.

"Governmental Authorization" means any approval, consent, license, permit, waiver or other authorization issued, granted or otherwise made available by or under the authority of any Governmental Authority.

"Governmental Transfer Documents" means applications and any other documents to be submitted to any and all applicable Governmental Authorities, including without limitation the BIA and the State of Colorado, seeking approval of the Transaction or any portion thereof, including without limitation, transfer of the Assigned Leases and Interests, the Assigned Contracts, or any other Asset.

"Hard Consent" has the meaning set forth in Section 2.6.

"Hazardous Substance" means any Pollutant and any "contaminant," "hazardous waste," "hazardous material", "hazardous substance", or other toxic substance under any Environmental Laws.

"Hydrocarbons" means oil, gas, minerals, and other gaseous and liquid hydrocarbons, or any combination of the foregoing, produced from and attributable to the Properties.

"Imbalances" means over-production or under-production or over-deliveries or under-deliveries with respect to Hydrocarbons produced from or allocated to the Properties, regardless of whether such over-production or under-production or over-deliveries or under-deliveries arise at the wellhead, pipeline, gathering system, transportation system, processing plant, or other location, including any imbalances under gas balancing or similar agreements, imbalances under production handling agreements, imbalances under processing agreements, imbalances under the Assigned Leases and Interests, imbalances under gathering or transportation agreements, and imbalances under operating agreements.

"Indemnification Claim" has the meaning set forth in Section 12.4(a).

"Intellectual Property" means all intellectual property, including all Copyrights, Patents and Trademarks, owned, used or licensed by Seller and used or held for use exclusively in the ownership and operation of the Assets, but specifically excluding, for the avoidance of doubt, (a) all seismic, geological, geochemical or geophysical data licensed by Seller and any of Seller's interpretations of such data and (b) that certain intellectual property being more particularly described on Schedule 2.1(b)(xiii).

"Knowledge" means, with respect to any matter in question, (a) in the case of Seller, the actual knowledge (without any duty of inquiry) of any of the individuals listed on Schedule 1.1(a) with respect to such matter, and (b) in the case of Buyer, the actual knowledge (without any duty of inquiry) of any of the individuals listed on Schedule 1.1(b) with respect to such matter.

"Known Receivables" means all expenditures incurred by Seller prior to the Effective Date in connection with the ownership, operation and maintenance of the Properties (including rentals, overhead, royalties, Lease option and extension payments, Taxes and other charges and expenses billed under applicable operating agreements or governmental statute(s)) and billed to third party working interest owners, which, as of two (2) Business Days prior to the Closing Date, remain outstanding and owed to Seller, such amounts and third parties being more particularly described on Schedule 2.1(b)(xii), which the Parties agree shall be updated no later than three (3) Business Days prior to the Closing Date.

"Lease" means any existing oil and gas lease, oil, gas and mineral lease or sublease, and other leasehold interest, and the leasehold estates created thereby, including carried interests, rights of recoupment, options, reversionary interests, convertible interests and rights to reassignment.

"Legal Requirement" means any federal, state, provincial, local, municipal, foreign, international, multinational, or other administrative Order, constitution, law, ordinance, principle of common law, regulation, rule, code, statute or treaty, promulgated by any Governmental Authority now or hereafter in effect, and in each case as amended or supplemented from time to time, and any applicable administrative or judicial interpretation thereof.

"Liabilities" means any and all claims, "Claims" (as defined in Section 101(5) of the Bankruptcy Code), rights, demands, causes of action, liabilities (including civil fines), obligations, damages, losses, fines, penalties, sanctions of every kind and character (including reasonable fees and expenses of attorneys, technical experts and expert witnesses), judgments or proceedings of any kind or character whatsoever, whether known or unknown, asserted or unasserted, absolute or contingent, accrued or unaccrued, liquidated or unliquidated, or due or to become due, and whether arising or founded in law, equity, statute, contract, tort, strict liability or voluntary settlement, and all reasonable expenses, costs and fees (including reasonable attorneys' fees) in connection therewith.

"Material Adverse Effect" means any change, event or occurrence that individually or in the aggregate (taking into account all other such changes, events or occurrences) has had, or would be reasonably likely to have, a material adverse effect on the Assets (excluding the Excluded Assets and the Excluded Liabilities), taken as a whole, but excluding (a) any change or effect to the extent that it results from or arises out of (i) the commencement or pendency of the Bankruptcy Case; (ii) the execution and delivery of this

Agreement or the announcement or pendency thereof or consummation of the transactions contemplated hereby; or (iii) any action contemplated by this Agreement or taken at the request of Buyer; (b) any change or effect generally applicable to (i) the industries and markets in which Seller operates or (ii) economic or political conditions or the securities, financial or commodities markets in any country or region, but in each instance only if Seller is not disproportionately impacted compared to other entities in the same industries and markets; (c) any outbreak or escalation of hostilities or war or any act of terrorism, but only if Seller is not disproportionately impacted compared to similarly situated entities; (d) any objections in the Bankruptcy Court to (i) this Agreement and the other Transaction Documents and the transactions contemplated hereby and thereby, (ii) the reorganization of Seller and any related plan of reorganization or disclosure statement, (iii) the Bidding Procedures or the Sale Motion, or (iv) the assumption or rejection of any Material Assigned Contract; (e) any Order of the Bankruptcy Court; and (f) any of the matters disclosed on any Exhibit or Disclosure Schedule to this Agreement or in any Seller SEC Documents.

"Material Assigned Contracts" means, to the extent related to the Assets, the following: (a) any Assigned Contract that can reasonably be expected to result in aggregate payments by or revenues to Seller (and/or the Transferring Subsidiaries) or Buyer with respect to the Assets of more than Two Hundred Thousand Dollars ($200,000) net to the interest of Seller (and/or the Transferring Subsidiaries) during the current or any subsequent fiscal year (based solely on the terms thereof and without regard to any expected increase in volumes or revenues); (b) any Hydrocarbon purchase and sale, exchange, marketing, compression, gathering, transportation, processing, refining or similar Assigned Contract (in each case) to which Seller (and/or any Transferring Subsidiary) is a party (or to which any portion of the Assets is subject) with respect to Hydrocarbons from the Assets that is not terminable without penalty on ninety (90) days or less notice (including any Assigned Contract providing for volumetric or monetary commitments or indemnification therefor or for dedication of future production); (c) any Assigned Contract binding upon Seller (and/or the Transferring Subsidiaries) to sell, lease, farmout, or otherwise dispose of or encumber any interest in any of the Assets after the Effective Date, other than (i) conventional rights of reassignment arising in connection with Seller's (and/or the Transferring Subsidiaries') surrender or release of any of the Assets (except where any such right of reassignment has already been triggered) or (ii) conventional rights of reassignment arising in connection with a payout, risk penalty, recoupment period or similar obligation where Seller's and the Transferring Subsidiaries' Net Revenue Interest after reassignment, or Seller's and the Transferring Subsidiaries' after-payout interest, is reflected on **Exhibit D**; (d) any Assigned Contract that would, by its express terms, obligate Buyer to drill additional wells or conduct other material development operations after the Closing; (e) any Assigned Contract that constitutes a non-competition agreement or any agreement that purports to materially restrict, limit, or prohibit the manner in which, or the locations in which, Seller and/or the Transferring Subsidiaries conduct business, including areas of mutual interest; (f) any Assigned Contract providing for any call upon, option to purchase, or similar rights with respect to the Assets or to the production therefrom or the processing thereof, or that is a dedication of production or otherwise requires production to be transported, processed or sold in a particular fashion; (g) any Assigned Contract that constitutes a joint or unit operating agreement whereby Seller or any Transferring Subsidiary is the Operator thereunder, and any other Assigned Contract constituting a joint or unit operating agreement to which Seller or any Subsidiary is a party and which is in Seller's possession or under Seller's control, provided that in any event all

material joint or unit operating agreements, regardless of whether Seller or any Subsidiary is the Operator, must be reflected on a Disclosure Schedule hereto; and (h) any Contract that constitutes a partnership agreement.

"Mineral Interests" means all mineral fee interests, mineral rights and mineral servitudes in which Seller owns an interest, including royalty interests, overriding royalty interests, net profits interests, production payments and other rights of a similar nature, whether legal or equitable, whether vested or contingent.

"Miscellaneous Corporate Property" has the meaning set forth in Section 2.1(b)(v).

"Net Revenue Interest" means, for any Well, Seller's and the Transferring Subsidiaries aggregate share of the Hydrocarbons produced, saved and marketed therefrom (after satisfaction of all other royalties, overriding royalties, nonparticipating royalties, net profits interests, or other similar burdens on or measured by production of Hydrocarbons).

"New Employees" has the meaning set forth in Section 8.6(a).

"Non-Disclosure Agreement" has the meaning set forth in Section 13.1.

"NORM" means naturally occurring radioactive materials.

"Order" means any award, writ, injunction, judgment, order or decree entered, issued, made, or rendered by any Governmental Authority.

"Outside Date" has the meaning set forth in Section 11.1(a)(iv).

"Party" or "Parties" means, individually or collectively, Buyer and Seller.

"Party Affiliate" has the meaning set forth in Section 13.13.

"Patents" means United States and foreign patents and patent applications, as well as any continuations, continuations-in-part, divisions, extensions, reexaminations, reissues, renewals and patent disclosures related thereto.

"Paying Party" has the meaning set forth in Section 8.1(d).

"Permits" has the meaning set forth in Section 2.1(b)(vii).

"Permitted Encumbrances" means any of the following: (a) liens or other Encumbrances for Taxes that are not yet due and payable; (b) plugging and surface restoration obligations; (c) all rights to consent by, required notices to, filings with or other actions by Governmental Authorities in connection with the conveyance of the Assigned Leases and Interests, if the same are customarily sought and received after the Closing (for clarification, this clause (d) shall not excuse Seller from complying with its obligations to execute the Governmental Transfer Documents); (e) third party preferential rights to take Hydrocarbon production under any Assigned Contracts; (f) the terms and conditions of the Assigned Leases and Interests, including any depth limitations, Pugh clauses or similar limitations that may be set forth therein; (g) mortgages on the lessor's interest under an Assigned Lease and Interest; provided that Buyer shall have no obligation on any loans secured by such mortgages; (h) subject to Section 8.11, Preferential Purchase Rights; (i) such other Encumbrances, if any, as Buyer may have agreed to accept in writing; (j) the terms and conditions of all Assigned Contracts, but only to the extent that they do not, individually or in the aggregate, (1) operate to reduce Seller's and

the Transferring Subsidiaries' Net Revenue Interest in a Well below that shown in **Exhibit D**, or increase Seller's and the Transferring Subsidiaries' Working Interest in a Well above that shown in **Exhibit D** without a proportionate increase in the Net Revenue Interest, or (2) adversely affect the ownership and/or operation of the affected Assets (as currently used or owned) in any material respect; (k) the terms and conditions of all Surface Rights, but only to the extent that they do not, individually or in the aggregate, interfere in any material respect with the use or operation of the Assets (as currently used or operated) burdened thereby; (l) any rights, obligations, or duties reserved to or vested in any Governmental Authority to regulate any Asset in any manner including all applicable Legal Requirements; (m) royalties, overriding royalties, production payments, net profits interests, reversionary interests and similar burdens with respect to a Well if the net cumulative effect of such burdens does not operate to reduce Seller's and the Transferring Subsidiaries' Net Revenue Interest in such Well below that shown in **Exhibit D**, or increase Seller's and the Transferring Subsidiaries' Working Interest in such Well above that shown in **Exhibit D** without a proportionate increase in the Net Revenue Interest; (n) defects or irregularities of title (1) as to which the relevant statute(s) of limitations or prescription would bar any attack or claim against Seller's and/or the Transferring Subsidiaries' title, (2) consisting of the failure to recite marital status, (3) resulting from a failure to record releases of liens, production payments or mortgages that have expired by their own terms, or (4) arising out of prior oil and gas leases that by their terms and on their face, expired more than ten (10) years prior to the Effective Date and which have not been released of record; (o) materialman's, mechanic's, repairman's, employee's, contractor's, operator's and other similar liens or Encumbrances arising in the ordinary course of business for payments not yet delinquent that are inchoate and have not been perfected pursuant to law or that are contained in joint operating agreements or similar agreements covering the Assets; (p) Imbalances, to the extent reflected on the Disclosure Schedules hereto; (q) liens, obligations, defects, irregularities, or other Encumbrances affecting the Assets that would be waived by an ordinary prudent operator or company experienced in the acquisition or divestiture of producing properties; (r) liens, obligations, defects, irregularities, or other Encumbrances affecting the Assets that would be waived by an ordinary prudent operator or company experienced in the acquisition or divestiture of producing properties in the region in which the Assets are located; (s) conventional rights of reassignment obligating Seller and/or any Transferring Subsidiary to reassign its interest in any portion of the Assigned Leases and Interests to a third party, if (1) such right is only triggered when Buyer expressly indicates its intention to release or abandon such interest prior to the expiration of the primary term or other termination of such interest, or (2) such right arises in connection with a payout, risk penalty, recoupment period or similar obligation where Seller's and the Transferring Subsidiaries' Net Revenue Interest after reassignment, or Seller's and the Transferring Subsidiaries' after-payout interest, is reflected on **Exhibit D**; and (t) any Encumbrances that will be released, barred or otherwise invalidated by the Sale Order.

"Person" means any individual, corporation (including any non-profit corporation), partnership, limited liability company, joint venture, estate, trust, association, organization or other entity or Governmental Authority.

"Petition Date" means September 16, 2015.

"Pollutants" has the meaning set forth in the definition of "Environmental Laws".

"Post-Closing Covenant" has the meaning set forth in Section 12.1.

"Potential Bidders" has the meaning set forth in Section 7.6.

"Preferential Purchase Right" means any right or agreement that enables any Person to purchase or acquire any Asset or any interest therein or portion thereof as a result of or in connection with the execution or delivery of this Agreement or the consummation of the transactions contemplated hereby.

"Preliminary Settlement Statement" means that certain statement provided by Seller to Buyer pursuant to Section 8.12, as amended (if applicable) by mutual agreement prior to Closing, setting forth those initial adjustments to the Base Purchase Price made at Closing.

"Proceeding" means any Action, arbitration, audit, hearing, investigation, litigation, or suit (whether civil, criminal, administrative or investigative) commenced, brought, conducted, or heard by or before, or otherwise involving, any Governmental Authority.

"Properties" has the meaning set forth in Section 2.1(b)(ii).

"Purchase Price" has the meaning set forth in Section 3.1.

"Records" has the meaning set forth in Section 2.1(b)(xi).

"Reimbursing Party" has the meaning set forth in Section 8.1(d).

"Representative" means, with respect to a particular Person, any director, officer, member, manager, partner, employee, agent, consultant, advisor, investor, shareholder, contractor, subcontractor or other representative of such Person, including legal counsel, accountants and financial advisors.

"Sale Motion" means the motion or motions, in form and substance reasonably satisfactory to Buyer, filed by Seller pursuant to, *inter alia*, Sections 105, 363 and 365 of the Bankruptcy Code seeking entry of the Bidding Procedures Order and the Sale Order and approval of the transactions contemplated by this Agreement.

"Sale Order" means an Order of the Bankruptcy Court, in substantially the form attached hereto as **Exhibit H**, with such changes thereto as are reasonably acceptable to Buyer and Seller, which Sale Order shall be filed by Seller with the Bankruptcy Court no later than ten (10) days prior to the hearing on the Sale Motion.

"San Juan Basin" means the area located in northwest New Mexico and southwest Colorado.

"San Juan Basin Package" means the assets of Seller included in the San Juan Basin Package as presented to potential bidders pursuant to the San Juan Management Presentation dated June 2016 prepared by PJT Partners on behalf of Seller, including those assets located in the San Juan Basin.

"SEC" means the United States Securities and Exchange Commission.

"Seller" has the meaning set forth in the introductory paragraph.

"Seller Credit Obligations" has the meaning in Section 8.4(c).

"Seller Group" means Seller, its respective Affiliates and the former, current or future equity holders and Representatives of each of the foregoing.

"Seller Indemnified Parties" has the meaning set forth in Section 12.3(a).

"Seller SEC Documents" means all of the reports and forms (including exhibits and information incorporated therein) filed with the SEC by Seller within the twelve (12) months immediately preceding the Execution Date.

"Seller Termination Notice" has the meaning set forth in Section 11.1(c)(i).

"Straddle Period" has the meaning set forth in Section 8.1(b).

"Subsidiary" means any entity with respect to which a specified Person (or a Subsidiary thereof) has the power, through the ownership of securities or otherwise, to elect a majority of the directors or similar managing body.

"Successful Bidder" has the meaning set forth in the Bidding Procedures.

"Superior Proposal" means any bona fide proposal or offer to or from a Person other than Buyer or its Representatives with respect to (i) any plan of reorganization or liquidation, proposal, offer, dissolution, winding up, liquidation, reorganization, merger, consolidation, business combination, joint venture, partnership, sale of assets or equity interests or restructuring involving Seller or any of its (or any Transferring Subsidiary's) material assets, properties or businesses, or (ii) any other direct or indirect acquisition involving Seller and/or one or more of its Transferring Subsidiaries or any of their material assets, properties or businesses, that, in each case, the board of directors of Seller has determined in good faith, after consultation with its outside financial advisors and outside legal counsel, would, if consummated, result in a transaction superior to Seller than the transactions contemplated hereunder, taking into account all terms thereof, including (x) the likelihood and timing of consummation (as compared to the transactions contemplated hereunder) and (y) all material legal, financial (including the financing terms of any such proposal), conditionality, regulatory and other aspects of such proposal.

"Surface Rights" means all surface leases, subsurface leases, rights-of-way, licenses, easements, access agreements, and other surface or subsurface rights agreements applicable to, or used or held in connection with the ownership, operation, maintenance or repair of, or the production, gathering, treatment, processing, storing, sale or disposal of Hydrocarbons or produced water from, the Properties, together with all surface fee interests in the lands covered by the Assigned Leases and Interests.

"Suspense Funds" means proceeds of production and associated penalties and interest in respect of any of the Assets that are payable to third parties and are being held in suspense by Seller as the operator of such Assets.

"Tax" or "Taxes" (and with correlative meaning, "Taxable" and "Taxing") means any federal, state, provincial, local, foreign or other income, alternative, minimum, add-on minimum, accumulated earnings, personal holding company, franchise, capital stock, net worth, capital, profits, intangibles, windfall profits, gross receipts, value added, sales, use, goods and services, excise, customs duties, transfer, conveyance, mortgage, registration, stamp, documentary, recording, premium, severance, environmental (including taxes under Section 59A of the Code), natural resources, real property, personal property, ad valorem, intangibles, rent, occupancy, license, occupational, employment, unemployment insurance, social security, disability, workers' compensation, payroll, health care, withholding, estimated or other tax of any kind whatsoever, whether computed on a separate or consolidated, unitary or combined basis,

or in any other manner, including any interest, penalty or addition thereto, whether disputed or not.

"Tax Allocation" has the meaning set forth in Section 8.2.

"Tax Return" means any return, declaration, report, claim for refund, information return or other document (including any related or supporting estimates, elections, schedules, statements, or information) filed or required to be filed in connection with the determination, assessment or collection of any Tax or the administration of any laws, regulations or administrative requirements relating to any Tax.

"Trademarks" means United States, state and foreign trademarks, service marks, logos, slogans, trade dress and trade names, Internet domain names and any other similar designations of source of goods or services, whether registered or unregistered, and registrations and pending applications to register the foregoing, and all goodwill related to or symbolized by the foregoing.

"Transaction Documents" means this Agreement and any other agreements, instruments or documents entered into pursuant to this Agreement.

"Transfer Taxes" has the meaning set forth in Section 8.1(a).

"Transferring Subsidiaries" does not refer to any Person, it being understood that there are no Transferring Subsidiaries related to the transactions contemplated by this Agreement.

"WARN Act" means the Worker Adjustment and Retraining Notification Act of 1988 and any similar Legal Requirement.

"Wells" has the meaning set forth in Section 2.1(b)(ii).

"Working Interest" means, for any Well, that share of costs and expenses associated with the exploration, maintenance, development and operation of such Well that Seller or the Transferring Subsidiaries, either individually or as applicable in the aggregate, are required to bear and pay.

1.2 Other Definitions and Interpretive Matters.

(a) Unless otherwise expressly provided, for purposes of this Agreement, the following rules of interpretation shall apply:

(i) Calculation of Time Period. When calculating the period of time before which, within which or following which any act is to be done or step taken pursuant to this Agreement, the date that is the reference date in calculating such period shall be excluded. If the last day of such period is a day other than a Business Day, the period in question shall end on the next succeeding Business Day.

(ii) Dollars. Any reference in this Agreement to $ means United States dollars.

(iii) Exhibits/Schedules/Disclosure Schedules. All Exhibits, Schedules and Disclosure Schedules attached or annexed hereto or referred to herein are hereby incorporated in and made a part of this Agreement as if set forth in full herein. Any capitalized terms used in any Exhibit, Schedule or Disclosure Schedule but not otherwise defined therein shall be defined as set forth in this Agreement.

(iv) Gender and Number. Any reference in this Agreement to gender includes all genders, and words imparting the singular number only include the plural and vice versa.

(v) Headings. The provision of a table of contents, the division of this Agreement into Articles, Sections and other subdivisions and the insertion of headings are for convenience of reference only and shall not affect or be utilized in the construction or interpretation of this Agreement. All references in this Agreement to any "Section" or "Article" are to the corresponding Section or Article of this Agreement unless otherwise specified.

(vi) Herein. Words such as "herein," "hereof" and "hereunder" refer to this Agreement as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires.

(vii) Including. The word "including" or any variation thereof means "including, without limitation," and shall not be construed to limit any general statement that it follows to the specific or similar items or matters immediately following it.

(viii) Statute. References to a statute means such statute as amended from time to time and includes any successor legislation thereto and any rules or regulations promulgated thereunder; *provided* that, for purposes of the representations and warranties set forth herein, with respect to any violation of or non-compliance with, or alleged violation of or non-compliance with, any Legal Requirement, the reference to such Legal Requirement means such Legal Requirement as in effect at the time of such violation or non-compliance or alleged violation or non-compliance, unless such Legal Requirement is later amended with retroactive effect, in which event the reference to such Legal Requirement means such Legal Requirement as amended.

(b) No Strict Construction. Buyer, on the one hand, and Seller, on the other hand, participated jointly in the negotiation and drafting of this Agreement, and, in the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as jointly drafted by Buyer, on the one hand, and Seller, on the other hand, and no presumption or burden of proof shall arise favoring or disfavoring any Party by virtue of the authorship of any provision of this Agreement. Without limitation as to the foregoing, no rule of strict construction construing ambiguities against the draftsperson shall be applied against any Person with respect to this Agreement.

ARTICLE 2

PURCHASE AND SALE

2.1 Purchase and Sale.

(a) Upon the terms and subject to the conditions of this Agreement and the Sale Order, on the Closing Date, Seller and the Transferring Subsidiaries shall sell, transfer, assign, convey and deliver, or cause to be sold, transferred, assigned, conveyed and delivered, to Buyer, and Buyer shall purchase from Seller and the Transferring Subsidiaries, the Assets, free and clear of all Liabilities (other than Assumed Liabilities), Encumbrances (other than Permitted Encumbrances), and Excluded Liabilities.

(b) The "Assets" shall include all right, title and interest of Seller and the Transferring Subsidiaries in, to or under the following:

(i) all Leases and Mineral Interests of Seller and the Transferring Subsidiaries in the San Juan Basin Package, including those described on **Exhibit C** attached hereto, and those Lease interests and Mineral Interests located in, under or that may be produced from or attributable to (1) the lands covered by the Leases or Mineral Interests described on **Exhibit C** attached hereto, and (2) the Leases and lands included in any units with which the Leases, the Mineral Interests or the lands covered thereby may have been pooled, unitized or communitized (collectively, the "Assigned Leases and Interests");

(ii) all of the oil, gas, water, disposal, observation, injection or other wells located on or traversing the Assigned Leases and Interests, on lands pooled, unitized or communitized with any portion thereof, on lands located within any governmental drilling or spacing unit (if applicable) which includes any portion thereof, or on portions thereof associated with proved undeveloped reserves, whether producing, non-producing, plugged, unplugged, shut-in or temporarily abandoned, including those described on **Exhibit D** (collectively, the "Wells", and together with the Assigned Leases and Interests, the "Properties");

(iii) all Hydrocarbons (1) in storage above a custody transfer point as of the Effective Date, but only to the extent Seller receives an upward adjustment to the Base Purchase Price pursuant to Section 8.12(a)(i), and (2) produced from or attributable to the Properties and not yet past a custody transfer point on the Effective Date or produced on and after the Effective Date, and all proceeds attributable thereto;

(iv) all equipment, machinery, fixtures, and other tangible personal property and improvements necessary to ensure the continued operation of each producing unit, located on, primarily used or held for use, or otherwise obtained in connection with the ownership or operation of the Properties, including without limitation tanks, boilers, plants, injection facilities, saltwater disposal facilities, compressors and other compression facilities (whether installed or not), LACT units and associated infrastructure, pumping units, flow lines, pipelines, gathering systems, Hydrocarbon treating or processing systems or facilities, meters, machinery, pumps, motors, gauges, valves, power and other utility lines, roads, computer and automation equipment, telecommunications equipment, field radio telemetry and associated frequencies and licenses, pressure transmitters, central processing equipment and other appurtenances, improvements and facilities (collectively, the "Equipment");

(v) all vehicles, office leases, field offices, storage yards, and data and software described on Schedule 2.1(b)(v), including without limitation all real property, buildings, structures and other improvements and all fixtures and appurtenances thereto, owned or leased by Seller (or any Subsidiary) in or around Bayfield, Colorado (collectively, the "Miscellaneous Corporate Property");

(vi) all pipes, casing, tubing, tubulars, fittings, and other spare parts, supplies, tools, and materials located on, used or held for use on or held as inventory in connection with the ownership or operation of the Properties, Miscellaneous Corporate Property or Equipment;

(vii) to the extent transferable pursuant to applicable Legal Requirements, all governmental (whether federal, state or local) permits, licenses, authorizations, franchises, grants, easements, variances, exceptions, consents, certificates, approvals and related instruments or rights of any Governmental Authority or other third party, and any writ, judgment, decree, award, order, injunction or similar order, ruling, directive or other requirement of any

Governmental Authority (in each such case whether preliminary or final) required of Seller and the Transferring Subsidiaries for the ownership, operation or use of the Properties, Miscellaneous Corporate Property or Equipment (collectively, the "Permits");

(viii) all Contracts (other than the Excluded Contracts), including sales and purchase contracts, operating agreements, exploration agreements, development agreements, seismic licenses, balancing agreements, farmout agreements, service agreements, transportation, processing, treatment and gathering agreements, equipment leases and other contracts, agreements and instruments, including the Contracts described on **Exhibit E** attached hereto, in each case, insofar as they relate to any Asset (collectively, the "Assigned Contracts");

(ix) all Surface Rights;

(x) except solely as they relate to the Excluded Assets and the Excluded Liabilities, all claims, refunds, abatements, variances, allocations, causes of action, claims for relief, choses in action, rights of recovery, rights of set-off, rights of indemnity, contribution or recoupment, counter-claims, cross-claims and defenses of Seller and the Transferring Subsidiaries to the extent related to the Assets and arising or relating to events occurring from and after the Effective Date or related to the Assumed Liabilities;

(xi) all information, books, databases, files, records and data (other than the Excluded Records), whether in written or electronic format, relating to any Asset or to any Assumed Liabilities (collectively, the "Records"), which Records shall include all reservoir, land, operation and production files and records, inclusive of lease records, well records, division order records, property ownership reports and files, contract files and records, well files, title records (including abstracts of title, title opinions and memoranda, and title curative documents), correspondence, production records, prospect files and other prospect information, supplier lists and files, customer lists and files; and all other data including proprietary and non-proprietary engineering, geological, geophysical and seismic data, files and records (but only to the extent transferable without material restriction (including a material restriction against assignment without prior consent)), inclusive of maps, logs, core analysis, formation tests, cost estimates, studies, plans, prognoses, surveys and reports, and including raw data and any interpretive data or information relating to the foregoing, and any other proprietary data in the actual possession or control of Seller and the Transferring Subsidiaries or which Seller and the Transferring Subsidiaries has the right to obtain (either without the payment of money or delivery of other consideration or unduly burdensome effort or, upon Buyer's written election, at Buyer's expense) and relating to the ownership, operation, development, maintenance or repair of, or the production, gathering, treatment, processing, storing, sale or disposal of Hydrocarbons or produced water from, the other Assets; *provided* that if any Records can only be assigned to Buyer with a fee or penalty, Buyer shall bear responsibility for such fee or penalty;

(xii) all Known Receivables, cash call pre-payments and other refunds due to Seller and the Transferring Subsidiaries for royalty overpayments and/or future deductions as royalty offsets associated with any Asset as of the Effective Date;

(xiii) that certain intellectual property being more particularly described on Schedule 2.1(b)(xiii);

(xiv) all trade credits, accounts receivable, note receivables, take or pay amounts receivable, and other receivables attributable to the other Assets, with respect to any period of time on and after the Effective Date; and

(xv) Avoidance Actions against parties to the Assigned Contracts.

2.2 Excluded Assets.

Notwithstanding the foregoing, the Assets shall not include, and there is excepted, reserved and excluded from the transactions contemplated hereby, the following (collectively, the "Excluded Assets"):

(a) the Purchase Price delivered to Seller pursuant to this Agreement;

(b) all cash and cash equivalents, including checks, commercial paper, treasury bills, certificates of deposit, bank accounts and other bank deposits as of the Closing Date;

(c) Intentionally Omitted;

(d) any shares of capital stock or other equity interest of Seller or any of Seller's Subsidiaries or any securities convertible into, exchangeable or exercisable for shares of capital stock or other equity interest of Seller or any of Seller's Subsidiaries;

(e) all minute books, stock ledgers, corporate seals and stock certificates of Seller and the Transferring Subsidiaries;

(f) all Excluded Records;

(g) Excluded Leases and Interests as identified on Schedule 2.2(g), if any;

(h) all Excluded Contracts as identified on Schedule 2.2(h), if any;

(i) all rights to any refunds of Taxes (or other related costs or expenses) that are borne by or the responsibility of Seller or any Transferring Subsidiary, attributable to any Tax asset of Seller or any Transferring Subsidiary or income Taxes of Seller or any Transferring Subsidiary, or to which Seller or any Transferring Subsidiary is otherwise entitled hereunder;

(j) subject to Section 8.8(b), all insurance policies and rights to proceeds thereof;

(k) all Permits and pending applications therefor to the extent related to any other Excluded Asset or the Excluded Liabilities;

(l) all Intellectual Property;

(m) all prepayments, good faith and other bid deposits submitted by any third party under the terms of the Bidding Procedures Order;

(n) all claims, refunds, loss carry forwards, abatements, variances, allocations, causes of action, claims for relief, choses in action, rights of recovery, audit rights, rights of set-off, rights of indemnity, contribution or recoupment, counter-claims, cross-claims and defenses of Seller or any Transferring Subsidiary, other than those constituting Assets;

(o) all rights, claims or causes of action by or in the right of Seller against any current or former director or officer of Seller;

(p) the Avoidance Actions, except those purchased pursuant to Section 2.1(xv);

(q) all Benefit Plans; and

(r) any rights, claims or causes of action of Seller or any Transferring Subsidiary under this Agreement or any other Transaction Document.

2.3 Assumed Liabilities.

Upon the terms and subject to the conditions of this Agreement and the Sale Order, at Closing, Buyer shall execute and deliver to Seller the Assumption Agreement in the form attached hereto as **Exhibit F** (the "Assumption Agreement") pursuant to which Buyer shall assume and agree to discharge or otherwise satisfy, when due (in accordance with their respective terms and subject to the respective conditions thereof), the following Liabilities (collectively, the "Assumed Liabilities"):

(a) Assigned Contracts. All of the Seller's and the Transferring Subsidiaries' Liabilities under the Assigned Contracts to the extent arising after the Effective Date.

(b) Properties. Except for those Liabilities identified as Excluded Liabilities in Section 2.4(a) through (h), inclusive: (i) all of Seller's and the Transferring Subsidiaries' plugging and abandonment obligations relating to the Properties and all other Liabilities under Environmental Laws, whether arising prior to, at or after the Effective Date, and (ii) all of Seller's and the Transferring Subsidiaries' other Liabilities arising under the Properties, to the extent such Liabilities arise after the Effective Date;.

(c) Cure Costs. Intentionally omitted.

(d) Suspense Funds. Subject to the adjustment to the Purchase Price as provided in Section 8.12(b)(ii), obligations of Seller and the Transferring Subsidiaries with respect to the Suspense Funds, together with any escheatment obligations related thereto, associated with Assets.

(e) Buyer Taxes. All Asset Taxes with respect to the Assets, except Asset Taxes that are the responsibility of the Seller and the Transferring Subsidiaries pursuant to Section 8.1(b).

(f) Transfer Taxes. All Transfer Taxes.

(g) Other Assets. To the extent not already described in 2.3(a) through (h) above, all Liabilities arising from, related to or associated with the Assets, to the extent arising after the Effective Date.

The assumption by Buyer of the Assumed Liabilities shall not, in any way, enlarge the rights of any third parties relating thereto.

2.4 Excluded Liabilities.

Notwithstanding any provision in this Agreement to the contrary, Buyer shall not assume and shall not be obligated to assume or be obliged to pay, perform, discharge or

otherwise satisfy any Liability of Seller and the Transferring Subsidiaries, and Seller and the Transferring Subsidiaries shall be solely and exclusively liable with respect to all Liabilities of Seller and the Transferring Subsidiaries, other than the Assumed Liabilities (such Liabilities other than Assumed Liabilities, collectively, the "Excluded Liabilities"). For purposes of clarity, and without limitation of the generality of the foregoing, the Excluded Liabilities shall include, without limitation, each of the following Liabilities of Seller and the Transferring Subsidiaries:

(a) all indebtedness of Seller and the Transferring Subsidiaries, including without limitation indebtedness for borrowed money;

(b) all guarantees of third party obligations by Seller and the Transferring Subsidiaries and reimbursement obligations to guarantors of Seller's and the Transferring Subsidiaries' obligations or under letters of credit;

(c) all accrued expenses and accounts payables;

(d) all Tax Liabilities of Seller other than the Transfer Taxes and Asset Taxes that are the responsibility of Buyer pursuant to Section 8.1(a) and Section 8.1(b);

(e) those Actions and Proceedings set forth on Disclosure Schedule 5.14(a);

(f) all Liabilities of Seller and the Transferring Subsidiaries to any owner or former owner of capital stock or warrants, or holder of indebtedness for borrowed money;

(g) any claims to the extent related to the Excluded Assets;

(h) obligations under any futures contracts, options on futures, swap agreements or forward sale agreements entered into by Seller or any Transferring Subsidiary;

(i) all Liabilities arising from or relating to any layoffs or termination of Employees by Seller at or prior to Closing, including without limitation all accrued and unpaid vacation, sick or other leave, payroll taxes, related expenses, or any other Liabilities to Employees, and all Liabilities, if any, arising from any Legal Requirements of Seller in connection with the termination of Employees, including without limitation notice and other obligations under the WARN Act;

(j) all Liabilities with respect to Employees and Benefit Plans; and

(k) all Liabilities that are not Assumed Liabilities.

2.5 Cure Costs. Intentionally omitted.

2.6 Assignment of Assets Subject to Consent Requirements.

If prior to the Closing Date any consent to assignment applicable to the transactions contemplated hereby (other than governmental consents or approvals customarily obtained post-Closing, including consents of the BIA relating to Tribal leases) (a) has not been obtained, satisfied or waived by Buyer, or (b) is no longer applicable to the transactions contemplated hereby by reason of any Bankruptcy Court Order, and further, failure to obtain such third party consent or waiver may result in termination of a Lease or would cause a Lease to be void or voidable, in each case after giving effect to the Sale Order (each such third party consent, a "Hard Consent"), the Properties affected by such Hard Consent shall be held back

from the Assets conveyed at Closing without reduction to the Base Purchase Price. Any Property so held back at the Closing will be conveyed to Buyer within ten (10) Business Days after such Hard Consent has been obtained, waived or otherwise satisfied. At such subsequent closing, Seller shall contribute, assign, transfer and convey to Buyer, and Buyer shall acquire and accept from Seller, such Property pursuant to the terms of this Agreement. Except for Hard Consents, if any consents to the assignment of any Asset are not obtained prior to Closing, then with respect to each affected Asset, the affected Assets shall nevertheless be sold and conveyed to Buyer at the Closing and Buyer shall pay for the affected Asset(s) at Closing in accordance with this Agreement as though the Consent had been obtained. In the case of licenses, certificates, approvals, authorizations, Leases, Contracts and other commitments included in the Assets (i) that cannot be transferred or assigned without the Hard Consent of third parties, which Hard Consent has not been obtained prior to the Closing (after giving effect to the Sale Order and the Bankruptcy Code), Seller shall, at Buyer's sole expense and subject to any approval of the Bankruptcy Court that may be required, reasonably cooperate with Buyer in attempting to obtain such Hard Consent and, if any such Hard Consent is not obtained, Seller shall, following the Closing, at Buyer's sole expense and subject to any approval of the Bankruptcy Court that may be required, cooperate with Buyer in all reasonable respects to provide to Buyer the benefits thereof in some other manner, or (ii) that are otherwise not transferable or assignable (after giving effect to the Sale Order and the Bankruptcy Code), Seller shall, following the Closing, at Buyer's sole expense and subject to any approval of the Bankruptcy Court that may be required, reasonably cooperate with Buyer to provide to Buyer the benefits thereof in some other manner (including the exercise of the rights of Seller thereunder); *provided* that nothing in this Section 2.6 shall (1) require Seller to make any expenditure or incur any obligation on its own or on behalf of Buyer for which funds in the full amount of such expenditure or obligation are not provided to Seller by Buyer in advance in cash or (2) prohibit Seller from ceasing operations or winding up its affairs following the Closing.

2.7 Consents for Assigned Contracts; Further Assurances.

The Parties agree:

(a) that for all purposes of this Agreement (including Seller's representations and warranties as set forth in this Agreement), Seller shall be deemed to have obtained all required consents in respect of the assumption and assignment of any Assigned Contract if, and to the extent that, (i) Seller has properly served under the Bankruptcy Code notice of assumption and assignment on the counterparty to such Assigned Contract, (ii) any objections to assumption and assignment filed by such counterparty have been withdrawn or overruled (including pursuant to the Sale Order or other Order of the Bankruptcy Court), and (iii) pursuant to the Sale Order, Seller is authorized to assume and assign such Assigned Contracts to Buyer pursuant to Section 365 of the Bankruptcy Code and any applicable Cure Costs have been satisfied by Buyer or Seller as provided in this Agreement. Seller shall, as part of the Sale Motion, seek the assumption and assignment to Buyer of the Assigned Leases and Interests and the Assigned Contracts.

(b) to (i) furnish upon request to each other such further information, (ii) execute, acknowledge and deliver to each other such other documents and (iii) do such other acts and things, all as the other Party may reasonably request for the purpose of carrying out the intent of this Agreement and the Transaction Documents; *provided* that nothing in this Section

2.7(b) shall prohibit Seller from ceasing operations or winding up its affairs following the Closing.

ARTICLE 3

PURCHASE PRICE

3.1 Purchase Price.

The purchase price for the purchase, sale, assignment and conveyance of Seller's right, title and interest in, to and under the Assets shall consist of the following (collectively, the "Base Purchase Price"):

(a) cash in an amount equal to ONE HUNDRED FIFTEEN MILLION, FIVE HUNDRED THOUSAND AND NO/100 DOLLARS ($115,500,000); and

(b) the assumption of the Assumed Liabilities.

Notwithstanding the foregoing or anything to the contrary in this Agreement, (i) the Base Purchase Price shall be adjusted as provided in Sections 8.11 through 8.13 hereof (as adjusted, the "Purchase Price") and (ii) the cash components of the Purchase Price shall be delivered by Buyer subject to the provisions set forth in Section 4.2.

3.2 Deposit.

No later than three (3) Business Days following the Execution Date, Buyer shall deposit with JPMorgan Chase Bank, N.A. ("Escrow Agent"), pursuant to that certain escrow agreement by and among Seller, Buyer and Escrow Agent, a deposit in the amount of FIVE MILLION, SEVEN HUNDRED SEVENTY-FIVE THOUSAND AND NO/100 DOLLARS ($5,775,000) (the "Deposit"). The Deposit shall not be subject to any lien, attachment, trustee process, or any other judicial process of any creditor of Seller or Buyer. If Closing occurs, the Parties shall cause the Escrow Agent to release the Deposit to Seller and the Deposit shall be credited against the amount required to be paid by Buyer to Seller at Closing. If this Agreement is terminated by Seller prior to Closing pursuant to Section 11.1(c)(i), or the conditions to the obligations of Buyer to consummate the Closing set forth in Article 9 shall have been satisfied by Seller or waived by Buyer, but Buyer shall have failed to perform its obligations under Section 4.3 after notice thereof by Seller in accordance with Section 11.1(c)(i), then the Deposit shall be released by Escrow Agent to Seller to be retained by Seller as liquidated damages (and not a penalty). In all other circumstances (including if Buyer is not the Successful Bidder, or if the Bankruptcy Court does not approve the Sale Order or Bidding Procedures Order), if this Agreement is terminated prior to Closing for any other reason, then the Parties shall cause the Escrow Agent to release the Deposit to Buyer within two (2) Business Days of such termination.

ARTICLE 4

CLOSING

4.1 Closing Date.

Upon the terms and subject to the conditions hereof, the closing of the sale of the Assets and the assumption of the Assumed Liabilities contemplated hereby (the "Closing") shall take place at 10:00 a.m. Central time, either by electronic exchange of documents with originals of recordable documents to be provided by FedEx (or other national overnight courier) or, if

either Party so desires, at the office of Seller at Samson Plaza, Two West Second Street, Tulsa, Oklahoma 74103 (or at such other location as the Parties may mutually agree), no later than three (3) Business Days following the date on which the conditions set forth in Article 9 and Article 10 have been satisfied or (if permissible) waived (other than the conditions which by their nature are to be satisfied at the Closing, but subject to the satisfaction or (if permissible) waiver of such conditions). The date and time at which the Closing actually occurs is hereinafter referred to as the "Closing Date."

4.2 Payment on the Closing Date.

Subject to satisfaction or (if permissible) waiver of the conditions set forth in Article 9 and Article 10, at the Closing, (a) Buyer shall pay (or cause to be paid) the cash components of the Purchase Price, less the Deposit, by wire transfer of immediately available funds to an account specified in writing by Seller prior to the Closing Date, and (b) as set forth in Section 3.2, the Parties shall cause the Escrow Agent to release the Deposit to Seller.

4.3 Buyer's Deliveries.

At the Closing, Buyer shall deliver or cause to be delivered to Seller (or such other Persons where so designated):

(a) the cash consideration referenced in Section 3.1(a) to Seller in accordance with Section 4.2;

(b) the Assumption Agreement, duly executed by Buyer;

(c) a copy of Buyer's Constitution, adopted by the Southern Ute Indian Tribe and approved November 4, 1936, as amended October 1, 1975 and August 27, 1991;

(d) a resolution of the Tribal Council of the Southern Ute Indian Tribe, evidencing Buyer's authority to consummate the transactions contemplated hereunder;

(e) a certificate of the recording secretary of Buyer or similar representative of the Tribe, dated the Closing Date, in form and substance reasonably satisfactory to Seller, certifying (i) that there have been no amendments to the Constitution of Buyer since the date of delivery pursuant to Section 4.3(c) and that the Tribe continues to be a federally recognized Indian tribe as of the Closing Date, (ii) that Buyer is authorized to execute and perform its obligations under the Transaction Documents to which Buyer is a party; and (iii) to the incumbency and signatures of the Chief Operating Officer or other authorized representative of Buyer executing the Transaction Documents;

(f) each other Transaction Document to which Buyer is a party, duly executed (and acknowledged, where applicable) by Buyer, including the Assignment, letters-in-lieu of transfer orders, change of operator forms to be prepared by Seller, change of operator notices required under applicable operating agreements, and any other applicable forms and declarations required by federal and state agencies relative to Buyer's assumption of operations and plugging and abandonment Liabilities with respect to all of the Assets;

(g) the certificates of Buyer to be received by Seller pursuant to Sections 10.1 and 10.3;

(h) a counterpart of the Preliminary Settlement Statement executed by Buyer;

(i) evidence (including evidence of satisfaction of all applicable bonding or insurance requirements) as Seller may reasonably request demonstrating that Buyer is qualified with the applicable Governmental Authorities and pursuant to any applicable operating agreement to succeed Seller as the owner and, where applicable, the operator of the Assets; and

(j) such other assignments and other good and sufficient instruments of assumption and transfer, in form reasonably satisfactory to Seller, as Seller may reasonably request to transfer and assign the Assumed Liabilities to Buyer.

4.4 Seller's Deliveries.

At the Closing, Seller shall deliver to Buyer:

(a) the Assignment and each other Transaction Document to which Seller is a party (including letters-in-lieu of transfer orders, change of operator forms as required under the applicable operating agreements in form and substance reasonably acceptable to both Buyer and Seller, and any other forms and declarations required by federal and state agencies relating to Buyer's assumption of operations and plugging and abandonment Liabilities with respect to the Assets), duly executed (and acknowledged, where applicable) by Seller and the applicable Transferring Subsidiaries;

(b) special warranty deeds conveying the real property, improvements and fixtures and all appurtenances thereto, included in the Miscellaneous Corporate Property, duly executed (and acknowledged, where applicable) by Seller and the applicable Transferring Subsidiaries;

(c) the Assumption Agreement, duly executed by Seller;

(d) a certified copy of the Sale Order and case docket reflecting that the Sale Order is in effect and has not been stayed;

(e) the certificates of Seller to be received by Buyer pursuant to Sections 9.1 and 9.2;

(f) a non-foreign affidavit dated as of the Closing Date, sworn under penalty of perjury and in form and substance required under the Treasury Regulations issued pursuant to Code §1445, stating that Seller is not a "foreign person" as defined therein;

(g) a counterpart of the Preliminary Settlement Statement executed by Seller; and

(h) such bills of sale, deeds, endorsements, assignments and other good and sufficient instruments of conveyance and transfer, in form reasonably satisfactory to Buyer, as Buyer may reasonably request to vest in Buyer all the right, title and interest of Seller in, to or under any or all the Assets.

ARTICLE 5

REPRESENTATIONS AND WARRANTIES OF SELLER

Except as disclosed in the Disclosure Schedules attached hereto or any Seller SEC Documents, Seller, on behalf of itself and each of the Transferring Subsidiaries, represents and warrants the following to Buyer:

5.1 Organization and Good Standing.

Seller, and each Transferring Subsidiary, is an entity duly organized, validly existing and in good standing under the laws of the jurisdiction of its organization. Seller, and each Transferring Subsidiary has the requisite corporate power and authority to own or lease and to operate and use its properties and to carry on its business as now conducted. Seller, and each Transferring Subsidiary, is duly qualified or licensed to do business and is in good standing in each jurisdiction where the character of its business or the nature of its properties makes such qualification or licensing necessary, except for such failures to be so qualified or licensed or in good standing as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing.

5.2 Authority; Validity; Governmental Authority Consents.

Seller, and each Transferring Subsidiary, has, subject to requisite Bankruptcy Court approval, the requisite power and authority necessary to enter into and perform its obligations under this Agreement and the other Transaction Documents to which Seller, or such Transferring Subsidiary, is a party and to consummate the transactions contemplated hereby and thereby, and, subject to requisite Bankruptcy Court approval, the execution, delivery and performance of this Agreement and such other Transaction Documents by Seller or such Transferring Subsidiary and the consummation by Seller or such Transferring Subsidiary of the transactions contemplated herein and therein have been duly and validly authorized by all requisite corporate action. This Agreement has been duly and validly executed and delivered by Seller and each other Transaction Document required to be executed and delivered by Seller and each Transferring Subsidiary at the Closing will be duly and validly executed and delivered by Seller or such Transferring Subsidiary at the Closing. Subject to requisite Bankruptcy Court approval, this Agreement and the other Transaction Documents constitute, with respect to Seller and where applicable, each Transferring Subsidiary, the legal, valid and binding obligations of Seller or such Transferring Subsidiary, enforceable against Seller or such Transferring Subsidiary in accordance with their respective terms, except as such enforceability may be limited by applicable bankruptcy, insolvency, reorganization, fraudulent conveyance, moratorium or other similar Legal Requirements affecting the enforcement of creditors' rights generally and by general principles of equity, regardless of whether such principles are considered in a proceeding at law or in equity. Subject to requisite Bankruptcy Court approval, except for (a) entry of the Sale Order, (b) notices, filings and consents required in connection with the Bankruptcy Case, (c) any applicable notices, filing, consents or approvals under any applicable antitrust, competition or trade regulation Legal Requirements and (d) the notices, filings and consents set forth on Disclosure Schedule 5.2, neither Seller nor any Transferring Subsidiary is required to give any notice to, make any filing with or obtain any consent from any Governmental Authority in connection with the execution and delivery of this Agreement and the other Transaction Documents or the consummation or performance of any of the transactions contemplated hereby and thereby, except as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing.

5.3 No Conflict.

When the consents and other actions described in Section 5.2, including requisite Bankruptcy Court approval, have been obtained and taken, the execution and delivery of this Agreement and the other Transaction Documents and the consummation of the transactions provided for herein and therein will not result in the breach of any of the terms and provisions of, or constitute a default under, or conflict with, or cause any acceleration of any obligation of Seller or any Transferring Subsidiary under (a) any agreement, indenture, or other instrument to which Seller or such Transferring Subsidiary is bound, (b) the certificate of incorporation, bylaws or other governing documents of Seller or such Transferring Subsidiary, (c) any Order or (d) any Legal Requirement, except for such failures to be so qualified or licensed or in good standing as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing.

5.4 Material Assigned Contracts.

(a) Disclosure Schedule 5.4 lists all Material Assigned Contracts in effect as of the Execution Date, to which Seller or a Transferring Subsidiary is a party or by which its interests in the Assets are bound, (b) all Material Assigned Contracts are in full force and effect, except (i) as such enforceability may be limited by applicable bankruptcy, insolvency, reorganization, fraudulent conveyance, moratorium or other similar Legal Requirements affecting the enforcement of creditors' rights generally and by general principles of equity, regardless of whether such principles are considered in a proceeding at law or in equity and (ii) as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, and (c) except as related to or arising out of or as a result of the Bankruptcy Case and subject to the entry of the Sale Order and the assumption by Seller of the same in accordance with applicable Legal Requirements (including the satisfaction of any applicable Cure Costs), no default or breach (or event that, with notice or lapse of time, or both, would become a default or breach) of any such Material Assigned Contracts has occurred or is continuing on the part of Seller.

5.5 Permits.

Except as set forth on Disclosure Schedule 5.5., as of the Execution Date, (a) Seller has not received written notice of default under any Permit and (b) no violations exist in respect of such Permits, except as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing.

5.6 Wells; Plug and Abandon Notice.

As of the Execution Date, except as set forth on Disclosure Schedule 5.6, there are no Wells (other than any water well constituting a Well) (a) in respect of which Seller or any Transferring Subsidiary has received an order from any Governmental Authority requiring that such Wells be plugged and abandoned or (b) that are neither in use for purposes of production or injection nor suspended or temporarily abandoned in accordance with applicable Legal Requirements that are required to be plugged and abandoned in accordance with applicable

Legal Requirements but have not been (or are not in the process of being) plugged and abandoned.

5.7 Imbalances.

All material Imbalances relating to the Assets operated by Seller or any Transferring Subsidiary are reflected in Disclosure Schedule 5.7 as of the date stated therein.

5.8 AFEs.

Disclosure Schedule 5.8 contains a list, true, correct and complete as of the date set forth therein, of all material authorities for expenditures (collectively, "AFEs") for capital expenditures with respect to the Assets in excess of One Hundred Thousand Dollars ($100,000), net to Seller's or the applicable Transferring Subsidiary's interest, that have been proposed by any Person having authority to do so (including internal AFEs of Seller or any Transferring Subsidiary not delivered to third parties) or of which Seller otherwise has Knowledge.

5.9 Non-Consent Operations.

Except as disclosed on Disclosure Schedule 5.9, no operations are being conducted or have been conducted on the Properties with respect to which Seller or a Transferring Subsidiary has elected to be a non-consenting party under the applicable operating agreement and with respect to which all of Seller's or such Transferring Subsidiary's rights have not yet reverted to it.

5.10 Hedging.

There are no futures, options, swaps or other derivatives with respect to the sale of Hydrocarbons from the Assets that are or will be binding on Buyer or the Assets at any time after the Closing Date.

5.11 Preferential Purchase Rights.

Disclosure Schedule 5.11 lists all Preferential Purchase Rights to which any Assets are subject, which would be triggered by this Agreement and to which a notice would be required under the terms thereof due to the Parties entering into this Agreement.

5.12 Suspense Funds.

Disclosure Schedule 5.12 sets forth a list, true, complete and correct as of the date set forth therein, of all Suspense Funds and the name or names of the parties to whom such funds are owed, together with information in reasonable detail regarding the Wells to which such Suspense Funds are attributable.

5.13 Intellectual Property.

To Seller's Knowledge, except as set forth on Schedule 2.1(b)(xiii), Seller owns no Intellectual Property related to or used in connection with the ownership or operation of the Assets that is material to Seller's business, taken as a whole.

5.14 Taxes.

Seller has filed all material Tax Returns required to be filed, and has paid all Taxes shown on any such Tax Return as owing. Except as set forth on Disclosure Schedule 5.14 and as would not result in an Assumed Liability, no examination of any such Tax Return of Seller is currently in progress by any Governmental Authority. Seller has no Knowledge that

any examination has been scheduled or threatened, or of any facts or circumstances which would suggest to a reasonable person that an examination is otherwise likely to occur.

5.15 Legal Proceedings.

Except for the Bankruptcy Case and any adversary proceedings or contested matters commenced in connection therewith (each of which Seller has disclosed and will continue to promptly disclose in writing to Buyer), or as set forth on Disclosure Schedule 5.15A (Excluded Litigation) or Disclosure Schedule 5.15B (Assumed Litigation), there is no Proceeding, appeal or Order pending, outstanding or, to Seller's Knowledge, threatened, that seeks to appeal, stay, restrain or prohibit or otherwise challenge the consummation, legality or validity of the transactions contemplated hereby, the Sale Motion or the Sale Order, that would, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing.

5.16 Labor Matters.

With respect to the Applicable Employees of Seller and its Subsidiaries, (a) there are no collective bargaining agreements or collective bargaining relationships to which Seller or its Subsidiaries are a party, (b) there is no pending or, to Seller's Knowledge, threatened, strike, slowdown, picketing or work stoppage, and no such dispute has occurred within the past five (5) years, (c) to Seller's Knowledge, there is no pending application for certification of a collective bargaining agent filed with any Governmental Authority and no such filing is threatened and (d) to Seller's Knowledge, no union organizing activities are underway or threatened and no such activities have occurred in the past five (5) years.

5.17 Employee Benefits.

Disclosure Schedule 5.17 sets forth a true and complete list in all material respects of each (a) deferred compensation plan, (b) incentive compensation plan, (c) equity compensation plan, (d) "welfare" plan, fund or program (within the meaning of Section 3(1) of ERISA), (e) "pension" plan, fund or program (within the meaning of Section 3(2) of ERISA), (f) "employee benefit plan" (within the meaning of Section 3(3) of ERISA), (g) employment (other than offer letters entered into in the ordinary course of business), termination, severance or "change in control" agreement, and (h) other employee benefit plan, fund, program, agreement or arrangement, in each case, that is sponsored, maintained or contributed to or required to be contributed to by Seller or any of the Transferring Subsidiaries or by any trade or business, whether or not incorporated, that together with Seller would be deemed a "single employer" within the meaning of Section 4001(b) of ERISA (an "ERISA Affiliate"), or to which Seller or any ERISA Affiliate (including for this purpose any of the Transferring Subsidiaries) is a party, in each case, for the benefit of any Applicable Employee (each such plan, whether or not material, is referred to herein as a "Benefit Plan").

5.18 No Take-or-Pay Obligations.

Except as set forth on Disclosure Schedule 5.18, Seller is not obligated by virtue of any material take-or-pay payment, advance payment or other similar payment (other than gas balancing arrangements) to deliver Hydrocarbons, or proceeds from the sale thereof, attributable to the Assets at some future time without receiving payment therefor at or after the time of delivery.

5.19 Payments.

Except as set forth on Disclosure Schedule 5.19, and excluding the Suspense Funds, all material delay rentals, royalties, shut-in royalties, overriding royalties, compensatory royalties and other payments due with respect to the Properties, in each case, to the extent attributable to the period of time prior to the Execution Date, have been properly and fully paid.

5.20 Environmental Matters

Except as set forth on Disclosure Schedule 5.20, to Seller's Knowledge, except as would not be reasonably expected to be material to the Assets or Assumed Liabilities:

(a) Seller, and each applicable Transferring Subsidiary, possesses and is in compliance with all Permits required under Environmental Laws for the ownership and operation of the Properties and Equipment at the Properties;

(b) with respect to Seller's or any applicable Transferring Subsidiary's operation of the Properties and Equipment at the Properties, neither Seller nor such Transferring Subsidiary has received any written notice of a violation of applicable Environmental Laws from any Governmental Authority, the subject of which is unresolved as of the Execution Date, and neither Seller nor any Transferring Subsidiary is aware of any failure to comply, or of the Assets to comply, with applicable Environmental Laws;

(c) Neither Seller nor any Transferring Subsidiary has received any written notice of potential liability for a release of Hazardous Substances, or liability for any investigatory, remedial or corrective obligation arising under any Environmental Laws, in each case with respect to the Properties or the Equipment at the Properties, the subject of which is unresolved as of the Execution Date, and neither Seller nor any Transferring Subsidiary is aware of any such potential liability; and

(d) there is no Proceeding or Order pending, outstanding or that has been threatened against Seller or any applicable Transferring Subsidiary pursuant to any Environmental Law with respect to the Properties or Equipment at the Properties or Seller's or such Transferring Subsidiary's operation of the Properties or the Equipment at the Properties.

5.21 Title Matters.

Seller and the Transferring Subsidiaries have, as of the Execution Date (and will have at Closing), and Seller and the Transferring Subsidiaries shall convey to Buyer at Closing, Defensible Title to the Assets against all Persons.

5.22 Brokers or Finders.

Seller has not incurred any obligation or liability, contingent or otherwise, for brokerage or finders' fees or agents' commissions or other similar payments in connection with this Agreement, the other Transaction Documents or the transactions contemplated hereby or thereby for which Buyer is or will become liable, except to the extent that such fees, commissions and other similar payments constitute Assumed Liabilities.

5.23 Cure Costs.

There are no cure, reinstatement or similar costs or expenses relating to the assignment and assumption of the Assigned Contracts or Assigned Leases and Interests

(collectively, "Cure Costs") to which Seller or any Transferring Subsidiary is a party and which are included in the Assets.

5.24 Materiality Qualifier for Non-Operated Assets.

To the extent that Seller has made any representations or warranties in this Article 5 in connection with matters relating to non-operated Assets, each and every such representation and warranty shall be deemed to be qualified by the phrase "Except as would not, individually or in the aggregate, reasonably be expected to be material to the Assets and Assumed Liabilities, taken as a whole, or impair, prevent, or materially delay the ability of Seller and Transferring Subsidiaries to consummate the Closing."

ARTICLE 6

REPRESENTATIONS AND WARRANTIES OF BUYER

Buyer represents and warrants to Seller as follows:

6.1 Organization and Good Standing.

Buyer is a federally recognized Indian tribe. Buyer has the requisite power and authority to own or lease and to operate and use its properties and to carry on its business as now conducted. To the extent so required, Buyer is duly qualified or licensed to do business in the State(s) where the Assets are located.

6.2 Authority; Validity; Consents.

Buyer has the requisite power and authority necessary to enter into and perform its obligations under this Agreement and the other Transaction Documents to which it is a party and to consummate the transactions contemplated hereby and thereby. The execution, delivery and performance of this Agreement by Buyer and the consummation by Buyer of the transactions contemplated herein have been duly and validly authorized by all requisite action of the Southern Ute Indian Tribal Council, which is the governing body for Buyer. This Agreement has been duly and validly executed and delivered by Buyer and each other Transaction Document to which Buyer is a Party will be duly and validly executed and delivered by Buyer, as applicable, at the Closing. This Agreement and the other Transaction Documents to which Buyer is a party constitute the legal, valid and binding obligation of Buyer, enforceable against Buyer in accordance with their respective terms, except in each case as such enforceability may be limited by applicable bankruptcy, insolvency, reorganization, fraudulent conveyance, moratorium or other similar Legal Requirements affecting the enforcement of creditors' rights generally and by general principles of equity, regardless of whether such principles are considered in a proceeding at law or in equity. Buyer is not or will not be required to give any notice to, make any filing with, or obtain any consent or approval from any Person in connection with the execution and delivery of this Agreement and the other Transaction Documents to which it is a Party or the consummation or performance of any of the transactions contemplated hereby or thereby, except for such notices, filings, consents and approvals, the failure of which to provide, make or obtain, would not, individually or in the aggregate, affect Buyer's ability to perform its obligations under this Agreement or any other Transaction Documents or to consummate the transactions contemplated hereby or thereby.

6.3 No Conflict.

When the consents and other actions described in Section 6.2 have been obtained and taken, the execution and delivery of this Agreement and the other Transaction Documents and the consummation of the transactions provided for herein and therein will not result in the breach of any of the terms and provisions of, or constitute a default under, or conflict with, or cause any acceleration of any obligation of Buyer under (a) any agreement, indenture or other instrument to which it is bound, (b) the Constitution of Buyer, as applicable, (c) any Order or (d) any Legal Requirement.

6.4 Availability of Funds.

As of the Closing, Buyer will have sufficient cash in immediately available funds (without giving effect to any unfunded financing, regardless of whether any such financing is committed) to pay the Purchase Price, all costs, fees and expenses to be paid by Buyer that are necessary to consummate the transactions contemplated by this Agreement and the other Transaction Documents, and to pay, perform, discharge or otherwise satisfy as and when due the Assumed Liabilities. Buyer's ability to consummate the transactions contemplated hereby is not contingent upon its ability to secure financing or to complete any public or private placement of securities prior to or upon Closing.

6.5 Litigation.

There are no Proceedings or Orders pending or, to the Knowledge of Buyer, threatened against Buyer, that seek to restrain or prohibit or otherwise challenge the consummation, legality or validity of the transactions contemplated hereby or that would, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

6.6 Bankruptcy.

There are no bankruptcy, reorganization or arrangement proceedings pending, being contemplated by, or to the Knowledge of Buyer, threatened against Buyer or any of its Affiliates.

6.7 Brokers or Finders.

Neither Buyer nor any Person acting on behalf of Buyer has paid or become obligated to pay any fee or commission to any broker, finder, investment banker, agent or intermediary for or on account of the transactions contemplated by this Agreement for which Seller is or will become liable.

6.8 Knowledge and Experience.

Buyer (a) is engaged in the business of exploring for and producing Hydrocarbons as an ongoing business and (b) is purchasing the Assets for its own account for investment purposes and not with the intent to resell the Assets in violation of any federal or state securities laws. Buyer is an experienced and knowledgeable investor in oil and gas properties, is knowledgeable with respect to the tax ramifications associated therewith and herewith, has the financial and business expertise to fully evaluate the merits and risks of the transactions covered by this Agreement and has relied solely upon the basis of its own independent investigation of the Assets for all purposes (including the geologic and geophysical characteristics of the Assets, the estimated Hydrocarbon reserves recoverable therefrom, and the price and expense assumptions applicable thereto). In acquiring the Assets, Buyer is acting in the conduct of its

own business and not under any specific contractual commitment to any third party, or any specific nominee agreement with any third party, to transfer to, or to hold title on behalf of, such third party, with respect to all or any part of the Assets. Buyer acknowledges that it has had the opportunity to seek the advice of persons it deemed appropriate concerning the consequences of the provisions of this Agreement and hereby waives any and all rights to claim that it is an unsophisticated investor in oil and gas properties.

6.9 Qualification to Assume Operatorship.

At Closing, Buyer will be qualified to own and, where applicable, assume operatorship of the Assets in all jurisdictions where the Assets are located, and the consummation of the transactions contemplated by this Agreement will not cause Buyer to be disqualified as such an owner or operator. To the extent required by the applicable state, tribal and federal Governmental Authorities, Buyer currently has, and will continue to maintain, lease bonds, area-wide bonds or any other surety bonds or insurance policies as may be required by, and in accordance with, any Governmental Authorities with jurisdiction over the ownership or operation of such Assets or any operating agreement.

ARTICLE 7

ACTIONS PRIOR TO THE CLOSING DATE

7.1 Access and Reports.

(a) Subject to applicable Legal Requirements, upon receipt of written notice from Buyer of any such activities no less than two (2) Business Days in advance, Seller shall (and shall cause its Subsidiaries to) afford Buyer's officers and other authorized Representatives reasonable access during normal business hours to Seller's employees, properties, books, Contracts and Records, including but not limited to books and records (other than Excluded Records) and, to the extent possible through Seller's use of reasonable best efforts, to Seller's customers and vendors. During such period, Seller shall use commercially reasonable, good faith efforts to furnish promptly to Buyer all information concerning the Assets as may reasonably be requested; *provided, however*, such access shall not unreasonably interfere with Seller's ordinary conduct of business or the operation of the Assets, and at all times during such access and to the extent desired by Seller, Buyer's authorized Representatives shall be accompanied by at least one (1) Representative of Seller. All requests for information made pursuant to this Section 7.1 shall be submitted in accordance with Section 13.3. All such information shall be governed by the terms of the Non-Disclosure Agreement. No investigation pursuant to this Section 7.1 or by Buyer or its Representatives at any time prior to or following the Execution Date shall affect or be deemed to modify any representation or warranty made by Seller herein.

(b) This Section 7.1 shall not require Seller to permit any access to, or to disclose (i) any information that, in the reasonable, good faith judgment (after consultation with counsel, which may be in-house counsel) of Seller, is reasonably likely to result in any violation of any Legal Requirement or any Contract to which Seller is a party or cause any privilege (including attorney-client privilege) that Seller would be entitled to assert to be undermined with respect to such information and such undermining of such privilege could, in Seller's good faith judgment (after consultation with counsel, which may be in-house counsel), adversely affect in any material respect Seller's position in any pending or, what Seller believes in good faith (after

consultation with counsel, which may be in-house counsel) could be, future litigation or (ii) if Seller, on the one hand, and Buyer or any of its Affiliates, on the other hand, are adverse parties in a litigation, any information that is reasonably pertinent thereto; *provided* that, in the case of clause (i), the Parties shall cooperate in seeking to find a way to allow disclosure of such information to the extent doing so (1) would not (in the good faith belief of Seller (after consultation with counsel, which may be in-house counsel)) be reasonably likely to result in the violation of any such Legal Requirement or Contract or be reasonably likely to cause such privilege to be undermined with respect to such information or (2) could reasonably (in the good faith belief of Seller (after consultation with counsel, which may be in-house counsel)) be managed through the use of customary "clean-room" arrangements pursuant to which non-employee Representatives of Buyer could be provided access to such information.

(c) The information provided pursuant to this Section 7.1 shall be used solely for the purpose of the transactions contemplated by this Agreement, and such information shall be kept confidential by Buyer in accordance with, and Buyer shall otherwise abide by and be subject to the terms and conditions of, the Non-Disclosure Agreement.

(d) BUYER SHALL DEFEND, RELEASE, INDEMNIFY AND HOLD HARMLESS EACH MEMBER OF THE SELLER GROUP FROM AND AGAINST ANY AND ALL LIABILITIES THAT ANY BUYER PARTY MAY ASSERT AGAINST A MEMBER OF THE SELLER GROUP, BASED UPON INJURY TO PERSON, INCLUDING DEATH, OR TO PROPERTY, ARISING IN ANY MANNER WHATSOEVER FROM ANY INSPECTION BY BUYER OF THE ASSETS PRIOR TO THE CLOSING DATE, **WHETHER OR NOT BASED UPON STRICT LIABILITY OR CAUSED BY THE SOLE OR CONCURRENT NEGLIGENCE (WHETHER ACTIVE OR PASSIVE) OF ANY MEMBER OF THE SELLER GROUP, UNLESS SUCH INJURY WAS OCCASIONED SOLELY BY THE GROSS NEGLIGENCE OR WILLFUL MISCONDUCT OF ANY MEMBER OF THE SELLER GROUP**.

7.2 Operations Prior to the Closing Date.

Seller covenants and agrees that after the Execution Date and prior to the Closing, except (v) as expressly contemplated by this Agreement, (w) as disclosed in Schedule 7.2, (x) with the prior written consent of Buyer (which consent shall not be unreasonably withheld, conditioned or delayed), (y) as otherwise required by Legal Requirements and disclosed to Buyer in writing, and (z) as ordered by the Bankruptcy Court or limited by restrictions or limitations under the Bankruptcy Code on chapter 11 debtors:

(a) Seller shall:

(i) use commercially reasonable efforts, taking into account Seller's status as debtor in possession, to maintain and operate the Assets operated by Seller as a reasonably prudent operator or cause such Assets to be operated as a reasonably prudent operator in the ordinary course of business;

(ii) maintain insurance on and in connection with the Assets as would a reasonably prudent operator in the ordinary course of business;

(iii) pay or cause to be paid all bonuses and rentals, royalties, overriding royalties, shut-in royalties, and minimum royalties and development and operating expenses, and other payments incurred with respect to the Assets operated by Seller except (A)

royalties held in suspense as a result of title issues and that do not give any third party a right to cancel an interest in any Assets operated by Seller, and (B) expenses or royalties being contested in good faith, unless the nonpayment of such contested expenses or royalties could result in the termination of an Assigned Lease and Interest, in which case Seller will notify Buyer and obtain Buyer's approval prior to withholding such payment;

(iv) maintain books, accounts and records relating to the Assets in accordance with past custom and practice;

(v) maintain the personal property comprising any part of the Assets operated by Seller in at least as good a condition as it is on the date hereof, subject to ordinary wear and tear; and

(vi) use commercially reasonable efforts, taking into account Seller's status as debtor in possession, to retain Seller's Employees who are in good standing and are necessary to operate the Assets as they are currently being operated.

(b) Seller shall not:

(i) abandon any Asset (except any abandonment of Leases to the extent any such Leases terminate pursuant to their terms);

(ii) other than as disclosed on Disclosure Schedule 5.8, commence, propose, or agree to participate in any single operation with respect to the Wells or Assigned Leases and Interests with an anticipated cost in excess of One Hundred Thousand Dollars ($100,000) net to the interest of Seller, except for emergency operations taken in the face of risk to life, injury, property or the environment, operations scheduled under the AFEs, or operations required by any Governmental Authority (including with respect to plugging and abandonment obligations);

(iii) terminate, cancel, or materially amend or modify any Assigned Contract or Assigned Lease and Interest;

(iv) sell, lease, encumber, or otherwise dispose of all or any portion of any Assets, except sales of Hydrocarbons in the ordinary course of business;

(v) grant to any New Employee any increase in compensation except in the ordinary course of Seller's business and consistent with past practice; or

(vi) enter into any agreement or commitment to take any action prohibited by this Section 7.2(b).

7.3 Reasonable Best Efforts.

(a) Seller, on the one hand, and Buyer, on the other hand, shall use reasonable best efforts to take, or cause to be taken, all actions, and to do, or cause to be done, and to assist and cooperate with the other in doing, all things necessary, proper or advisable to consummate and make effective, in the most expeditious manner practicable, the transactions contemplated hereby, including using reasonable best efforts to accomplish the following: (i) the taking of all reasonable acts necessary to cause the conditions precedent set forth in Article 9 and Article 10 to be satisfied, (ii) the obtaining, at the earliest practicable date, of all necessary Governmental Authorizations and any other approvals, consents, licenses, permits, waivers or other authorizations necessary for Closing and the making of all necessary registrations,

declarations and filings (including registrations, declarations and filings with Governmental Authorities, if any) and the taking of all reasonable steps as may be necessary to avoid any Proceeding by any Governmental Authority; *provided* that anything in this Agreement or otherwise to the contrary notwithstanding, Buyer shall not be required to agree to the sale, divestiture or disposition of any of the assets or businesses of Buyer or any of its Subsidiaries for any reason, including without limitation to avoid the entry, or to effect the dissolution, of any injunction, temporary restraining Order or other Order in any suit or Proceeding, which would otherwise have the effect of preventing, delaying or restricting the consummation of the transactions contemplated in this Agreement, and (iii) the execution or delivery of any additional instruments consistent with the terms of this Agreement as are necessary to consummate the transactions contemplated hereby and to fully carry out the purposes of this Agreement. Additionally, (1) with regard to each Well operated by a party other than Seller, Buyer shall, as soon as reasonably practicable after the Closing Date, deliver to the applicable operator of such Well a copy of the recorded Assignment evidencing the conveyance of Seller's interest in such Well to Buyer, as well as any other documentation reasonably requested by such operator to evidence such conveyance and (2) Seller reasonably shall cooperate with Buyer, including without limitation making Seller's Employees and Records available to Buyer through the Closing Date upon reasonable advance written notice from Buyer, to assist Buyer in successfully transitioning electronic records from Seller to Buyer in formats workable to Buyer, including Seller's Records for and relating to divisions of interest and expense decks.

(b) Seller, on the one hand, and Buyer, on the other hand, (i) shall promptly inform each other of any communication from any Governmental Authority concerning this Agreement, the transactions contemplated hereby, and any filing, notification or request for approval and (ii) shall permit the other to review in advance any proposed written or material oral communication or information submitted to any such Governmental Authority in response thereto. In addition, neither of Parties shall agree to participate in any meeting with any Governmental Authority in respect of any filings, investigation or other inquiry with respect to this Agreement or the transactions contemplated hereby, unless such Party consults with the other Party in advance and, to the extent permitted by any such Governmental Authority, gives the other Party the opportunity to attend and participate thereat, in each case to the maximum extent practicable. Subject to any restrictions under applicable Legal Requirements, each of Buyer, on the one hand, and Seller, on the other hand, shall furnish the other with copies of all correspondence, filings and communications (and memoranda setting forth the substance thereof) between it and its Affiliates and its respective Representatives on the one hand, and the Governmental Authority or members of its staff on the other hand, with respect to this Agreement, the transactions contemplated hereby (excluding documents and communications which are subject to preexisting non-disclosure agreements or to the attorney-client privilege or work product doctrine) or any such filing, notification or request for approval. Each Party shall also furnish the other Party with such necessary information and assistance as such other Party and its Affiliates may reasonably request in connection with their preparation of necessary filings, registration or submissions of information to the Governmental Authority in connection with this Agreement, the transactions contemplated hereby and any such filing, notification or request for approval.

(c) Subject to the terms and conditions of this Agreement, Buyer shall take any and all steps reasonably necessary to avoid or eliminate any impediments under any applicable antitrust, competition or trade regulation laws that may be asserted by any

Governmental Authority with respect to the transactions contemplated hereby so as to enable the Closing to occur as soon as reasonably possible, *provided* that anything in this Agreement or otherwise to the contrary notwithstanding, Buyer shall not be required to agree to the sale, divestiture or disposition of such assets or businesses of Buyer or any of its Subsidiaries as may be required in order to avoid the entry, or to effect the dissolution, of any injunction, temporary restraining order or other order in any suit or proceeding, which would otherwise have the effect of preventing, delaying or restricting the consummation of the transactions contemplated in this Agreement.

7.4 Bankruptcy Court Approval.

(a) Seller and Buyer acknowledge that this Agreement and the sale of the Assets and the assumption and assignment of the Assigned Contracts and Assigned Leases and Interests are subject to Bankruptcy Court approval. Seller and Buyer acknowledge that (i) to obtain such approval, Seller must demonstrate that it has taken reasonable steps to obtain the highest and otherwise best offer possible for the Assets, and that such demonstration shall include giving notice of the transactions contemplated by this Agreement to creditors and other interested parties as ordered by the Bankruptcy Court, and, if necessary, conducting the Auction, and (ii) Buyer must provide adequate assurance of future performance as required under the Bankruptcy Code with respect to each Assigned Contract and Assigned Lease and Interest.

(b) In the event an appeal is taken or a stay pending appeal is requested, from either the Bidding Procedures Order or the Sale Order, Seller shall promptly notify Buyer in writing of such appeal or stay request and shall provide to Buyer promptly a copy of the related notice of appeal or Order of stay. Seller shall also provide Buyer with written notice of any motion or application filed in connection with any appeal from either of such Orders. Seller shall promptly defend any motion for reconsideration, or to alter, amend, stay or otherwise challenge the Sale Order or any appeal of the Sale Order, and shall prosecute such defense until the Sale Order is final and not subject to appeal.

(c) From and after the Execution Date and prior to the Closing or the termination of this Agreement in accordance with Section 11.1, Seller shall not take any action which is intended to (or is reasonably likely to), or fail to take any action the intent (or the reasonably likely result) of which failure to act is to, result in the reversal, voiding, modification or staying of the Bidding Procedures Order, Sale Order or this Agreement. If Buyer is the Successful Bidder at the Auction, Seller shall not take any action which is intended to (or is reasonably likely to), or fail to take any action the intent (or the reasonably likely result) of which failure to act is to, result in the reversal, voiding, modification or staying of the Sale Order or this Agreement.

7.5 Bankruptcy Filings.

From and after the Execution Date and until the Closing Date, Seller shall use commercially reasonable efforts to deliver to Buyer copies of all pleadings, motions, notices, statements, schedules, applications, reports and other papers that relate, in whole or in part, to this Agreement and the transactions contemplated hereby, or to Buyer or its respective agents or representatives, that are to be filed by Seller in the Bankruptcy Case in advance of its filing, in each case, if reasonably practicable under the circumstances before the filing of such papers. Notwithstanding the foregoing, Seller's failure to comply with this Section 7.5 shall not constitute a breach under this Agreement, *provided* that upon discovery of such failure (or the

termination of any emergency circumstance that prompted such failure), Seller shall use commercially reasonable efforts to remedy the failure to comply with this Section 7.5.

7.6 Updates and Amendments of Exhibits, Schedules and Disclosure Schedules.

(a) Until the Auction (if any), Seller shall have the right to amend, modify and/or supplement **Exhibit C**, **Exhibit E**, Schedule 2.2(g) and Schedule 2.2(h), in each case, as applicable, in order to reflect (i) any new Contracts or Leases taken by Seller or (ii) the deletion (in accordance with the terms of this Agreement) of any Contracts or Leases from any such Exhibit or Schedule.

(b) Until the Auction (if any), and in any event promptly upon discovery or occurrence, Seller shall amend, modify and/or supplement its Disclosure Schedules with respect to any matters discovered or occurring subsequent to the Execution Date. Such amendments, modifications and/or supplements shall be deemed to have been included in Seller's representations and warranties for all purposes, *provided* that Seller delivers a copy of such amended, modified or supplemented Disclosure Schedules to Buyer promptly upon Seller's discovery or the occurrence leading to such amendment, modification or supplementation.

(c) No later than the close of business on the subsequent Business Day after the Execution Date, the Parties shall have the right to amend, modify and/or supplement the Exhibits and Schedules hereto, in each case, as applicable, in order to correct errors or omissions therein.

7.7 Bidding Procedures.

The bidding procedures to be employed with respect to this Agreement shall be those reflected in the Bidding Procedures Order. Buyer agrees and acknowledges that Seller and its Representatives and Affiliates are and may continue soliciting inquiries, proposals or offers from third parties (the "Potential Bidders") for the Assets in connection with any Superior Proposal pursuant to the terms of the Bidding Procedures Order.

7.8 Cure Costs.

Intentionally omitted.

7.9 Division Order Title Opinions.

No later than ten (10) Business Days following the Execution Date, Seller shall provide Buyer with access during Seller's reasonable business hours to copies of all Division Order Title Opinions for all Assigned Leases and Interests that are in Seller's possession or under Seller's control and for (and with respect to) which Seller is currently billing and paying.

7.10 Governmental Transfer Documents.

At or prior to Closing, Seller shall deliver to Buyer the Governmental Transfer Documents reasonably requested by Buyer and executed by an appropriate officer of Seller.

7.11 Funding of Purchase Price.

Buyer's ability to consummate the transactions contemplated hereby is not contingent upon its ability to secure financing or to complete any public or private placement of securities prior to or upon Closing. Buyer acknowledges and agrees that there shall be no

conditions precedent to the funding of the full amount of the Purchase Price to be paid at Closing pursuant to Section 3.1(a). Buyer acknowledges and agrees that the consummation of, and receipt of proceeds from, any financing is not a condition to Buyer's obligations hereunder.

ARTICLE 8

ADDITIONAL AGREEMENTS

8.1 Taxes.

(a) Any transfer, documentary, sales, use, stamp, registration and other such Taxes, and all conveyance fees, recording charges and other fees and charges (including any penalties and interest) incurred in connection with the consummation of the transactions contemplated by this Agreement ("Transfer Taxes") shall be borne by Buyer. Buyer will, at its own expense, file all necessary Tax Returns and other documentation with respect to all Transfer Taxes, and, if required by applicable law, the Parties will, and will cause their Affiliates to, join in the execution of any such Tax Returns and other documentation.

(b) Seller shall retain responsibility for, and shall bear and pay, all ad valorem, property, excise, severance, production or similar Taxes based upon operation or ownership of the Assets or the production of Hydrocarbons or the receipt of proceeds therefrom (but excluding, for the avoidance of doubt, income taxes, franchise taxes and Transfer Taxes) (collectively, the "Asset Taxes") assessed with respect to the Assets for (i) any period ending on or prior to the Effective Date and (ii) the portion of any Straddle Period ending on or prior to the Effective Date, and Buyer shall be responsible for and shall bear and pay, all Asset Taxes assessed with respect to the Assets for (i) any period after the Effective Date and (ii) the portion of any Straddle Period after the Effective Date. For purposes of allocation between the Parties of Asset Taxes assessed with respect to the Assets that are payable with respect to any tax periods beginning before and ending after the Effective Date ("Straddle Periods"), the portion of any such taxes that are attributable to the portion of the Straddle Period that ends on or prior to the Effective Date shall (1) in the case of such Asset Taxes that are based upon or related to income or receipts or imposed on a transactional basis such as severance or production taxes, be allocated based on revenues from sales occurring on or before the Effective Date or, in the case of an Asset Tax imposed on a transaction basis, whether the relevant transaction closed on or prior to the Effective Date (which shall be Seller's responsibility) and from and after the Effective Date (which shall be Buyer's responsibility); and (2) in the case of other Asset Taxes, be allocated pro rata per day between the period on or prior to the Effective Date (which shall be Seller's responsibility) and the period after the Effective Date (which shall be Buyer's responsibility). For purposes of clause (1) of the preceding sentence, any exemption, deduction, credit or other item that is calculated on an annual basis shall be allocated pro rata per day between the period ending on or prior to the Effective Date and the period beginning at the Effective Date. At the Closing, Asset Taxes with respect to each Asset for the applicable Straddle Period shall be prorated in accordance with the foregoing provisions based on the Asset Tax assessment for such Asset for such Straddle Period, if available, or if otherwise, based on the Asset Taxes paid with respect to such Asset during the preceding Tax period.

(c) With respect to any not yet delinquent Asset Taxes relating to a Tax year ending after the Effective Date, Buyer will assume responsibility for the actual payment of all such Asset Taxes to the applicable Governmental Authority. With respect to any Asset Taxes

relating to a Straddle Period or Pre-Effective Date Tax Period that are delinquent as of the Effective Date, the amount of which is known and not subject to dispute, Buyer shall pay the delinquent amount of such Asset Taxes directly to the applicable Governmental Authority at or promptly after the Closing. The Parties specifically acknowledge and agree (i) that Buyer's sole responsibilities for Taxes are for those Transfer Taxes and Asset Taxes that are the express responsibility of Buyer pursuant to Section 8.1(a) and Section 8.1(b); (ii) that by assuming responsibility for the actual payment of Asset Taxes pursuant to this Section 8.1(c), Buyer is not the actual obligor for and is not liable for any Asset Taxes paid on behalf of Seller; and (iii) that with regard to any Asset Taxes actually paid by Buyer on behalf of Seller pursuant to this Section 8.1(c), Buyer shall be a Paying Party for purposes of Section 8.1(d) hereof.

(d) Seller, on the one hand, or Buyer, on the other hand, as the case may be (the "Reimbursing Party"), shall provide reimbursement for any Tax paid by the other Party (the "Paying Party"), all or a portion of which is the responsibility of the Reimbursing Party, or which represents an overpayment for Taxes by the Paying Party, all in accordance with the terms of this Section 8.1 (which reimbursement, if requested by Buyer, may apply as a Purchase Price adjustment pursuant to Section 8.11(a)(ii) or Section 8.11(b)(iii), as applicable). Within a reasonable time prior to the payment of any such Tax, the Paying Party shall give notice to the Reimbursing Party of the Tax payable and the Paying Party's and Reimbursing Party's respective Liability therefor, although failure to do so will not relieve the Reimbursing Party from its Liability hereunder except to the extent the Reimbursing Party is prejudiced thereby. Any amounts which may become payable from Seller to Buyer pursuant to Section 8.1 shall constitute a super priority administrative expense of Seller under Section 364(c)(1) of the Bankruptcy Code with priority over any and all administrative expenses of the kind specified in Sections 503(b) or 507(b) of the Bankruptcy Code.

(e) From and after the Closing, Buyer and Seller agree to furnish or cause to be furnished to each other, upon request, as promptly as practicable, such information and assistance relating to the Assets (including access to books and records and Tax Returns and related working papers dated before Closing) as is reasonably necessary for the filing of all Tax Returns, the making of any election relating to Taxes, the preparation for any audit by any taxing authority, the prosecution or defense of any claims, suit or proceeding relating to any Tax, and the claiming by Buyer of any federal, state or local business tax credits or incentives that Buyer may qualify for in any of the jurisdictions in which any of the Assets are located; *provided, however*, that neither Buyer nor Seller shall be required to disclose the contents of its income Tax Returns to any Person. Any expenses incurred in furnishing such information or assistance pursuant to this Section 8.1(e) shall be borne by the Party requesting it.

8.2 Allocation of Purchase Price.

The Purchase Price (and all other capitalized costs) shall be allocated among the Assets as set forth on Schedule 8.2, which shall be in accordance with Code §1060 and the regulations thereunder (and any similar provision of state, local, or non-U.S. law, as appropriate). The allocation to each Asset is referred to herein as the "Allocated Value" of such Asset, and the general allocation of value described in this Section 8.2 is referred to herein as the "Tax Allocation". Seller and Buyer agree to be bound by the Allocated Values set forth in Schedule 8.2 for purposes of this Agreement. Seller and Buyer each agree to report, and to cause their respective Affiliates to report, the federal, state, and local income and other Tax consequences of

the transactions contemplated herein, and in particular to report the information required by Code §1060(b), and to jointly prepare IRS Form 8594 (Asset Acquisition Statement under Code §1060) as promptly as possible following the Closing Date and in a manner consistent with the Tax Allocation, as may be revised, to take into account subsequent adjustments to the Purchase Price, including any adjustments pursuant to the Agreement to determine the Purchase Price, and shall not take any position for US federal, state and local income tax purposes inconsistent therewith upon examination of any Tax return, in any refund claim, in any tax litigation or investigation, unless required to do so by any Legal Requirement after notice to and discussions with the other Party, or with such other Party's prior consent; *provided, however*, that nothing contained herein shall prevent Buyer or Seller from settling any proposed deficiency or adjustment by any Governmental Authority based upon or arising out of the Tax Allocation, and neither Buyer nor Seller shall be required to litigate before any court any proposed deficiency or adjustment by any Governmental Authority challenging the Tax Allocation. Notwithstanding any other provision of this Agreement, the terms and provisions of this Section 8.2 shall survive the Closing without limitation.

8.3 Bulk Sales.

The Parties intend that pursuant to section 363(f) of the Bankruptcy Code, the transfer of the Assets shall be free and clear of any Encumbrances arising out of bulk transfer Legal Requirements. The Parties shall take such steps as may be necessary or appropriate to so provide in the Sale Order. In furtherance of the foregoing, each Party hereby waives compliance by the Parties with "bulk sales," "bulk transfers" or similar Legal Requirements in respect of the transactions contemplated by this Agreement or any Transaction Document.

8.4 Payments Received.

Seller and Buyer each agree that after Closing, each will hold in trust and will promptly transfer and deliver to the other when received by it, any cash, checks (with appropriate endorsements, using reasonable efforts not to convert any such checks to cash, so long as such efforts would not cause a check to become stale-dated), or other property that it may receive on or after Closing that belongs to the other Party pursuant to the terms of this Agreement. The recipient will promptly account to the other Party for all such receipts.

8.5 Assigned Contracts and Assigned Leases and Interests: Adequate Assurance and Performance.

(a) With respect to each Assigned Contract and Assigned Lease and Interest, Buyer shall provide adequate assurance as required under the Bankruptcy Code of the future performance by Buyer of each such Assigned Contract or Assigned Lease and Interest. Buyer and Seller agree that they will promptly take all actions reasonably required to assist in obtaining a Bankruptcy Court finding that there has been an adequate demonstration of adequate assurance of future performance under the Assigned Contracts and the Assigned Leases and Interests, such as furnishing timely requested and factually accurate affidavits and other documents or information for filing with the Bankruptcy Court and making Buyer's and Seller's employees and Representatives available to testify before the Bankruptcy Court. Notwithstanding the foregoing, Seller shall have no obligation under this Agreement (including, for the avoidance of doubt, pursuant to Section 7.3 or this Section 8.5(a)) to provide any assistance with respect to the preparation of any financial information.

(b) Buyer shall pay, perform or otherwise satisfy the Assumed Liabilities from time to time and as and when such Assumed Liabilities become due and payable or are required to be performed or satisfied in accordance with their respective terms.

(c) Without limiting the provisions of Section 8.5(a), Buyer acknowledges that Seller has no duty to maintain any bonds, letters of credit, guarantees, cash deposits and insurance to secure performance or payment under any Assigned Contracts or Assigned Leases and Interests (collectively, "Seller Credit Obligations") after the Closing, and Buyer agrees to reasonably cooperate with Seller in Seller's efforts to secure the release of any Seller Credit Obligations posted by Seller, such cooperation to include, if reasonably necessary, the provision by Buyer of a guaranty or letter of credit to secure Buyer's payment and/or performance under any Assigned Contracts or Assigned Leases and Interests after the Closing. On or before the Closing, Buyer shall obtain, or cause to be obtained in the name of Buyer, replacements for all Seller Credit Obligations. If any Seller Credit Obligation remains outstanding as of the Closing Date, Buyer shall indemnify each member of the Seller Group and hold them harmless against any Losses that the Seller Group may incur under any such Seller Credit Obligations from and after the Effective Date.

8.6 Employee Matters.

(a) New Employees. Buyer shall notify Seller no later than seven (7) Business Days prior to the scheduled Closing Date of those Applicable Employees to whom Buyer intends to offer employment at Closing. Buyer's decision to offer or not offer employment to any of the Applicable Employees shall be in in Buyer's sole discretion, provided that Buyer commits to make employment offers of Good Positions at Closing to no fewer than a majority of the Applicable Employees who are employed by Seller on the Closing Date. All employment offers made by Buyer will be conditioned upon (i) the occurrence of the Closing and (ii) each such Applicable Employee's satisfaction of all requirements of Buyer that would apply to any other person to whom Buyer extends an offer of employment, including without limitation (x) satisfactory drug testing; (y) satisfactory background checks; and (z) insurability under Buyer's automobile and related insurance plans (all conditions under clause (ii) hereof, "Buyer's Employment Conditions"). Those Applicable Employees to whom offers are made by Buyer pursuant to this Section 8.6(a) and who accept such offers and commence working for Buyer on the Closing Date are referred to herein as "New Employees." Each Applicable Employee (1) to whom Buyer does not make an offer of employment; (2) who does not accept any offer of employment made by Buyer; (3) does not satisfy Buyer's Employment Conditions; or (4) is not an active employee as of the Closing Date, shall remain Seller's (or its applicable Subsidiary's) sole responsibility and anything in this Agreement or otherwise to the contrary notwithstanding, Buyer shall have no liability to any such Applicable Employees or to Seller in connection with such Applicable Employee. From and after Closing, Buyer shall indemnify each member of the Seller Group and hold them harmless against any Losses that the Seller Group may incur arising solely out of Buyer's direct employment of the New Employees.

(b) Buyer and Seller intend to use the "standard procedure" under Revenue Procedure 2004-34, whereby each of the Buyer and the Seller shall report on Forms W-2 only those wages paid to the New Employees for the portion of the calendar year that such New Employees were employed by the Buyer and Seller, respectively.

8.7 Post-Closing Books and Records and Personnel.

For five (5) years after the Closing Date (or such longer period as may be required by any Governmental Authority or an ongoing claim or Proceeding), (a) Buyer shall not dispose of or destroy any of the Records received by Buyer as Assets and (b) Buyer shall allow Seller (including, for clarity, any trust established under a chapter 11 plan of Seller or any other successors of Seller) and any of its directors, officers, employees, counsel, representatives, accountants and auditors reasonable access during normal business hours, at Seller's sole expense and upon reasonable advance notice, to all employees and files of Buyer and its respective Subsidiaries and any Records included in the Assets for purposes relating to the Bankruptcy Case, the wind-down of the operations of Seller, the functions of any such trusts or successors, or other reasonable business purposes, and Seller (including any such trust or successors) and such directors, officers, employees, counsel, representatives, accountants and auditors shall have the right to make copies of any such files, books, records and other materials. Until the closing of the Bankruptcy Case or the liquidation and winding up of Seller's estate, Seller shall preserve and keep the Records and, at Buyer's sole expense, shall make such Records, records, and Seller's personnel available to Buyer as may be reasonably required by Buyer in connection with, among other things, any insurance claims by, Proceedings, Actions or Tax audits against, or governmental investigations of, Buyer or any of its Affiliates or in order to enable Buyer to comply with its obligations under this Agreement and each other Transaction Document. In the event any Party desires to destroy any such Records during or after the time during which they must be maintained pursuant to this Section 8.7, such Party shall first give ninety (90) days prior written notice to the other Party and such other Party shall have the right at its option and expense, upon prior written notice given within such ninety (90) day period to the Party desiring to destroy such Records or records, to take possession of the Records within one hundred and eighty (180) days after the date of such notice, or such shorter period as the liquidation and winding up of Seller's estate shall permit.

8.8 No Other Representations or Warranties; Disclaimers; NORM.

(a) **NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED IN THIS AGREEMENT, EXCEPT AS AND TO THE EXTENT EXPRESSLY SET FORTH IN THIS AGREEMENT AND IN THE TRANSACTION DOCUMENTS, SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND DISCLAIMS ALL LIABILITY AND RESPONSIBILITY FOR ANY REPRESENTATION, WARRANTY, STATEMENT OR INFORMATION MADE OR COMMUNICATED (ORALLY OR IN WRITING) TO BUYER (INCLUDING ANY OPINION, INFORMATION, OR ADVICE THAT MAY HAVE BEEN PROVIDED TO BUYER BY ANY RESPECTIVE AFFILIATE OR REPRESENTATIVE OF SELLER OR BY ANY INVESTMENT BANK OR INVESTMENT BANKING FIRM, ANY PETROLEUM ENGINEER OR ENGINEERING FIRM, SELLER'S COUNSEL, OR ANY OTHER AGENT, CONSULTANT, OR REPRESENTATIVE OF SELLER). EXCEPT AS AND TO THE EXTENT EXPRESSLY SET FORTH IN THIS AGREEMENT AND IN THE TRANSACTION DOCUMENTS, SELLER FURTHER MAKES NO REPRESENTATION, COVENANT OR WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY OR COMPLETENESS OF ANY FILES, RECORDS OR DATA HERETOFORE OR HEREAFTER FURNISHED IN CONNECTION WITH THE ASSETS, OR AS TO THE QUALITY OR QUANTITY OF HYDROCARBON RESERVES (IF ANY) ATTRIBUTABLE TO THE ASSETS, OR THE ABILITY OF THE ASSETS TO PRODUCE HYDROCARBONS. EXCEPT AS AND TO THE EXTENT EXPRESSLY SET FORTH IN THIS AGREEMENT AND IN THE TRANSACTION DOCUMENTS, ANY AND ALL SUCH FILES, RECORDS AND DATA FURNISHED BY SELLER IS PROVIDED AS A CONVENIENCE,**

AND ANY RELIANCE ON OR USE OF THE SAME SHALL BE AT BUYER'S SOLE RISK. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, EXCEPT AS AND TO THE EXTENT EXPRESSLY SET FORTH IN THIS AGREEMENT (INCLUDING WITHOUT LIMITATION SECTION 5.21) AND IN THE TRANSACTION DOCUMENTS, SELLER EXPRESSLY DISCLAIMS AND NEGATES ANY REPRESENTATION OR WARRANTY, EXPRESS, IMPLIED, AT COMMON LAW, BY STATUTE, OR OTHERWISE, RELATING TO (A) THE TITLE TO ANY OF THE ASSETS, (B) THE CONDITION OF THE ASSETS (INCLUDING ANY IMPLIED OR EXPRESS WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR CONFORMITY TO MODELS OR SAMPLES OF MATERIALS), IT BEING DISTINCTLY UNDERSTOOD THAT THE ASSETS ARE BEING SOLD "AS IS," "WHERE IS," AND "WITH ALL FAULTS AS TO ALL MATTERS," (C) FREEDOM FROM HIDDEN OR REDHIBITORY DEFECTS OR VICES, (D) ANY INFRINGEMENT BY SELLER OF ANY PATENT OR PROPRIETARY RIGHT OF ANY THIRD PARTY, (E) ANY INFORMATION, DATA, OR OTHER MATERIALS (WRITTEN OR ORAL) FURNISHED TO BUYER BY OR ON BEHALF OF SELLER (INCLUDING WITHOUT LIMITATION, IN RESPECT OF ANY SEISMIC DATA, THE EXISTENCE OR EXTENT OF HYDROCARBONS OR THE MINERAL RESERVES, THE RECOVERABILITY OF SUCH RESERVES, ANY PRODUCT PRICING ASSUMPTIONS, AND THE ABILITY TO SELL HYDROCARBON PRODUCTION AFTER THE CLOSING), AND (F) THE ENVIRONMENTAL CONDITION AND OTHER CONDITION OF THE ASSETS AND ANY POTENTIAL LIABILITY ARISING FROM OR RELATED TO THE ASSETS.

(b) WAIVER OF CONSUMER AND OTHER RIGHTS: BUYER WAIVES ITS RIGHTS UNDER THE TEXAS DECEPTIVE TRADE PRACTICES-CONSUMER PROTECTION ACT, SPECIFICALLY INCLUDING SECTION 17.41 ET SEQ., VERNON'S TEXAS CODE ANNOTATED, BUSINESS AND COMMERCE, A LAW THAT GIVES CONSUMERS SPECIAL RIGHTS AND PROTECTIONS, OR ANY SIMILAR STATE OR FEDERAL LAW. AFTER AN OPPORTUNITY TO CONSULT WITH AN ATTORNEY OF ITS OWN SELECTION, BUYER ACKNOWLEDGES THAT THE DISCLAIMERS AND WAIVERS GIVEN IN AND UNDER THIS AGREEMENT SHALL BE CONSIDERED MATERIAL AND INTEGRAL PARTS OF THIS AGREEMENT, WITH CONSIDERATION GIVEN THEREFOR, AND ACKNOWLEDGES THAT ALL DISCLAIMERS AND WAIVERS ARE "CONSPICUOUS" AND, HAVE BEEN BROUGHT TO THE ATTENTION OF BUYER, AND THAT BUYER HAS VOLUNTARILY AND KNOWINGLY CONSENTED TO ALL DISCLAIMERS AND WAIVERS.

(c) Buyer acknowledges and affirms that it has made its own independent investigation, analysis, and evaluation of the transactions contemplated hereby and the Assets (including Buyer's own estimate and appraisal of the extent and value of Seller's Hydrocarbon reserves attributable to the Assets and an independent assessment and appraisal of the environmental risks associated with the acquisition of the Assets). Buyer acknowledges that in entering into this Agreement, it has relied on the aforementioned investigation and on the express representations and warranties of Seller contained in this Agreement and in the Transaction Documents. Buyer hereby irrevocably covenants to refrain from, directly or indirectly, asserting any claim, or commencing, instituting, or causing to be commenced, any Proceeding of any kind against Seller or its Affiliates or Subsidiaries, alleging facts contrary to the foregoing acknowledgment and affirmation.

(d) BUYER ACKNOWLEDGES THAT THE ASSETS HAVE BEEN USED FOR EXPLORATION, DEVELOPMENT AND PRODUCTION OF OIL, GAS AND WATER AND THAT THERE MAY BE PETROLEUM, PRODUCED WATER, WASTES OR OTHER HAZARDOUS SUBSTANCES LOCATED ON, UNDER OR ASSOCIATED WITH THE ASSETS. EQUIPMENT AND SITES INCLUDED IN

THE ASSETS MAY CONTAIN NORM. NORM MAY AFFIX OR ATTACH ITSELF TO THE INSIDE OF WELLS, MATERIALS AND EQUIPMENT AS SCALE, OR IN OTHER FORMS; THE WELLS, MATERIALS AND EQUIPMENT LOCATED ON OR INCLUDED IN THE ASSETS MAY CONTAIN NORM AND OTHER WASTES OR HAZARDOUS SUBSTANCES; AND NORM CONTAINING MATERIAL AND OTHER WASTES OR HAZARDOUS SUBSTANCES MAY HAVE BEEN BURIED, COME IN CONTACT WITH THE SOIL OR OTHERWISE BEEN DISPOSED OF ON OR AROUND THE ASSETS. SPECIAL PROCEDURES MAY BE REQUIRED FOR THE REMEDIATION, REMOVAL, TRANSPORTATION OR DISPOSAL OF WASTES, ASBESTOS, HAZARDOUS SUBSTANCES, INCLUDING HYDROGEN SULFIDE GAS AND NORM FROM THE ASSETS. FROM AND AFTER THE CLOSING, BUYER SHALL ASSUME RESPONSIBILITY FOR THE CONTROL, STORAGE, HANDLING, TRANSPORTING AND DISPOSING OF OR DISCHARGE OF ALL MATERIALS, SUBSTANCES AND WASTES FROM THE ASSETS (INCLUDING PRODUCED WATER, HYDROGEN SULFIDE GAS, DRILLING FLUIDS, NORM AND OTHER WASTES), PRESENT AFTER THE EFFECTIVE DATE, IN A SAFE AND PRUDENT MANNER AND IN ACCORDANCE WITH ALL APPLICABLE ENVIRONMENTAL LAWS.

8.9 Casualty.

(a) If, after the Execution Date and prior to the Closing, a material part of the Assets suffers a Casualty Loss or if a material part of the Assets is taken in condemnation or under the right of eminent domain or if proceedings for such purposes are pending or threatened, Seller shall promptly give Buyer written notice of such occurrence, including reasonable particulars with respect thereto, and this Agreement shall remain in full force and effect notwithstanding any such Casualty Loss.

(b) With regard to a Casualty Loss or condemnation occurring after the Execution Date, without Buyer's prior consent (which shall not be unreasonably withheld, conditioned or delayed), no insurance or condemnation proceeds shall be committed or applied by Seller to repair, restore or replace a lost, damaged, destroyed or taken portion of the Assets if the cost to repair, restore or replace a lost, damaged, destroyed or taken portion of the Assets is projected to exceed One Hundred Thousand Dollars ($100,000). To the extent such proceeds are not committed or applied by Seller prior to the Closing Date in accordance with this Section 8.8(b), Seller shall at the Closing pay to Buyer all sums paid to Seller by reason of such loss, damage, destruction or taking, less any reasonable costs and expenses incurred by Seller in collecting such proceeds. In addition and to the extent such proceeds have not been committed or applied by Seller in accordance with this Section 8.8(b), in such repair, restoration or replacement, Seller shall transfer to Buyer, at the Closing, without recourse against Seller, all of the right, title and interest of Seller in and to any unpaid insurance or condemnation proceeds arising out of such loss, damage, destruction or taking, less any reasonable costs and expenses incurred by Seller in collecting such proceeds. Any such funds that have been committed by Seller for repair, restoration or replacement as aforesaid shall be paid by Seller for such purposes or, at Seller's option, delivered to Buyer upon Seller's receipt from Buyer of adequate assurance and indemnity that Seller shall incur no liability or expense as a result of such commitment.

(c) Notwithstanding anything to the contrary in this Agreement, (i) at the Closing, the Assets affected by a Casualty Loss or condemnation shall be included in the Closing and Buyer shall pay the Allocated Value therefor, subject to any applicable adjustments under this Agreement, and (ii) Buyer's recourse with respect to a condemnation or Casualty Loss shall be limited to the proceeds of Seller's applicable insurance coverage actually recovered by Seller in respect thereof or other sums paid to Seller by third parties (or an assignment of claims

related thereto), which proceeds or other sums shall be payable to Buyer only upon or after the Closing of the transactions contemplated hereby. Seller shall have no other liability or responsibility to Buyer with respect to a condemnation or Casualty Loss, **EVEN IF SUCH CASUALTY LOSS SHALL HAVE RESULTED FROM OR SHALL HAVE ARISEN OUT OF THE SOLE OR CONCURRENT NEGLIGENCE, FAULT, VIOLATION OF A LEGAL REQUIREMENT, OR MISCONDUCT OF SELLER OR ANY MEMBER OF SELLER GROUP**.

8.10 Successor Operator.

Seller shall use its commercially reasonable efforts to support Buyer's efforts to be appointed or to have a designee appointed as the successor operator of those Properties that Seller currently operates. Notwithstanding the foregoing, Seller makes no representations or warranties to Buyer as to the transferability of operatorship of any Properties which Seller currently operates. Rights and obligations associated with operatorship of the Properties are governed by operating agreements or similar agreements and will be determined in accordance with the terms of such agreements. Seller and Buyer shall enter into a subcontract agreement pursuant to which the Parties shall subcontract, without additional charge to Buyer, for the operation of all Wells for which Seller is presently the operator until such time as Buyer is approved as operator for such Wells, the form of which agreement shall be reasonably agreeable to each of Seller and Buyer.

8.11 Preferential Purchase Rights.

(a) Promptly after the Sale Order is entered, Seller shall deliver to each holder of a Preferential Purchase Right a notice that is in material compliance with the contractual provisions applicable thereof and is in form acceptable to Buyer, offering to sell to each such holder the applicable Assets subject to such Preferential Purchase Right in exchange for an amount not less than the Allocated Value of such Asset together with all other amounts required to be paid by each such holder to match Buyer's obligations under this Agreement and the ancillary documents in connection herewith, or, alternatively, seeking such holder's written consent to the assignment of the applicable Assets to Buyer; it being understood and agreed by the Parties that Seller shall not be obligated to make any payments. Seller shall use best commercial efforts to obtain such consents, but shall not be liable if notwithstanding such efforts such consents cannot be obtained.

(b) All Assets that are subject to Preferential Purchase Rights shall be transferred or assigned to Buyer at the Closing, and Buyer shall take title to such Assets subject to such Preferential Purchase Rights. In the event any holder of a valid Preferential Purchase Right thereafter lawfully and timely exercises its Preferential Purchase Right, Buyer shall assign such affected Assets to the holder of such Preferential Purchase Right, and such holder shall pay Buyer all proceeds generated from the exercise of such Preferential Purchase Right.

(c) If a Preferential Purchase Right is not discovered prior to Closing, the affected Asset(s) is conveyed to Buyer at Closing, and such Preferential Purchase Right is validly exercised by the holder thereof after Closing, then Buyer (i) agrees to convey such affected Asset(s) to the person exercising such Preferential Purchase Right on the same terms and conditions under which Seller conveyed such Asset(s) to Buyer (with the purchase price for such Asset(s) being the Allocated Value of the affected Asset(s)) and (ii) shall be entitled to retain all amounts paid by the person exercising such Preferential Purchase Right. In the event of such exercise, Buyer shall prepare, execute and deliver a form of conveyance of such.

8.12 Accounting Adjustments for Revenues and Expenses.

(a) The Base Purchase Price shall be increased by the following (without duplication): (i) an amount equal to the value of all merchantable allowable oil or other liquid Hydrocarbons in storage owned by Seller above a custody transfer point on the Effective Date that is credited to the Assets and for which Seller has not been paid, such value to be the current market price or the price paid, less Taxes and gravity adjustments deducted by the purchaser of such oil or other liquid Hydrocarbons; (ii) an amount equal to the aggregate amount of all expenditures paid in connection with the ownership, operation and maintenance of the Properties (including rentals, overhead, royalties, Lease option and extension payments, Taxes and other charges and expenses billed under applicable operating agreements or governmental statute(s)) which are paid by or on behalf of Seller, are not subject to reimbursement to Seller pursuant to a joint interest billing and are attributable to the period on or after the Effective Date (including any pre-paid charges); (iii) the aggregate amount of all Known Receivables, excluding any amounts owed to Seller or any Transferring Subsidiary that are ninety (90) days or more past due; (iv) all cash call pre-payment amounts set forth on Schedule 8.11(a)(iv) (which the Parties agree shall be updated two (2) Business Days prior to the Closing Date), royalty overpayment amounts and/or future deductions as royalty offsets associated with the Assets as of the Effective Date; and (v) any other amount agreed upon in writing by Buyer and Seller.

(b) The Base Purchase Price shall be decreased by the following (without duplication): (i) the amount of any proceeds received by Seller from the sale of Hydrocarbons, produced from and after the Effective Date, from the Properties (net of royalties and other burdens on Buyer's share of the proceeds from the production of Hydrocarbons not otherwise accounted for hereunder) actually received by Seller; (ii) the amount of the Suspense Funds; (iii) the aggregate amount of all expenditures paid (if any) in connection with the ownership, operation and maintenance of the Properties (including rentals, overhead, royalties, Lease option and extension payments, Taxes and other charges and expenses billed under applicable operating agreements or governmental statute(s)) which are paid by or on behalf of Buyer, are not subject to reimbursement to Buyer pursuant to a joint interest billing and are attributable to the period prior to the Effective Date; (iv) proceeds received by Seller pre-Closing from the exercise of any Preferential Purchase Rights; (v) the damages sustained by Buyer as a result of a breach of Seller's representation and warranty set forth in Section 5.23; and (vi) any other amount agreed upon in writing by Buyer and Seller; and

(c) The Base Purchase Price will be adjusted upward or downward, as applicable, by all Imbalances in existence at or arising after the Effective Date but prior to Closing, including (i) the net Mcf amount of the aggregate Imbalances attributable to Seller's Net Revenue Interest in the Wells as of the Effective Date multiplied by a price per Mcf (adjusted by the most recent average 6-month btu content reported to the State of Colorado) of gas for such Wells equal to the S&P Global Platts-EPNG San Juan IF contract price as of the close of trading on the last Business Day immediately preceding the Effective Date; and (ii) the MMBtu amount of any pipeline Imbalances or unsatisfied throughput obligations attributable to Seller or the Assets for Seller's ownership prior to the Effective Date multiplied by the actual settlement price per MMBtu (upward for over deliveries and downward for under deliveries).

8.13 Initial Adjustment at Closing.

At least five (5) Business Days before the Closing Date, Seller shall provide to Buyer a statement showing its computations, calculated in good faith, of the amount of the adjustments provided for in Section 3.1 above. Buyer and Seller shall attempt to agree upon such adjustments prior to Closing; *provided* that if agreement is not reached, Seller's computation shall be used at Closing, subject to further adjustment under Section 8.13 below. If the amount of adjustments so determined which would result in a credit to Buyer exceeding the amount of adjustments so determined which would result in a credit to Seller, Buyer shall receive a Base Purchase Price reduction at Closing for the amount of such excess, and if the converse is true, then the amount to be paid by Buyer to Seller at Closing shall be increased by the amount of such excess.

8.14 Adjustment Post Closing.

On or before one hundred twenty (120) days after Closing, Buyer and Seller shall review any information which may then be available pertaining to the adjustments provided for in Section 3.1, shall determine if any additional adjustments should be made beyond those made at Closing (whether the same be made to account for expenses or revenues not considered in making the adjustments made at Closing, or to correct errors made in the adjustments made at Closing), and shall make any such adjustments by appropriate payments from Seller to Buyer or from Buyer to Seller. If the Parties fail to agree on final adjustments within such ninety (90) day period, either Party may, within thirty (30) days after the end of such period, submit the disputed items to a nationally-recognized, United States-based independent public accounting firm on which the Parties mutually agree in writing (the "Accounting Referee"); *provided, however*, that the Accounting Referee shall not have performed any material work for either Party or its respective Affiliates within three (3) years of the date hereof. If the Parties are unable to agree upon the designation of a Person or entity as Accounting Referee, then Seller or Buyer, or either of them, may in writing request the Bankruptcy Court to appoint a substitute Accounting Referee and such thirty (30) day period shall be extended until ten (10) Business days after the Bankruptcy Court makes such appointment; *provided* that such Person or entity so appointed shall be a national or regional accounting firm with no prior material relationships with Seller or Buyer or their respective Affiliates and shall have experience in auditing companies engaged in oil and gas exploration and development activities. Any unresolved matters described in this Section 8.13 that are not submitted to the Accounting Referee within such thirty (30) day period shall be deemed waived by the Parties, which waiver shall be final and binding on the Parties and the subject matter thereof shall not be subject to further review or audit. The Parties shall direct the Accounting Referee to resolve the disputes within thirty (30) days (or longer, as provided above) after submission of the matters in dispute. The Accounting Referee shall act as an expert for the limited purpose of determining the specific disputed matters submitted by either Party and may not award damages or penalties to either Party with respect to any matter. Seller and Buyer shall share equally the Accounting Referee's costs, fees and expenses (including attorneys' fees). The final settlement statement, whether as agreed between the Parties or as determined by a decision of the Accounting Referee (the "Final Settlement Statement"), shall be binding on, and non-appealable by, the Parties and not subject to further review or audit. Payment by Buyer or Seller, as applicable, for any outstanding amounts on the Final Settlement Statement shall be made within five (5) Business Days after the date on which all disputes in respect of the Final Settlement Statement are finally resolved (whether by agreement of the Parties or pursuant to the

Accounting Referee's decision). During the period between Closing and the point in time when the Final Settlement Statement has been agreed to by the Parties, or determined by a decision of the Accounting Referee, each Party shall, on a monthly basis, (i) pay over to the other Party any revenue received by it (net of related expenses) with respect to the Assets which is owed to the other Party as set forth in Section 8.11 above, and (ii) deliver any cash, checks with appropriate endorsements (using reasonable best efforts not to convert such checks into cash, so long as such efforts would not cause a check to become stale-dated) or other property that it may receive on or after the Closing which properly belongs to the other Party, and such payments and deliveries shall be considered in determining the Final Settlement Statement. Notwithstanding the foregoing, as of the date that the Final Settlement Statement is agreed to by the Parties, or determined by a decision of the Accounting Referee, the Final Settlement Statement shall be final and binding on the Parties and not subject to further review or audit, and neither Party shall have any further rights or obligations regarding payment of money or delivery of property pursuant to the preceding sentence.

ARTICLE 9

CONDITIONS PRECEDENT TO OBLIGATIONS OF BUYER TO CLOSE

The obligations of Buyer to consummate the transactions contemplated by this Agreement are subject to the satisfaction by Seller or waiver by Buyer, at or prior to the Closing, of each of the following conditions:

9.1 Accuracy of Representations.

The representations and warranties of Seller set forth in this Agreement shall be true, correct and complete in all material respects (except that those representations and warranties that are qualified as to materiality or Material Adverse Effect or similar expressions shall have been duly performed and complied with in all respects) on and as of the Closing Date with the same effect as though such representations and warranties had been made on and as of the Closing Date (*provided* that representations and warranties which are confined to a specified date shall speak only as of such date). Buyer shall have received a certificate of Seller to such effect signed by a duly authorized officer thereof. If Buyer determines that there has been a breach or inaccuracy of any of Seller's representations and warranties, it shall use commercially reasonably efforts to provide Seller with notice of such breach or inaccuracy as promptly as reasonably practicable after the determination thereof, so that Seller may attempt to cure such breach or inaccuracy on or before the Closing Date, *provided* that failure to provide such notice shall not relieve Seller of liability for such breach.

9.2 Seller's Performance.

Each covenant and agreement that Seller is required to perform or to comply with pursuant to this Agreement at or prior to the Closing shall have been duly performed and complied with in all material respects (except that those covenants and agreements that are qualified as to materiality or Material Adverse Effect or similar expressions shall have been duly performed and complied with in all respects), and Buyer shall have received a certificate of Seller to such effect signed by a duly authorized officer thereof.

9.3 No Order.

No Governmental Authority shall have enacted, issued, promulgated or entered any Order or other Legal Requirement which is in effect and has the effect of making illegal or otherwise prohibiting the consummation of the transactions contemplated by this Agreement or would be reasonably likely to cause any of such transactions to be rescinded following the Closing.

9.4 Seller's Deliveries.

Each of the deliveries required to be made to Buyer pursuant to Section 4.4 shall have been so delivered.

9.5 Bidding Procedures Order and Sale Order.

The Bankruptcy Court shall have entered the Bidding Procedures Order and the Sale Order, and the Bidding Procedures Order and the Sale Order each shall be final orders in full force and effect and shall not have been modified, amended, rescinded or vacated in any material respect (other than with Buyer's written approval) and shall not be subject to a motion for reconsideration or to alter or amend or modify or subject to any appeal or to a stay pending appeal.

9.6 Cure of Defaults.

Seller shall be current in its post-petition obligations under all Contracts and Leases designated by Buyer for assumption and assignment.

9.7 No Casualty Loss. No Casualty Losses shall have occurred of which the aggregate damages to the Assets suffering such losses equal more than twenty-five percent (25%) of the Base Purchase Price, with such damages to be capped (solely for purposes of this Section 9.7) at the Allocated Value of such affected Assets.

9.8 Authorizations. All authorizations, consents, orders or approvals of, or declarations or filings with, or expirations of waiting periods imposed by any Governmental Authority, set forth on Schedule 9.8 of the Disclosure Schedules, shall have been filed, occurred or been obtained.

ARTICLE 10

CONDITIONS PRECEDENT TO THE OBLIGATION OF SELLER TO CLOSE

Seller's obligation to consummate the transactions contemplated by this Agreement is subject to the satisfaction or waiver, at or prior to the Closing, of each of the following conditions:

10.1 Accuracy of Representations.

The representations and warranties of Buyer set forth in this Agreement shall be true, correct and complete in all material respects (except that those representations and warranties which are qualified as to materiality or similar expressions shall be true and correct in all respects) as of the Closing Date with the same effect as though such representations and warranties had been made on and as of the Closing Date (*provided* that representations and warranties which are confined to a specified date shall speak only as of such date), and Seller

shall have received a certificate of Buyer to such effect signed by a duly authorized officer thereof.

10.2 Sale Order in Effect.

The Bankruptcy Court shall have entered the Sale Order and the Sale Order shall be in full force and effect and shall not have been modified, amended, rescinded or vacated in any material respect (other than as provided in Section 9.5) and shall not be subject to a stay pending appeal.

10.3 Buyer's Performance.

The covenants and agreements that Buyer is required to perform or to comply with pursuant to this Agreement at or prior to the Closing shall have been performed and complied with in all material respects (except that those covenants and agreements that are qualified as to materiality or similar expressions shall have been duly performed and complied with in all respects), and Seller shall have received a certificate of Buyer to such effect signed by a duly authorized officer thereof.

10.4 No Order.

No Governmental Authority shall have enacted, issued, promulgated or entered any Order or other Legal Requirement which is in effect and which has the effect of making illegal or otherwise prohibiting the consummation of the transactions contemplated by this Agreement or would be reasonably likely to cause any of such transactions to be rescinded following the Closing.

10.5 Buyer's Deliveries.

Each of the deliveries required to be made to Seller pursuant to Section 4.3 shall have been so delivered.

10.6 Authorizations. All authorizations, consents, orders or approvals of, or declarations or filings with, or expirations of waiting periods imposed by any Governmental Authority, set forth on Schedule 9.8 of the Disclosure Schedules, shall have been filed, occurred or been obtained.

ARTICLE 11

TERMINATION

11.1 Termination Events.

Notwithstanding anything herein to the contrary, this Agreement may be terminated at any time prior to the Closing:

(a) by either Seller or Buyer:

(i) if a Governmental Authority issues a final, non-appealable ruling, Order or other Legal Requirement prohibiting the transactions contemplated hereby where such ruling or Order was not requested, encouraged or supported by Seller or Buyer;

(ii) if the Bidding Procedures Order has not been entered by September 30, 2016;

(iii) by mutual written consent of Seller and Buyer;

(iv) if the Closing has not occurred by the close of business on November 30, 2016 (the "Outside Date"); *provided, however*, that if the Closing has not occurred by such date, but on such date all of the conditions set forth in Article 9 and Article 10 have been satisfied or waived (to the extent such conditions may be waived) by the Party entitled to so waive, other than (A) any approval or consent from a Governmental Authority required for the Closing to occur or (B) the condition set forth in Section 9.1 due to the breach or inaccuracy of Seller's representations and warranties contained in Section 5.20 or Section 5.21, then the Outside Date shall automatically be extended until thirty (30) days after such date (and thereafter such date shall be deemed to be the "Outside Date" for all purposes hereunder); and *provided, further*, that (1) Buyer shall be permitted to terminate this Agreement pursuant to this Section 11.1(b)(v) only if (x) Buyer is not itself in material breach of any of its representations, warranties, covenants or agreements contained herein and (y) Buyer has provided written notice to Seller of its intention to exercise its rights under this Section 11.1(b)(v) and Seller has not provided written notice to Buyer that it is ready, willing and able to close the transactions contemplated by this Agreement on or before the date that is five (5) Business Days after the date of such notice from Buyer, and (2) Seller shall be permitted to terminate this Agreement pursuant to this Section 11.1(b)(v) only if (x) Seller is not itself in material breach of any of its representations, warranties, covenants or agreements contained herein and (y) Seller has provided written notice to Buyer of its intention to exercise its rights under this Section 11.1(b)(v) and Buyer has not provided written notice to Seller that it is ready, willing and able to close the transactions contemplated by this Agreement on or before the date that is five (5) Business Days after the date of such notice from Seller;

(v) in the event Seller enters into a definitive agreement regarding a Superior Proposal, provided that in such event, Buyer shall be entitled to the payment of the Break-Up Fee and Expense Reimbursement; or

(vi) if the Bankruptcy Court enters an Order dismissing, or converting into cases under chapter 7 of the Bankruptcy Code, any of the cases commenced by Seller under chapter 11 of the Bankruptcy Code and comprising part of the Bankruptcy Case, where such Order was not requested, encouraged or supported by Seller.

(b) by Buyer:

(i) in the event of any breach by Seller of any of Seller's agreements, covenants, representations or warranties contained herein (*provided* such breach would result in the failure of a condition set forth in Section 9.1 or Section 9.2 to be satisfied) or in the Bidding Procedures Order or Sale Order, and (A) in the case of any breach by Seller of any of Seller's agreements, covenants, representations or warranties contained herein other than as set forth in Section 5.20 and Section 5.21, the failure of Seller to cure such breach within ten (10) days after receipt of the Buyer Termination Notice, and (B) in the case of any breach by Seller of Section 5.20 or Section 5.21, the failure of Seller to Cure such breach on or prior to the Outside Date (as may be extended); *provided, however*, that (1) Buyer is not itself in material breach of any of its representations, warranties, covenants or agreements contained herein or in the Bidding Procedures Order or the Sale Order, (2) Buyer notifies Seller in writing (the "Buyer Termination Notice") of its intention to exercise its rights under this Section 11.1(b)(i) as a result of the breach, and (3) Buyer specifies in the Buyer Termination Notice the representation, warranty, covenant or agreement contained herein or in the Bidding Procedures Order or Sale

Order of which Seller is allegedly in breach and a description of the specific factual circumstances to support the allegation;

(ii) if Buyer is not the Successful Bidder or the Backup Bidder at the Auction;

(iii) if the Sale Order has not been entered by the Bankruptcy Court on or before October 31, 2016 at 11:59 p.m. (Eastern), the hearing with respect to approval of the Sale Order shall not have occurred on or before October 31, 2016 at 11:59 p.m. (Eastern), or following the entry of the Sale Order, the Sale Order shall (A) fail to be in full force and effect, (B) have been reversed, (C) have been stayed and such stay shall continue to be in effect for more than fourteen (14) days, or (D) have been modified or amended in any manner adverse to the Buyer without the prior written consent of the Buyer; or

(iv) if Seller withdraws or seeks authority to withdraw the Sale Motion, or announces any stand-alone plan of reorganization or liquidation with respect to the Assets (or supports any such plan filed by any other party), provided that in such event Buyer shall be entitled to payment of the Expense Reimbursement.

(c) by Seller:

(i) in the event of any breach by Buyer of any of Buyer's agreements, covenants, representations or warranties contained herein (*provided* such breach would result in the failure of a condition set forth in Section 10.1 or Section 10.3 to be satisfied) or in the Bidding Procedures Order or Sale Order, and the failure of Buyer to cure such breach within ten (10) days after receipt of the Seller Termination Notice; *provided, however*, that Seller (A) is not itself in material breach of any of its representations, warranties, covenants or agreements contained herein or in the Bidding Procedures Order or the Sale Order, (B) Seller notifies Buyer in writing (the "Seller Termination Notice") of its intention to exercise its rights under this Section 11.1(c)(i) as a result of the breach, and (C) Seller specifies in the Seller Termination Notice the representation, warranty, covenant or agreement contained herein or in the Bidding Procedures Order or Sale Order of which Buyer is allegedly in breach and a description of the specific factual circumstances to support the allegation; or

(ii) if the Deposit is not timely paid by Buyer in accordance with Section 3.2.

11.2 Effect of Termination.

(a) In the event of termination of this Agreement by Buyer or Seller pursuant to this Article 11, all rights and obligations of the Parties under this Agreement shall terminate without any Liability of any Party to any other Party; *provided, however*, that nothing herein shall relieve any Party from liability for breach of this Agreement prior to such termination. The provisions of this Section 11.2 and Section 3.2 (and, to the extent applicable to the interpretation or enforcement of such provisions, Article 1 and Article 13) shall expressly survive the termination of this Agreement.

(b) In the event of a termination of this Agreement (i) by Buyer pursuant to any provision of Section 11.1(b), or (ii) by Buyer or Seller pursuant to Section 11.1(a)(iv), Section 11.1(a)(v), or or Section 11.1(a)(vi) Seller shall pay to Buyer, without duplication, the Expense Reimbursement within two (2) Business Days following

such termination and receipt of applicable invoices from Buyer. The Expense Reimbursement shall be an administrative expense under Section 503 and 507 of the Bankruptcy Code.

(c) In the event of a termination of this Agreement (i) by Buyer pursuant to any provision of Section 11.1(b), or (ii) by Buyer or Seller pursuant to Section 11.1(a)(iv), Section 11.1(a)(v), or Section 11.1 (a)(vi), if Seller executes a definitive agreement with respect to, or consummates, a Superior Proposal within twelve (12) months following such termination (including if the Auction produced a Successful Bidder other than Buyer), Seller shall pay to Buyer, without duplication, a break-up fee of three percent (3%) of the Base Purchase Price (the "Break-Up Fee") less any Expense Reimbursement that has been paid to Buyer (which Expense Reimbursement shall be paid to Buyer on or before the date that is two (2) business days after entry of the Sale Order) at the time that the Break-Up Fee becomes payable, to be paid on the date that is the earlier of (i) the closing of the Superior Proposal and out of the Seller's proceeds from the consummation thereof or (ii) twenty (20) days after entry of the Sale Order. The Break-Up Fee and the Expense Reimbursement shall both be administrative expenses under Sections 503 and 507 of the Bankruptcy Code, provided, however, that nothing in this Section 11.2(c) shall be deemed to limit the amount of the Expense Reimbursement and/or the Break-Up Fee in any way, including to the amount of the Seller's proceeds, if any, from the consummation of a Superior Proposal.

(d) Each Party acknowledges that the agreements contained in this Section 11.2 are an integral part of the transactions contemplated by this Agreement, that without these agreements such Party would not have entered into this Agreement, and that any amounts payable pursuant to this Section 11.2 do not constitute a penalty. To the extent that all amounts, if any, due in respect of the Break-Up Fee and the Expense Reimbursement pursuant to this Section 11.2 have actually been paid by Seller to Buyer, Buyer shall not have any additional recourse against Seller for any obligations or Liabilities relating to or arising from this Agreement. Furthermore, in the event of any breach of this Agreement by Seller, subject to the rights of Buyer pursuant to Section 13.10, the sole and exclusive remedies of Buyer will be, if applicable, to terminate this Agreement pursuant to Section 11.1 and receive, if applicable, any payments payable pursuant to this Section 11.2. Subject to the rights of Buyer pursuant to Section 13.10, in no event will Seller or any member of Seller Group be liable for any monetary damages for any breach of this Agreement, other than any payments payable pursuant to this Section 11.2

ARTICLE 12

SURVIVAL AND INDEMNIFICATION

12.1 No Survival of Seller's Representations and Warranties.

The representations and warranties of Seller contained herein and in any certificate or other Transaction Document delivered by Seller pursuant to this Agreement shall terminate upon and not survive the Closing and, except as provided in Section 8.12(b)(v) there shall be no liability thereafter in respect thereof. Each of Seller's covenants and other agreements contained in this Agreement shall terminate upon the Closing, except that the covenants and agreements of Seller that require or contemplate performance after Closing (each a "Post-Closing Covenant") shall survive the Closing until the earlier of (a) performance of such Post-Closing Covenant in accordance with this Agreement or, (b) (i) if time for performance of

such Post-Closing Covenant is specified in this Agreement or in any other Transaction Document, sixty (60) days following the expiration of the time period for such performance or (ii) if time for performance of such Post-Closing Covenant is not specified in this Agreement or in any other Transaction Document, the expiration of the applicable statute of limitations with respect to any claim for any failure to perform such Post-Closing Covenant; *provided* that if a written notice of any claim with respect to any Post-Closing Covenant is given prior to the expiration thereof then such Post-Closing Covenant shall survive until, but only for purposes of, the resolution of such claim by final, non-appealable judgment or settlement.

12.2 Survival of Buyer's Representations and Warranties.

The representations and warranties of Buyer contained in Article 6 of this Agreement shall terminate upon and not survive the Closing and there shall be no liability thereafter in respect thereof. Each of Buyer's covenants and other agreements contained in this Agreement shall terminate upon the Closing, except that the covenants and agreements of Buyer that require or contemplate performance after Closing shall survive the Closing until the earlier of (a) performance of such covenants or agreements in accordance with this Agreement or, (b) (i) if time for performance of such covenant or agreement is specified in this Agreement or in any other Transaction Document, sixty (60) days following the expiration of the time period for such performance or (ii) if time for performance of such covenants or agreements is not specified in this Agreement or in any other Transaction Document, the expiration of the applicable statute of limitations with respect to any claim for any failure to perform any such covenants or agreements; *provided* that if a written notice of any claim with respect to any such covenant or agreement is given prior to the expiration thereof then such covenant or agreement shall survive until, but only for purposes of, the resolution of such claim by final, non-appealable judgment or settlement and *provided, further*, that any obligations to indemnify and hold harmless shall not terminate with respect to any Liabilities as to which a Seller Indemnified Party shall have given notice to Buyer in accordance with Section 12.4(a) on or before the Expiration Date.

12.3 Indemnification by Buyer.

(a) Subject to Section 12.2, Buyer hereby agrees to indemnify and hold Seller and each member of the Seller Group (collectively, the "Seller Indemnified Parties") harmless from and against:

(i) any and all Liabilities based upon, attributable to or resulting from the breach of any representation or warranty of Buyer set forth in Article 6 hereof, or any representation or warranty contained in any certificate delivered by or on behalf of Buyer pursuant to this Agreement;

(ii) any and all Liabilities based upon, attributable to or resulting from the breach of any covenant or other agreement on the part of Buyer under this Agreement, *provided* that Buyer's indemnity obligations with respect to any breach of the covenants set forth in Section 8.6(a) hereof shall be limited to the sum of the "Cash Payment" and the "COBRA Premium Payment" that Seller is obligated to pay under Section 2.1 of the Samson Resources Corporation Job Elimination Severance Plan for Non-Officers (as each such term is defined therein); and

(iii) all Assumed Liabilities.

(b) Notwithstanding anything contained herein to the contrary, any Seller Indemnified Party making an Indemnification Claim under Section 12.3 must give notice to the indemnifying Party of any such Indemnification Claim in writing on or prior to the Expiration Date.

12.4 Indemnification Procedures.

(a) In the event that any Actions shall be instituted or that any claim or demand shall be asserted by any Seller Indemnified Party in respect of which payment may be sought under Section 12.3 (an "Indemnification Claim"), the Seller Indemnified Party shall reasonably and promptly cause written notice of the assertion of any Indemnification Claim of which it has knowledge which is covered by this indemnity to be forwarded to the indemnifying Party; *provided* that a Seller Indemnified Party need not wait until an Action has been instituted or demand has been asserted before delivering written notice of an Indemnified Claim to the indemnifying Party. The indemnifying Party shall have the right, at its sole option and expense, to be represented by counsel of its choice, which must be reasonably satisfactory to the Seller Indemnified Party, and to defend against any Indemnification Claim which relates to any Liabilities indemnified against hereunder. If the indemnifying Party elects to defend against any Indemnification Claim which relates to any Liabilities indemnified against hereunder, it shall within thirty (30) days (or sooner, if the nature of the Indemnification Claim so requires) notify the Seller Indemnified Party of its intent to do so, *provided* that the undertaking any of such defense shall not constitute an admission by the indemnifying Party of liability or responsibility for the Indemnification Claim. If the indemnifying Party elects not to defend against, negotiate, settle or otherwise deal with any Indemnification Claim which relates to any Liabilities indemnified against hereunder, the Seller Indemnified Party may defend against, negotiate, settle or otherwise deal with such Indemnification Claim. If the indemnifying Party shall assume the defense of any Indemnification Claim, the Seller Indemnified Party may participate, at his or its own expense, in the defense of such Indemnification Claim; *provided, however*, that such Seller Indemnified Party shall be entitled to participate in any such defense with separate counsel at the reasonable expense of the indemnifying Party if (a) so requested by the indemnifying Party to participate or (b) in the reasonable opinion of counsel to the Seller Indemnified Party a conflict or potential conflict exists between the Seller Indemnified Party and the indemnifying Party that would make such separate representation advisable; and *provided, further*, that the indemnifying Party shall not be required to pay for more than one such counsel for all Seller Indemnified Parties in connection with any Indemnification Claim and that all legal fees incurred shall be reasonable. The Parties agree to cooperate fully with each other in connection with the defense, negotiation or settlement of any such Indemnification Claim. Notwithstanding anything in this Section 12.4 to the contrary, neither the indemnifying Party nor any Seller Indemnified Party shall, without the written consent of the other, settle or compromise any Indemnification Claim or permit a default or consent to entry of any judgment unless the claimant and such party provide to such other party an unqualified release from all liability in respect of the Indemnification Claim. If the indemnifying Party makes any payment on any Indemnification Claim, the indemnifying Party shall be subrogated, to the extent of such payment, to all rights and remedies of the Seller Indemnified Party to any insurance benefits or other claims of the Seller Indemnified Party with respect to such Indemnification Claim.

(b) After any final decision, judgment or award shall have been rendered by a Governmental Authority of competent jurisdiction and the expiration of the time in

which to appeal therefrom, or a settlement shall have been consummated, or the Seller Indemnified Party and the indemnifying Party shall have arrived at a mutually binding agreement with respect to an Indemnification Claim hereunder, the Seller Indemnified Party shall promptly forward to the indemnifying Party notice of any sums due and owing by the indemnifying Party pursuant to this Agreement with respect to such matter.

12.5 Calculation of Liabilities.

The amount of any Liabilities for which indemnification is provided under this Article 12 shall be net of any amounts actually recovered by the Seller Indemnified Party under insurance policies with respect to such Liabilities (net of any Tax or expenses incurred in connection with such recovery).

12.6 Tax Treatments of Indemnity Payments.

The Parties agree to treat any indemnity payment made pursuant to this Article 12 as an adjustment to the Base Purchase Price for federal, state, local and foreign income tax purposes. Any indemnity payment under this Article 12 shall be treated as an adjustment to the value of the Asset upon which the underlying Indemnification Claim was based, unless a final determination (which shall include the execution of an agreement such as an IRS Form 906; Closing Agreement; a compromise agreement; or an agreement on IRS Form 870-AD with an IRS Appeals office or any successor forms thereto) with respect to the Seller Indemnified Party causes any such payment not to be treated as an adjustment to the value of the asset for United States federal income tax purposes. The Parties acknowledge and agree that an adjustment to the Base Purchase Price pursuant to this Section 12.6 may necessitate, to the extent required or advisable, that the Parties amend any IRS Form 8594 Asset Acquisition Statement under Code Section 1060 previously prepared pursuant to Section 8.2 hereof.

ARTICLE 13

GENERAL PROVISIONS

13.1 Confidentiality.

Notwithstanding anything in the Non-Disclosure Agreement to the contrary, the Parties agree that the non-disclosure agreement entered into by them and their Affiliates, dated May 9, 2016 (the "Non-Disclosure Agreement"), shall continue in full force and effect notwithstanding the execution and delivery by the Parties of this Agreement; *provided, however*, that (a) disclosure of matters that become a matter of public record as a result of the Bankruptcy Case and the filings related thereto shall not constitute a breach of such Non-Disclosure Agreement, and (b) disclosures permitted under this Agreement shall not constitute a breach of such Non-Disclosure Agreement.

13.2 Public Announcements.

Buyer, on the one hand, and Seller, on the other hand, shall consult with each other before issuing any press release or otherwise making any public statement with respect to this Agreement, the transactions contemplated hereby or the activities and operations of the other Party, and shall not issue any such release or make any such statement without the prior written consent of the other Party (such consent not to be unreasonably withheld or delayed). Notwithstanding the foregoing, prior to or after the Closing, if Buyer (including any of its parent entities), on the one hand, or Seller (including any of its parent entities), on the other is required

to make any statement, declaration or public announcement regarding this Agreement or the transactions contemplated hereunder pursuant to (a) any Legal Requirement, (b) applicable rules or regulations of any national securities exchange, or (c) the terms of such Party's (including such Party's respective parent entities) indentures, loan agreements, credit agreements or other similar debt agreements or financial instruments, then the same may be made without the approval of the other Party, but, in the case of disclosures made by either Party, only to the extent the name of the non-disclosing Party is omitted from such statement, declaration or announcement if permitted by the applicable Legal Requirements.

13.3 Notices.

All notices, consents, waivers and other communications under this Agreement must be in writing and shall be deemed to have been duly given when (a) delivered by hand (with written confirmation of receipt), (b) sent by email (with read receipt requested, with the receiving Party being obligated to respond affirmatively to any read receipt requests delivered by the other Party), (c) received by the addressee, if sent by a delivery service (prepaid, receipt requested) or (d) received by the addressee, if sent by registered or certified mail (postage prepaid, return receipt requested), in each case to the appropriate addresses and representatives (if applicable) set forth below (or to such other addresses and representatives as a Party may designate by notice to the other Parties):

(i) If to Seller, then to:

Samson Resources Company
Two West Second Street
Tulsa, Oklahoma 74103-3103
Attn: General Manager - Business Development
Phone: 918-591-1254
E-mail: bd@samson.com

and

Samson Resources Company
Two West Second Street
Tulsa, Oklahoma 74103-3103
Attn: Corporate Secretary
Phone: 918-583-1791
E-mail: legal@samson.com

with copies (which shall not constitute notice) to:

Kirkland & Ellis LLP
300 North LaSalle
Chicago, Illinois 60654
Attn: Ross M. Kwasteniet; Brad Weiland; Jason Gott
Phone: (312) 862-7182
E-mail: brad.weiland@kirkland.com

Kirkland & Ellis LLP
600 Travis Street, Suite 3300
Houston, Texas 77002
Attn: Anthony Speier, P.C.; Cody R. Carper
Phone: (713) 835-3734
E-mail: cody.carper@kirkland.com

(ii) If to Buyer:

Red Willow Production Company
14933 Highway 172
P.O. Box 369
Ignacio, Colorado 81137
Attn: Peter S. Joslin,
Vice President of Business
Development
Phone: (970) 563-5231
E-mail: pjoslin@rwpc.us

with copies (which shall not constitute notice) to:

Maynes, Bradford, Shipps and Sheftel, LLP
835 East Second Avenue, Suite 123
Post Office Box 2717
Durango, Colorado 81301
Attn: Thomas H. Shipps
E-mail: tshipps@mbssllp.com

Maynes, Bradford, Shipps and Sheftel, LLP
1331 Seventeenth Street, Suite 410
Denver, CO 80202
Attn: Sherri D. Way
E-mail: sway@mbssllp.com

13.4 Waiver; Waiver of Damages.

No waiver of any of the provisions of this Agreement or rights hereunder shall operate as a waiver unless it is in writing and signed by the Party against whom enforcement of such waiver is sought. Neither the failure nor any delay by any Party in exercising any right, power or privilege under this Agreement or the documents referred to in this Agreement shall operate as a waiver of such right, power or privilege, and no single or partial exercise of any such right, power or privilege shall preclude any other or further exercise of such right, power or privilege or the exercise of any other right, power or privilege. To the maximum extent permitted by applicable law, (a) no waiver that may be given by a Party shall be applicable except in the specific instance for which it is given, and (b) no notice to or demand on one Party shall be deemed to be a waiver of any right of the Party giving such notice or demand to take

further action without notice or demand. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, NO PARTY SHALL BE LIABLE TO THE OTHER FOR SPECIAL, INDIRECT, EXEMPLARY, CONSEQUENTIAL OR PUNITIVE DAMAGES ARISING OUT OF, ASSOCIATED WITH, OR RELATING TO THIS AGREEMENT (INCLUDING LOSS OF PROFIT OR BUSINESS INTERRUPTIONS, HOWEVER THE SAME MAY BE CAUSED) AND THE PARTIES HEREBY WAIVE ALL CLAIMS FOR ANY SUCH DAMAGES, EXCEPT TO THE EXTENT ANY SELLER INDEMNIFIED PARTY SUFFERS SUCH DAMAGES TO AN UNAFFILIATED THIRD PARTY IN CONNECTION WITH A FINALLY ADJUDICATED THIRD PARTY CLAIM, IN WHICH CASE SUCH DAMAGES SHALL BE RECOVERABLE (TO THE EXTENT RECOVERABLE UNDER ARTICLE 12) WITHOUT GIVING EFFECT TO THIS SECTION 13.4.

13.5 Entire Agreement; Amendment.

This Agreement (including the Schedules, Disclosure Schedules and the Exhibits) and the other Transaction Documents supersede all prior agreements between Buyer, on the one hand, and Seller, on the other hand, with respect to its subject matter and constitute a complete and exclusive statement of the terms of the agreements between Buyer, on the one hand, and Seller, on the other hand, with respect to their subject matter. The terms of this Agreement shall control over any conflicting provision in any other Transaction Document. This Agreement may not be amended except by a written agreement executed by all of the Parties.

13.6 Assignment.

This Agreement, and the rights, interests and obligations hereunder, shall not be assigned by any Party by operation of law or otherwise without the express written consent of the other Parties (which consent may be granted or withheld in the sole discretion of such other Party), *provided* that Buyer shall have the right to assign this Agreement to an affiliated entity, or to a special purpose entity or affiliate formed for purposes of this acquisition but in so doing, Buyer shall remain liable for its obligations under this Agreement through the Closing Date. Buyer shall provide Seller with a copy of the assignment executed by Buyer and assignee no later than five (5) Business Days prior to Closing. Each and all of the covenants and conditions of this Agreement shall inure to the benefit of and shall be binding upon the respective successors and assigns of Buyer and Seller. For purposes of this Agreement, an affiliated entity shall mean a corporation, limited liability company, or other entity controlling, controlled by, or under common control with Buyer.

13.7 Severability.

The provisions of this Agreement shall be deemed severable, and the invalidity or unenforceability of any provision shall not affect the validity or enforceability of the other provisions hereof. If any provision of this Agreement, or the application thereof to any Person or any circumstance, is invalid or unenforceable, (a) a suitable and equitable provision shall be substituted therefor in order to carry out, so far as may be valid and enforceable, the intent and purpose of such invalid or unenforceable provision and (b) the remainder of this Agreement and the application of such provision to other Persons or circumstances shall not be affected by such invalidity or unenforceability.

13.8 Expenses.

Except as otherwise provided in this Agreement, the Parties shall bear their own respective expenses (including all compensation and expenses of counsel, financial advisors, consultants, actuaries and independent accountants) incurred in connection with this Agreement and the transactions contemplated hereby.

13.9 Time of the Essence.

Time shall be of the essence with respect to all time periods and notice periods set forth in this Agreement.

13.10 Specific Performance.

The Parties agree that irreparable damage would occur if any provision of this Agreement is not performed in accordance with the terms hereof, including if any of the Parties fails to take any action required of it hereunder to consummate the transactions contemplated by this Agreement, and that the Parties shall be entitled to an injunction or injunctions without proof of damages or posting a bond or other security to prevent breaches of this Agreement or to enforce specifically the performance of the terms and provisions hereof, in addition to any other remedy to which they are entitled at law or in equity. Unless otherwise expressly stated in this Agreement, no right or remedy described or provided in this Agreement is intended to be exclusive or to preclude a Party from pursuing other rights and remedies to the extent available under this Agreement, at law or in equity. The right of specific performance and other equitable relief is an integral part of the transactions contemplated by this Agreement and without that right neither Seller nor Buyer would have entered into this Agreement. If, prior to the Outside Date (giving effect to any extensions thereof as provided in Section 11.1(a)(iv)), any Party brings any action to enforce specifically the performance of the terms and provisions hereof by any other Party, the Outside Date (giving effect to any extensions thereof as provided in Section 11.1(a)(iv)) will automatically be extended (a) for the period during which such action is pending, plus ten (10) Business Days or (b) by such other time period established by the court presiding over such action, as the case may be.

13.11 Governing Law; Consent to Jurisdiction and Venue; Jury Trial Waiver.

(a) **Except to the extent the mandatory provisions of the Bankruptcy Code apply, this Agreement shall be governed by, and construed in accordance with, the laws of the State of Texas applicable to contracts made and to be performed entirely in such state without regard to principles of conflicts or choice of laws or any other law that would make the laws of any other jurisdiction other than the State of Texas applicable hereto.**

(b) Without limitation of any Party's right to appeal any Order of the Bankruptcy Court, (i) the Bankruptcy Court shall retain exclusive jurisdiction to enforce the terms of this Agreement and to decide any claims or disputes which may arise or result from, or be connected with, this Agreement, any breach or default hereunder, or the transactions contemplated hereby and (ii) any and all claims relating to the foregoing shall be filed and maintained only in the Bankruptcy Court, and the Parties hereby consent and submit to the exclusive jurisdiction and venue of the Bankruptcy Court and irrevocably waive the defense of an inconvenient forum to the maintenance of any such Action or Proceeding; *provided, however*, that, if the Bankruptcy Case is closed, all Actions and Proceedings arising out of or relating to

this Agreement shall be heard and determined in a Texas state court or a federal court sitting in the state of Texas, and the Parties hereby irrevocably submit to the exclusive jurisdiction and venue of such courts in any such Action or Proceeding and irrevocably waive the defense of an inconvenient forum to the maintenance of any such Action or Proceeding. The Parties consent to service of process by mail (in accordance with Section 13.3) or any other manner permitted by law.

(c) THE PARTIES HEREBY IRREVOCABLY WAIVE ALL RIGHT TO TRIAL BY JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM (WHETHER BASED IN CONTRACT, TORT OR OTHERWISE) ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE ACTIONS OF SELLER, BUYER OR THEIR RESPECTIVE REPRESENTATIVES IN THE NEGOTIATION OR PERFORMANCE HEREOF.

13.12 Counterparts.

This Agreement and any amendment hereto may be executed in two (2) or more counterparts, each of which shall be deemed to be an original of this Agreement or such amendment and all of which, when taken together, shall constitute one and the same instrument. Notwithstanding anything to the contrary in Section 13.3, delivery of an executed counterpart of a signature page to this Agreement or any amendment hereto by telecopier or email attachment shall be effective as delivery of a manually executed counterpart of this Agreement or such amendment, as applicable.

13.13 Parties in Interest; No Third Party Beneficiaries.

This Agreement shall inure to the benefit of and be binding upon the Parties and their respective successors and permitted assigns. This Agreement is for the sole benefit of the Parties and their permitted assigns, and nothing herein, express or implied, is intended to or shall confer upon any other Person any legal or equitable benefit, claim, cause of action, remedy or right of any kind.

13.14 No Recourse.

Notwithstanding anything that may be expressed or implied in this Agreement or any Transaction Document, and notwithstanding the fact that any Party may be a partnership or limited liability company, each Party, by its acceptance of the benefits of this Agreement, covenants, agrees and acknowledges that no Persons other than the Parties shall have any obligation hereunder and that it has no rights of recovery hereunder against, and no recourse hereunder or under any Transaction Documents or in respect of any oral representations made or alleged to be made in connection herewith or therewith shall be had against, any former, current or future Affiliate, incorporator, controlling Person, fiduciary, Representative, co-owner or equity holder of any Party (or any of their successors or permitted assignees) (each, a "Party Affiliate"), whether by or through attempted piercing of the corporate veil, by or through a claim (whether in tort, contract or otherwise) by or on behalf of such Person against the Party Affiliates, by the enforcement of any assessment or by any legal or equitable proceeding, or by virtue of any statute, regulation or other applicable Legal Requirement, or otherwise; it being expressly agreed and acknowledged that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Party Affiliate, as such, for any obligations of the applicable Person under this Agreement or the transactions contemplated hereby, under any documents or instruments delivered contemporaneously herewith, in respect of any oral representations made

or alleged to be made in connection herewith or therewith, or for any claim (whether in tort, contract or otherwise) based on, in respect of, or by reason of, such obligations or their creation.

13.15 Disclosure Schedules; Materiality.

Any disclosure made by a party in any Disclosure Schedule with reference to any Section or Schedule of this Agreement shall be deemed to be a disclosure with respect to any other Section or Schedule to which such disclosure may apply to the extent the applicability of such additional disclosure is reasonably apparent on its face, and any disclosure in the Seller SEC Documents or the Disclosure Schedules will be deemed to qualify a representation or warranty to the extent that the relevance of such disclosure to such representation or warranty is reasonably apparent on its face. The information contained in this Agreement, Schedules, Disclosure Schedules, and Exhibits hereto is disclosed solely for purposes of this Agreement, and no information contained herein or therein will be deemed to be an admission by any Party to any Person of any matter whatsoever, including any violation of Legal Requirements or breach of Contract. The disclosure of any particular fact or item in any Disclosure Schedule shall not be deemed an admission as to whether the fact or item is "material" or would constitute a "Material Adverse Effect.

13.16 Liquidating Trustee.

If at any time Seller liquidates or otherwise has a trustee or other representative appointed by the Bankruptcy Court, then such trustee or other representative shall be entitled to exercise the rights of Seller and shall perform the obligations of Seller under this Agreement.

13.17 Approval of the Bankruptcy Court.

Notwithstanding anything herein to the contrary, except for Buyer's right to receive the Break-Up Fee and/or Expense Reimbursement as provided in Section 11.2, any and all obligations under this Agreement are subject to the entry of the Sale Order.

[*Signature page follows.*]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed and delivered by their duly authorized representatives, all as of the day and year first above written.

SAMSON RESOURCES COMPANY

By: _____
Name: Sean Woolverton
Title: Executive Vice President & Chief Operating Officer

THE SOUTHERN UTE INDIAN TRIBE
d/b/a RED WILLOW PRODUCTION COMPANY

By: _____
Name: _____
Title: _____

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed and delivered by their duly authorized representatives, all as of the day and year first above written.

SAMSON RESOURCES COMPANY

By: _____
Name: Sean Woolverton
Title: Executive Vice President & Chief Operating Officer

THE SOUTHERN UTE INDIAN TRIBE
d/b/a RED WILLOW PRODUCTION COMPANY

By: Albert J Brown
Name: ALBERT J. BROWN
Title: PRESIDENT & COO RED WILLOW PRODUCTION COMPANY

United States Environmental Protection Agency
Region 8, Air Program
1595 Wynkoop Street
Denver, CO 80202

Air Pollution Control
Synthetic Minor Source Permit to Construct

40 CFR 49.151

#SMNSR-SU-000031-2015.002

Permit to Construct to establish legally and practically enforceable limitations and requirements on sources at an existing facility

Permittee:

Samson Resources Company

Permitted Facility:

South Ignacio Central Delivery Point (CDP)
Southern Ute Indian Reservation
La Plata County, Colorado

Summary

On September 1, 2011, the Environmental Protection Agency, Region 8 (EPA) received an application from Samson Resources Company (Samson) requesting a synthetic minor permit for the South Ignacio CDP in accordance with the requirements of the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR Part 49. The EPA received an updated application on January 11, 2012 that replaced the previous application.

The EPA became aware of an inadvertent material mistake in this permit. Specifically, the standard permit condition for enclosed combustor devices for TEG Dehydration Systems contained an incorrect regulatory citation for the annual emission reporting requirement. The EPA revised this permit to correct that citation on January 19, 2016 in accordance with the administrative permit revision provisions at 40 CFR 49.159(f).

The South Ignacio CDP is located within the exterior boundaries of the Southern Ute Indian Reservation in Colorado and compresses and dehydrates inlet coal-bed methane gas. Gas entering the facility from the field is first fed to an inlet separator that removes water gravimetrically. Separator overhead gas is fed from a common suction header to one of eight (8) reciprocating internal combustion engines used to compress the gas. The compressors discharge gas to a common discharge header that feeds to scrubbers. Scrubbers separate and collect liquids that may have formed during compression. The compressed gas is then fed to two (2) tri-ethylene glycol (TEG) dehydration systems operating in parallel. TEG is circulated counter-currently and absorbs water. Rich TEG is circulated to a reboiler, where moisture is driven to the atmosphere by heating the glycol. Dry gas exits the contactors and is directed to one of two sales lines, where it is metered and exits the facility. The gas processing capacity of the facility is 70 million standard cubic feet per day (MMscfd).

This permit action applies to an existing facility operating on the Southern Ute Indian Reservation in Colorado.

This permit does not authorize the construction of any new emission sources, nor does it otherwise authorize any other physical modifications to the facility or its operations. This permit is intended only to incorporate required and requested emission limits and provisions from the following documents:

A. An August 10, 2009, operating permit renewal that the EPA issued to Samson for the South Ignacio CDP in accordance with the Title V Operating Permit Program at 40 CFR Part 71 (Part 71). The limits were originally established in the initial Part 71 operating permit the EPA issued on April 2, 2004, and two Part 71 significant permit modifications the EPA issued on November 30, 2005, and July 14, 2008.

B. A January 11, 2012, application from Samson requesting a synthetic minor permit for the South Ignacio CDP to transfer the requirements of the Part 71 operating permit to a federally enforceable MNSR permit.

Upon compliance with this MNSR permit, the legally and practically enforceable reductions in emissions can be used when determining the applicability of other Clean Air Act (CAA) requirements, such as the Prevention of Significant Deterioration (PSD) Permit Program at 40 CFR Part 52 and the Title V Operating Permit Program at 40 CFR Part 70 (Part 70), in accordance with the Southern Ute Indian Tribe's EPA-approved Part 70 Operating Permit Program.

The EPA has determined that issuance of this MNSR permit will not contribute to National Ambient Air Quality Standards (NAAQS) violations, or have potentially adverse effects on ambient air quality.

Table of Contents

I. Conditional Permit to Construct

A. General Information

Facility:	Samson Resources Company, South Ignacio CDP
Permit Number:	SMNSR-SU-000031-2015.002
SIC Code and SIC Description:	1311- Crude Petroleum and Natural Gas

Site Location:	Corporate Office Location
South Ignacio CDP	Samson Resources Company
SE ¼, Sec 32 T33N R7W	Samson Plaza
Southern Ute Indian Reservation	Two West Second Street
La Plata County, CO	Tulsa, Oklahoma 74103-3103

The equipment listed in this permit may only be operated by Samson at the following location:

Latitude 37.053917N, Longitude -107.625222W

B. Applicability

1. This permit is being issued under authority of the MNSR Permit Program.

2. The requirements in this permit have been created, at the Permittee's request, to establish legally and practically enforceable restrictions for limiting benzene TEG dehydration unit emissions, carbon monoxide (CO) and nitrogen oxide (NO_X) engine emissions, and facility-wide formaldehyde (CH_2O) and total hazardous air pollutant (HAP) emissions.

3. Any conditions established for this facility or any specific units at this facility pursuant to any permit issued under the authority of the PSD Permit Program or the MNSR Permit Program shall continue to apply.

4. By issuing this permit, the EPA does not assume any risk of loss which may occur as a result of the operation of the permitted facility by the Permittee, Owner, and/or Operator, if the conditions of this permit are not met by the Permittee, Owner, and/or Operator.

C. Facility-Wide Requirements

1. Emission Limits

   (a) Facility-wide emissions of CH_2O shall not exceed 9.5 tons during any consecutive 12 months.

   (b) Facility-wide emissions of total HAP shall not exceed 23.0 tons during any consecutive 12 months.

   (c) Emission limits shall apply at all times, unless otherwise specified in this permit.

2. CH_2O Monitoring Requirements

(a) Facility-wide actual CH_2O emissions shall be calculated by the Permittee, in tons, and recorded at the end of each month, beginning with the first calendar month that this permit is effective.

(b) Prior to 12 full months of facility-wide emissions calculations, the Permittee shall, at the end of each calendar month, add the emissions for that month to the calculated emissions for all previous calendar months and record the total. Thereafter, the Permittee shall, at the end of each calendar month, add the facility-wide emissions for that month to the calculated facility-wide emissions for the preceding 11 months and record a new 12-month total.

(c) The Permittee shall include emissions from all controlled and uncontrolled emission sources at the facility in the calculations, including but not limited to insignificant emission units, as defined in 40 CFR 71.5(c)(11)(ii).

(d) The facility-wide emissions of CH_2O shall be calculated as follows:

(i) Emission units with control devices:

(A) For engines equipped with catalytic control systems, CH_2O emissions for the month shall be calculated by multiplying the most recent performance test results for CH_2O for each engine in pounds per hour (lb/hr), by the number of operating hours for the engine for that month. If data on operating hours are not available for that unit for that month, full-time operation of the unit for that month (24 hours per day, 7 days per week) shall be assumed.

(B) Monthly emissions for any engine break-in period, as specified in this permit, where the engine was operated without the catalytic control system installed, shall be calculated by multiplying the manufacturer-specified CH_2O emission factors for an uncontrolled engine by the hours the engine operated without the emission control system installed for that month.

(C) The calculated CH_2O emissions for each engine with catalytic control systems shall be added together to calculate the total CH_2O emissions for controlled engines for that month.

(ii) Emission units without control devices. For remaining emission units at the facility, emissions for the month for each unit shall be calculated by multiplying the CH_2O emission factor for that unit, in lb/hr, by the number of operating hours for that unit for that month. If data on operating hours are not available for a unit for that month, full-time operation of the unit for that month (24 hours per day, 7 days per week) shall be assumed.

3. Total HAP Monitoring Requirements

(a) Facility-wide actual HAP emissions shall be calculated by the Permittee, in tons, and recorded at the end of each month, beginning with the first calendar month that this permit is effective.

(b) Prior to 12 full months of facility-wide emissions calculations, the Permittee shall, at the end of each calendar month, add the emissions for that month to the calculated emissions for all previous calendar months and record the total. Thereafter, the Permittee shall, at the end of each calendar month, add the facility-wide emissions for that month to the calculated facility-wide emissions for the preceding 11 months and record a new 12-month total.

(c) The Permittee shall include emissions from all controlled and uncontrolled emission sources at the facility in the calculations, including but not limited to insignificant emission units, as defined in 40 CFR 71.5(c)(11)(ii).

(d) The facility-wide emissions of total HAP shall be calculated as follows:

(i) TEG Dehydration systems. Total HAP emissions from each TEG dehydration system shall be obtained from the requirements for determining total HAPs from each dehydration system still vent in this permit;
(ii) CH_2O Emissions. CH_2O emissions shall be obtained from the requirements for determining facility-wide CH_2O emissions in this permit; and
(iii) All other HAP emissions. For remaining emission units at the facility, emissions for the month for each unit shall be calculated by multiplying the HAP emission factors for that unit, in lb/hr, by the number of operating hours for that unit for that month. If data on operating hours are not available for a unit for that month, full-time operation of that unit for that month (24 hours per day, 7 days per week) shall be assumed. The Permittee shall provide the basis for the HAP emission calculations with the next annual emissions report required by this permit.

4. Recordkeeping Requirements

The Permittee shall maintain the following records:

(a) The actual monthly and rolling 12-month facility-wide CH_2O and HAP emissions, in tons per year (tpy);

(b) All input parameters and calculations used to determine the monthly emissions from all controlled and uncontrolled emission sources at the facility; and

(c) All deviations from the requirements of this permit.

D. Requirements for Engines

1. Construction and Operational Limits

(a) The Permittee shall install and operate emission controls as specified in this permit on one (1) 4-stroke rich-burn (4SRB) reciprocating internal combustion engine for electric power generation meeting the following specifications:

(i) Operated as a 4SRB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,680 hp.

(b) The Permittee shall install and operate emission controls as specified in this permit on two (2) 4-stroke lean-burn (4SLB) reciprocating internal combustion engines for natural gas compression, each meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,267 hp.

(c) The Permittee shall install and operate emission controls as specified in this permit on one (1) 4SLB reciprocating internal combustion engine for natural gas compression, meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,336 hp.

(d) The Permittee shall install and operate emission controls as specified in this permit on four (4) 4SLB reciprocating internal combustion engines for natural gas compression, each meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,400 hp.

(e) Only the engines that are operated and controlled as specified in this permit are approved for installation under this permit.

2. Emission Limits

(a) Emissions from the one (1) 4SRB 1,680 hp engine shall not exceed the following:

(i) CO: 12.9 lb/hr;
(ii) NO_X: 9.2 lb/hr; and
(iii) CH_2O: 0.07 lb/hr.

(b) Emissions from each of the two (2) 4SLB 1,267 hp engines shall not exceed the following:

(i) CO: 2.79 lb/hr; and
(ii) CH_2O: 0.29 lb/hr.

(c) Emissions from the one (1) 4SLB 1,336 hp engine shall not exceed the following:

(i) CO: 2.94 lb/hr; and
(ii) CH_2O: 0.25 lb/hr.

(d) Emissions from each of the four (4) 4SLB 1,400 hp engines shall not exceed the following:

(i) CO: 3.08 lb/hr; and
(ii) CH_2O: 0.31 lb/hr.

(e) Emission limits shall apply at all times, unless otherwise specified in this permit.

3. Control and Operational Requirements

(a) The Permittee shall ensure that the one (1) 4SRB engine is equipped with a non-selective catalytic reduction (NSCR) control system and air-to-fuel ratio (AFR) control system capable of reducing uncontrolled NO_X, CO and CH_2O emissions to meet the engine specific emission limits in this permit.

(b) The Permittee shall replace the oxygen (O_2) sensor on the AFR controller on the one (1) 4SRB engine within every 2,190 hours of engine run time.

(c) The Permittee shall ensure that the seven (7) 4SLB engines are all equipped with oxidation catalytic control systems capable of reducing uncontrolled CO and CH_2O emissions to meet the engine specific emission limits in this permit.

(d) The Permittee shall install, operate, and maintain temperature sensing devices (e.g., thermocouple or resistance temperature detectors) before the inlet to the catalyst bed on each engine in order to continuously monitor the engine exhaust temperature at the inlet to the catalyst bed. Each temperature sensing device shall be calibrated and operated according to manufacturer specifications or equivalent specifications developed by the Permittee or vendor.

(e) Except during startups, which shall not exceed 30 minutes, the engine exhaust temperature of each engine at the inlet to the catalyst bed shall be maintained at all times the engines operate within the following limits:

(i) For the one (1) 4SRB engine, an inlet temperature of at least 750 °F and no more than 1,250 °F; and
(ii) For the seven (7) 4SLB engines, an inlet temperature of at least 500 °F and no more than 1,250 °F.

(f) During operation, the pressure drop across the catalyst bed on each engine shall be maintained to within ±2 inches of water from the baseline pressure drop measured during the most recent performance test. The baseline pressure drop for the catalyst bed shall be determined at 100% ± 10% of the engine load measured during the most recent performance test.

(g) The Permittee shall only fire the engines with natural gas. The natural gas shall be pipeline-quality in all respects except that the carbon dioxide (CO_2) concentration in the gas shall not be required to be within pipeline-quality.

(h) The Permittee shall follow, for each engine and any respective catalytic control system, the manufacturer recommended maintenance schedule and procedures, or equivalent maintenance schedule and procedures developed by the Permittee or vendor, to ensure optimum performance of each engine and its respective catalytic control system.

(i) The Permittee may rebuild or replace an existing permitted engine with an engine of the same hp rating, and configured to operate in the same manner as the engine being rebuilt or replaced. Any emission limits, requirements, control technologies, testing or other provisions that apply to the permitted engines that are replaced shall also apply to the rebuilt or replaced engines.

(j) The Permittee may resume operation without the catalytic control system during an engine break-in period, not to exceed 200 operating hours, for rebuilt and replaced engines.

4. Performance Testing Requirements

(a) Performance tests shall be conducted on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller for measuring NO_X, CO, and CH_2O emissions and on each of the seven (7) 4SLB engines equipped with catalytic control systems for measuring CO and CH_2O emissions, to demonstrate compliance with each respective emission limitation in this permit. The performance tests shall be conducted in accordance with appropriate reference methods specified in 40 CFR Part 60, Appendix A, 40 CFR Part 63, Appendix A, or an appropriate EPA-approved American Society for Testing and Materials (ASTM) method. The Permittee may submit to the EPA a written request for approval of an alternate test method, but shall only use that alternate test method after obtaining written approval from the EPA.

(i) The initial performance test shall be conducted within 90 calendar days of startup of a new engine.

(ii) Performance tests shall be conducted within 90 calendar days of startup of all rebuilt and replaced engines.

(iii) Performance tests shall be conducted within 90 calendar days of each catalyst replacement.

(iv) Subsequent performance tests for CH_2O emissions shall be performed once every calendar quarter.

(A) The first subsequent performance test shall be conducted within 90 days of the initial performance test for each engine.
(B) For any one (1) engine, if the results of two (2) consecutive subsequent quarterly performance tests demonstrate compliance with CH_2O emission limits, required testing frequency for CH_2O may change from quarterly to semi-annually.
(C) For any one (1) engine, if the results of any subsequent semi-annual performance test demonstrates non-compliance with the CH_2O emission limits, required monitoring frequency for CH_2O shall change back to quarterly.

(b) The Permittee shall not perform engine tuning or make any adjustments to engine settings, catalytic control system settings, processes or operational parameters immediately prior to the engine testing or during the engine testing. Any such tuning or

adjustments may result in a determination by the EPA that the test is invalid. Artificially increasing an engine load to meet test requirements is not considered engine tuning or adjustments.

(c) The Permittee shall not abort any engine tests that demonstrate non-compliance with any NO_X, CO, or CH_2O emission limits in this permit.

(d) Performance tests conducted on the one (1) 4SRB engine for measuring NO_X, CO, and CH_2O emissions and on each of the seven (7) 4SLB engines for measuring CO and CH_2O emissions shall meet the following requirements:

(i) The pressure drop across each catalyst bed and the inlet temperature to each catalyst bed shall be measured and recorded during all performance tests;

(ii) All performance tests for NO_X and CO emissions on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller shall be performed simultaneously;

(iii) The Permittee shall measure NO_X emissions from each of the seven (7) 4SLB engines simultaneously with all performance tests for CO emissions. NO_X emissions shall be measured using a portable analyzer and protocol approved in writing by the EPA; *[Note to Permittee: Although the permit does not contain NO_X emission limits for these engines, NO_X measurement requirements have been included as an indicator to ensure compliance with Condition C.4(b) above.]*

(iv) All performance tests shall be conducted at a maximum operating rate (90% to 110% of the maximum achievable load available at the time of the test). The Permittee may submit to the EPA a written request for approval of an alternate load level for testing, but shall only test at that alternate load level after obtaining written approval from the EPA;

(v) During each test run, data shall be collected on all parameters necessary to document how emissions were measured and calculated (such as test run length, minimum sample volume, volumetric flow rate, moisture and oxygen corrections, etc.);

(vi) Each test shall consist of at least three 1-hour or longer valid test runs. Emission results shall be reported as the arithmetic average of all valid test runs and shall be in terms of the emission limits in this permit;

(vii) Performance test plans shall be submitted to the EPA for approval 60 calendar days prior to the date the test is planned;

(viii) Performance test plans that have already been approved by the EPA for the emission units approved in this permit may be used in lieu of new test plans unless the EPA requires the submittal and approval of new test plans. The Permittee may submit new plans for EPA approval at any time; and

(ix) The test plans shall include and address the following elements:

(A) Purpose of the test;
(B) Engines and catalytic control systems to be tested;
(C) Expected engine operating rate(s) during the test;
(D) Sampling and analysis procedures (sampling locations, test methods, laboratory identification);
(E) Quality assurance plan (calibration procedures and frequency, sample recovery and field documentation, chain of custody procedures); and
(F) Data processing and reporting (description of data handling and quality control procedures, report content).

(e) The Permittee shall notify the EPA at least 30 calendar days prior to scheduled performance testing. The Permittee shall notify the EPA at least 1 week prior to scheduled performance testing if the testing cannot be performed.

(f) If the results of a complete and valid performance test of the emissions from any permitted engine demonstrate noncompliance with the emission limits in this permit, the engine shall be shut down as soon as safely possible, and appropriate corrective action shall be taken (e.g., repairs, catalyst cleaning, catalyst replacement). The Permittee shall notify the EPA in writing within 24 hours of each such shut down. The engine must be retested within 7 days of being restarted and the emissions must meet the applicable limits in this permit. If the retest shows that the emissions continue to exceed the limits in this permit, the engine shall again be shut down as soon as safely possible, and the engine may not operate, except for purposes of startup and testing, until the Permittee demonstrates through testing that the emissions do not exceed the emission limits in this permit.

(g) If a permitted engine is not operating, the Permittee does not need to start up the engine solely to conduct a performance test. The Permittee may conduct the performance test when the engine is started up again.

5. Monitoring Requirements

(a) The Permittee shall continuously measure the engine exhaust temperature at the inlet to the catalyst bed on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller and each of the seven (7) 4SLB engines.

(b) Except during startups not to exceed 30 minutes, if the engine exhaust temperature at the inlet to the catalyst bed deviates from the acceptable ranges specified in this permit then the following actions shall be taken. The Permittee's completion of any or all of these actions shall not constitute, nor qualify as, an exemption from any other emission limits in this permit.

(i) Within 24 hours upon determining a deviation of the engine exhaust temperature at the inlet to the catalyst bed, the Permittee shall investigate. The investigation shall include testing the temperature sensing device, inspecting the engine for performance problems and assessing the catalytic control system for possible

damage that could affect catalytic system effectiveness (including, but not limited to, catalyst housing damage, and fouled, destroyed or poisoned catalyst).

(ii) If the engine exhaust temperature at the inlet to the catalyst bed can be corrected by following the engine manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor and the catalytic control system has not been damaged, then the Permittee shall correct the engine exhaust temperature at the inlet to the catalyst bed within 24 hours of inspecting the engine and catalytic control system.

(iii) If the engine exhaust temperature at the inlet to the catalyst bed cannot be corrected using the engine manufacturer recommended procedures or equivalent procedures developed by the Permittee or vendor, or the catalytic control system has been damaged, then the affected engine shall cease operating immediately and shall not be returned to routine service until the following has been met:

(A) The engine exhaust temperature at the inlet to the catalyst bed is measured and found to be within the acceptable temperature range for that engine; and

(B) The catalytic control system has been repaired or replaced, if necessary.

(c) The Permittee shall monitor the pressure drop across the catalyst bed of the one (1) 4SRB engine equipped with a NSCR control system and AFR controller and each of the seven (7) 4SLB engines once every calendar week using pressure sensing devices before and after the catalyst bed to obtain a direct reading of the pressure drop (also referred to as the differential pressure). *[Note to Permittee: Differential pressure measurements, in general, are used to show the pressure across the filter elements. This information will determine when the elements in the catalyst bed are fouling, blocked or blown out and thus require cleaning or replacement.]*

(d) The Permittee shall perform the first measurement of the pressure drop across each catalyst bed no more than 7 days from the date of the initial performance test. Thereafter, the Permittee shall measure the pressure drop across the catalyst bed, at a minimum every 7 days. Subsequent performance tests, as required in this permit, can be used to meet the periodic pressure drop monitoring requirement provided it occurs within the 7-day window. The pressure drop reading can be a one-time measurement on that day, the average of performance test runs, or a 12-hour average of all the measurements on that day if continuous readings are taken.

(e) If the pressure drop reading exceeds ± 2 inches of water from the baseline pressure drop reading taken during the most recent performance test, then the following actions shall be taken. The Permittee's completion of any or all of these actions shall not constitute, nor qualify as, an exemption from any other emission limits in this permit:

(i) Within 24 hours of determining a deviation of the pressure drop across the catalyst bed, the Permittee shall investigate. The investigation shall include testing the pressure transducers and assessing the catalytic control system for possible damage that could affect catalytic system effectiveness (including, but not limited to, catalyst housing damage, and plugged, fouled, destroyed or poisoned catalyst).

(ii) If the pressure drop across the catalyst bed can be corrected by following the catalytic control system manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor, and the catalytic control system has not been damaged, then the Permittee shall correct the problem within 24 hours of inspecting the catalytic control system.

(iii) If the pressure drop across the catalyst bed cannot be corrected using the catalytic control system manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor, or the catalytic control system is damaged, then the Permittee shall do one of the following:

(A) Conduct a performance test as specified in this permit to ensure that the CH_2O emission limits are being met and to re-establish the pressure drop across the catalyst bed; or

(B) Cease operating the affected engine immediately. The engine shall not be returned to routine service until the pressure drop is measured and found to be within the acceptable pressure range for that engine as determined from the most recent performance test. Corrective action may include removal and cleaning of the catalyst or replacement of the catalyst.

(f) The Permittee shall monitor CO and NO_X emissions from the exhaust of the catalytic control system on each engine at least quarterly, to demonstrate compliance with the engine emission limits in this permit. To meet this requirement, the Permittee shall:

(i) Measure CO and NO_X emissions at the normal operating load using a portable analyzer and a monitoring protocol approved by the EPA or conduct a performance test as specified in this permit;
(ii) Measure the CO and NO_X emissions simultaneously; and
(iii) Commence monitoring for CO and NO_X emissions within 90 calendar days of the Permittee's submittal of the initial performance test results for NO_X and/or CO emissions, as appropriate, to the EPA.

(g) The Permittee shall not perform engine tuning or make any adjustments to engine settings, catalytic control system settings, processes or operational parameters the day of or during measurements. Any such tuning or adjustments may result in a determination by the EPA that the result is invalid. Artificially increasing an engine load to meet testing requirements is not considered engine tuning or adjustments.

(h) For each of the seven (7) 4SLB engines, if the results of consecutive quarterly portable analyzer measurements demonstrate compliance with the CO emission limits, the required monitoring frequency may change from quarterly to semi-annually.

(i) For the one (1) 4SRB engine, if the results of consecutive quarterly portable analyzer measurements demonstrate compliance with the NO_X and CO emission limits, the required monitoring frequency may change from quarterly to semi-annually.

(j) For any one (1) engine, if the results of consecutive semi-annual portable analyzer measurements demonstrate non-compliance with the NO_X and/or CO emission limits, the required test frequency shall revert back to quarterly.

(k) The Permittee shall submit portable analyzer specifications and monitoring protocols to the EPA at the following address for approval at least 45 calendar days prior to the date of initial portable analyzer monitoring:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

(l) Portable analyzer specifications and monitoring protocols that have already been approved by the EPA for the emission units approved in this permit may be used in lieu of new protocols unless the EPA determines it is necessary to require the submittal and approval of a new protocol. The Permittee may submit a new protocol for EPA approval at any time.

(m) The Permittee is not required to conduct parametric monitoring of exhaust temperature and catalyst differential pressure on engines that have not operated during the monitoring period. The Permittee shall certify that the engine(s) did not operate during the monitoring period in the annual report specified in this permit.

6. Recordkeeping Requirements

(a) Records shall be kept of manufacturer and/or vendor specifications and maintenance requirements developed by the manufacturer, vendor, or Permittee for each engine, and each catalytic control system, temperature-sensing device, and pressure-measuring device required in this permit.

(b) Records shall be kept of all calibration and maintenance conducted for each engine, and each catalytic control system, temperature-sensing device, and pressure-measuring device required in this permit.

(c) Records shall be kept that are sufficient to demonstrate that the fuel for the engines is pipeline quality natural gas in all respects, with the exception of CO_2 concentrations.

(d) Records shall be kept of all temperature measurements required in this permit, as well as a description of any corrective actions taken pursuant to this permit.

(e) Records shall be kept of all pressure drop measurements required in this permit, as well as a description of any corrective actions taken pursuant to this permit.

(f) Records shall be kept of all required testing and monitoring in this permit. The records shall include the following:

(i) The date, place, and time of sampling or measurements;
(ii) The date(s) analyses were performed;
(iii) The company or entity that performed the analyses;
(iv) The analytical techniques or methods used;

(v) The results of such analyses or measurements; and
(vi) The operating conditions as existing at the time of sampling or measurement.

(g) Records shall be kept of all catalyst replacements or repairs, AFR controller replacements, engine rebuilds and replacements.

(h) Records shall be kept of each rebuilt or replaced engine break-in period, pursuant to the requirements of this permit, where an existing engine that has been rebuilt or replaced resumes operation without the catalyst control system, for a period not to exceed 200 hours.

(i) Records shall be kept of each time any of the eight (8) engines are shut-down due to a deviation in the inlet temperature to the catalyst bed or pressure drop across a catalyst bed. The Permittee shall include in the record the cause of the problem, the corrective action taken, and the timeframe for bringing the pressure drop and inlet temperature range into compliance.

E. Requirements for TEG Dehydration Systems

1. Construction and Operational Limits

(a) The Permittee may install and operate no more than one (1) TEG dehydration unit meeting the following specifications:

(i) Limited to a maximum natural gas processing capacity of 30 million standard cubic feet per day (MMscfd); and
(ii) Equipped with a natural gas-fired TEG reboiler limited to a maximum heat input capacity of 0.6 million British thermal units per hour (MMBtu/hr).

(b) The Permittee may install and operate no more than one (1) TEG dehydration unit meeting the following specifications:

(i) Limited to a maximum natural gas processing capacity of 40 MMscfd; and
(ii) Equipped with a natural gas-fired TEG reboiler limited to a maximum heat input capacity of 0.6 MMBtu/hr.

(c) Only the TEG dehydration units that are operated and controlled as specified in this permit may be installed and operated.

2. Emission Limits: Emissions of benzene from each of the TEG dehydration systems approved in this permit for installation and operation at the facility shall not exceed 0.9 tons in any consecutive 12 months. The emission limits shall apply at all times.

3. Control and Operational Requirements

(a) *TEG Dehydration Units.* The Permittee shall meet the following requirements for the TEG dehydration unit:

(i) Each TEG dehydration unit must be equipped with flash gas separators that route the flash gas back into the sales line, condensers, or an enclosed combustor capable of 98.0% benzene emission destruction efficiency;
(ii) All emissions from each TEG dehydration unit shall be routed through a closed-vent system to an emissions control system as specified in this permit; and
(iii) The Permittee shall follow, for each TEG dehydration unit and respective emission control system, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance.

(b) *Closed-Vent Systems.* The Permittee shall meet the following requirements for the closed-vent systems:

(i) Each closed-vent system shall route all hydrocarbon emissions from the dehydration units to the control system required by this permit.

(ii) All vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain and collect gases, vapors, and fumes and transport them to control equipment shall be maintained and operated during any time the control equipment is operating.

(iii) Each closed-vent system shall be designed to operate with no detectable emissions.

(iv) If any closed-vent system contains one or more bypass devices that could be used to divert all or a portion of the gases, vapors, or fumes from entering the control devices, the Permittee shall meet the one of following requirements for each bypass device:

(A) At the inlet to the bypass device that could divert the stream away from the control device and into the atmosphere, properly install, calibrate, maintain, and operate a flow indicator that is capable of taking periodic readings and sounding an alarm when the bypass device is open such that the stream is being, or could be, diverted away from the control device and into the atmosphere;
(B) Secure the bypass device valve installed at the inlet to the bypass device in the non-diverting position using a car-seal or a lock-and-key type configuration; and
(C) Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and safety devices are not subject to the requirements applicable to bypass devices.

(v) The Permittee shall minimize leaks of hydrocarbon emissions from all vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain, collect, and transport gases, vapors, and fumes to the control device.

(c) *Enclosed Combustion Devices.* The Permittee shall meet the following requirements for each enclosed combustion device:

(i) For each enclosed combustion device, the Permittee shall follow the manufacturer's written operating instructions, procedures and maintenance schedule to ensure good air pollution control practices for minimizing emissions.

(ii) The Permittee shall ensure that each enclosed combustion device has sufficient capacity to achieve at least a 98.0% benzene emission destruction efficiency for the minimum and maximum hydrocarbon volumetric flow rate and BTU content routed to the device.

(iii) The Permittee must ensure that each enclosed combustion device is:

(A) A model demonstrated by a manufacturer to the meet the benzene destruction efficiency requirements of this permit using the procedures specified in 40 CFR 60.5413(d) for VOC emissions by the due date of the first annual report specified in Condition I.G.1. of this permit; or

(B) Demonstrated by the Permittee to meet the benzene destruction efficiency requirements of this permit by using the EPA approved performance test methods specified in 40 CFR 63.772 (e)(i) – (iii) for hazardous air pollutants, by the due date of the first annual report specified in Condition I.G.1. of this permit.

(iv) The Permittee must ensure that each enclosed combustion device is:

(A) Operated properly at all times that natural gas is routed to it;

(B) Operated with a liquid knock-out system to collect any condensable vapors (to prevent liquids from going through the control device);

(C) Equipped with a flash-back flame arrestor;

(D) Equipped with one of the following:

I. A continuous burning pilot flame, a thermocouple, and a malfunction alarm and notification system if the pilot flame fails; or

II. An electronically controlled auto-ignition system with a malfunction alarm and notification system if the pilot flame fails while produced natural gas or natural gas emissions are flowing to the enclosed combustor;

(E) Maintained in a leak-free condition; and

(F) Operated with no visible smoke emissions.

(d) The Permittee shall follow, for each TEG dehydration unit and respective emission control system, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance.

4. Testing Requirements

The Permittee shall obtain extended wet gas analyses of the inlet wet gas stream to each TEG dehydration system at least once per calendar month. The analysis shall include the inlet gas temperature and pressure at which the sample was taken.

5. Monitoring Requirements

(a) The Permittee shall monitor each closed vent system for leaks of hydrocarbon emissions from all vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain, collect, and transport gases, vapors, and fumes to the enclosed combustion devices as follows:

(i) Visit the facility on a quarterly basis to inspect all closed vent systems for defects that could result in air emissions and document each inspection. Defects include, but are not limited to, visible cracks, holes, or gaps in piping; loose connections; or broken or missing caps or other closure devices. If a quarterly visit is not feasible due to sudden, infrequent, and unavoidable events (i.e., weather, road conditions), every effort shall be made to visit the facility as close to quarterly as possible;
(ii) The inspections shall be based on audio, visual, and olfactory procedures; and
(iii) Any leaks detected in any closed vent system shall be addressed immediately unless the repair requires resources not currently available. If the resources are not available, the leak shall be repaired no later than 15 days after initial detection of the leak.

(b) The Permittee shall monitor each enclosed combustion device to confirm proper operation as follows:

(i) Continuously monitor the proper functioning of each enclosed combustion device's combustion source using a thermocouple or other or other heat sensing monitoring device and a recording device that indicates the continuous ignition of the flame while gas is flowing to it;
(ii) Visually inspect the combustion source (continuous burning pilot flame or automatic igniter) to ensure proper operation whenever an operator is on site, at a minimum, quarterly; and
(iii) Visually confirm that no smoke is present during operation of each smokeless enclosed combustion device whenever an operator is on site; at a minimum, quarterly.

(c) Benzene and total HAP emissions from each of the TEG dehydration systems shall be determined monthly using the most recent version of the GRI GlyCalc model and the following input parameters:

(i) Current month's inlet wet gas stream properties;
(ii) Temperature and pressure of the gas provided in the inlet wet gas analysis;
(iii) The emission control device efficiency, unless the closed-vent system or control device was bypassed or down or a malfunction alarm was triggered. In such

cases, the emission control device efficiency used in the calculation shall be 0.0%; and

(iv) The maximum gas throughput and glycol pump recirculation rate for each TEG dehydration system as follows:

TEG Dehydration Unit Description	Maximum Glycol Pump Recirculation Rate
30 MMscfd maximum gas throughput	15 gallons per minute
40 MMscfd maximum gas throughput	17 gallons per minute

(d) Benzene and total HAP emissions from each TEG dehydration system shall be calculated and recorded at the end of each month, beginning with the first full calendar month after operations commenced. Prior to 12 full months of operation, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for all previous months since operations commenced, where applicable, and record the total. Thereafter, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for the preceding 11 months and record a new 12 month total.

6. Recordkeeping Requirements

The Permittee shall keep records of the following:

(a) The monthly benzene, total HAP emissions, GRI GlyCalc model input parameters and GRI GlyCalc model reports for each TEG dehydration system;

(b) Written, site-specific designs, operating instructions, operating procedures, and maintenance schedules;

(c) All required monitoring of the control device operations;

(d) The exceedances of the operating parameters specified in manufacturers' or vendors' guarantees or engineering specifications with regard to the TEG dehydration units, closed vent systems and control devices. The records shall include each TEG dehydration unit, closed-vent system, enclosed combustion device total operating times during the calendar month in which the exceedance occurred, the date, time and length of time that the parameters were exceeded, and the corrective actions taken and any preventative measures adopted to operate the facility within that operating parameter;

(e) Any instances in which any closed-vent system or control device was bypassed or down in each calendar month, the reason for each incident, its duration, and the corrective actions taken and any preventative measures adopted to avoid such bypasses or downtimes;

(f) Any instances in which the pilot flame is not present in the combustor or the auto ignition system was not operating, the date and times of the observation and the corrective actions taken and any preventative measures adopted to limit the malfunctions;

(g) Any instances in which the thermocouple (or other heat sensing monitoring device) installed to detect the presence of a flame in the combustor is not operational, the time period during which it was not operational, and the corrective measures taken;

(h) Any instances in which the recording device installed to record data from the thermocouple is not operational;

(i) Any time periods in which visible emissions are observed emanating from a control system;

(j) The emissions calculations included in the consecutive 12-month facility-wide total; and

(k) Each leak detection inspection. All leak detection inspection records must include, at a minimum, the following information:

(i) A description of the methods used for the inspection;
(ii) The date of the inspection;
(iii) The findings of the inspection;
(iv) Any corrective action taken and the date of the corrective action;
(v) Reason for any delays to corrective actions;
(vi) The inspector's name and signature; and
(vii) All input parameters and calculations used to determine the monthly emissions.

F. Requirements for Records Retention

1. The Permittee shall retain all records required by this permit for a period of at least 5 years from the date the record was created.

2. Records shall be kept in the vicinity of the facility, such as at the facility, the location that has day-to-day operational control over the facility, or the location that has day-to-day responsibility for compliance of the facility.

G. Requirements for Reporting

1. Annual Emission Reports

(a) The Permittee shall submit a written annual report of the actual annual emissions from all emission units at the facility each year no later than April 1st. The annual report shall cover the period for the previous calendar year. All reports must be certified to truth and accuracy by the by the person primarily responsible for Clean Air Act compliance of the Permittee.

(b) The report shall include NO_X, CO, total HAP, CH_2O, and benzene emissions.

(c) The report shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

The report may be submitted via electronic mail to r8AirPermitting@epa.gov.

2. All other documents required to be submitted under this permit, with the exception of the **Annual Emission Reports**, shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

Documents may be submitted electronically to r8airreportenforcement@epa.gov.

3. The Permittee shall promptly submit to the EPA a written report of any deviations of permit requirements, a description of the probable cause of such deviations, and any corrective actions or preventative measures taken. A "prompt" deviation report is one that is post marked or submitted via electronic mail to r8airreportenforcement@epa.gov as follows:

(a) Within 30 days from the discovery of any deviation of permit requirements that is left uncorrected for more than 5 days after discovering the deviation; and

(b) By April 1st for the discovery of a deviation of recordkeeping or other permit conditions during the preceding calendar year that do not affect the Permittee's ability to meet the emission limits.

4. The Permittee shall submit a written report for any required performance tests to the EPA within 60 days after completing the tests.

5. The Permittee shall submit any record or report required by this permit upon EPA request.

II. General Provisions

A. Conditional Approval:

Pursuant to the authority of 40 CFR 49.151, the EPA hereby conditionally grants this permit. This authorization is expressly conditioned as follows:

1. *Document Retention and Availability:* This permit and any required attachments shall be retained and made available for inspection upon request at the location set forth herein.

2. *Permit Application:* The Permittee shall abide by all representations, statements of intent and agreements contained in the application submitted by the Permittee. The EPA shall be notified 10 days in advance of any significant deviation from this permit application as well as any plans, specifications or supporting data furnished.

3. *Permit Deviations:* The issuance of this permit may be suspended or revoked if the EPA determines that a significant deviation from the permit application, specifications, and supporting data furnished has been or is to be made. If the proposed source is constructed, operated, or modified not in accordance with the terms of this permit, the Permittee will be subject to appropriate enforcement action.

4. *Compliance with Permit:* The Permittee shall comply with all conditions of this permit, including emission limitations that apply to the affected emissions units at the permitted facility/source. Noncompliance with any permit term or condition is a violation of this permit and may constitute a violation of the Clean Air Act and is grounds for enforcement action and for a permit termination or revocation.

5. *Fugitive Emissions:* The Permittee shall take all reasonable precautions to prevent and/or minimize fugitive emissions during the construction period.

6. *National Ambient Air Quality Standard and PSD Increment:* The permitted source shall not cause or contribute to a National Ambient Air Quality Standard violation or a PSD increment violation.

7. *Compliance with Federal and Tribal Rules, Regulations, and Orders:* Issuance of this permit does not relieve the Permittee of the responsibility to comply fully with all other applicable federal and tribal rules, regulations, and orders now or hereafter in effect.

8. *Enforcement:* It is not a defense, for the Permittee, in an enforcement action, to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

9. *Facility/Source Modifications:* For proposed modifications, as defined at 40 CFR 49.152(d), that would increase an emissions unit allowable emissions of a pollutant above its existing permitted annual allowable emissions limit, the Permittee shall first obtain a permit modification pursuant to the MNSR regulations approving the increase. For a proposed modification that is not otherwise subject to review under the PSD or MNSR regulations, such proposed increase in the annual allowable emissions limit shall be approved through an administrative permit revision as provided at 40 CFR 49.159(f).

10. *Relaxation of Legally and Practically Enforceable Limits:* At such time that a new or modified source within this permitted facility/source or modification of this permitted facility/source becomes a major stationary source or major modification solely by virtue of a relaxation in any legally and practically enforceable limitation which was established after August 7, 1980, on the capacity of this permitted facility/source to otherwise emit a pollutant, such as a restriction on hours of operation, then the requirements of the PSD regulations shall apply to the source or modification as though construction had not yet commenced on the source or modification.

11. *Revise, Reopen, Revoke and Reissue, or Terminate for Cause:* This permit may be revised, reopened, revoked and reissued, or terminated for cause. The filing of a request by the Permittee, for a permit revision, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. The EPA may reopen this permit for a cause on its own initiative, e.g., if this permit contains a material mistake or the Permittee fails to assure compliance with the applicable requirements.

12. *Severability Clause:* The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.

13. *Property Rights:* This permit does not convey any property rights of any sort or any exclusive privilege.

14. *Information Requests:* The Permittee shall furnish to the EPA, within a reasonable time, any information that the EPA may request in writing to determine whether cause exists for revising, revoking and reissuing, or terminating this permit or to determine compliance with this permit. For any such information claimed to be confidential, you shall also submit a claim of confidentiality in accordance with 40 CFR Part 2, Subpart B.

15. *Inspection and Entry:* The EPA or its authorized representatives may inspect this permitted facility/source during normal business hours for the purpose of ascertaining compliance with all conditions of this permit. Upon presentation of proper credentials, the Permittee shall allow the EPA or its authorized representative to:

    (a) Enter upon the premises where this permitted facility/source is located or emissions-related activity is conducted, or where records are required to be kept under the conditions of this permit;

    (b) Have access to and copy, at reasonable times, any records that are required to be kept under the conditions of this permit;

    (c) Inspect, during normal business hours or while this permitted facility/source is in operation, any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit;

    (d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this permit or other applicable requirements; and

    (e) Record any inspection by use of written, electronic, magnetic and photographic media.

16. *Permit Effective Date:* This permit is effective immediately upon issuance unless comments resulted in a change in the proposed permit, in which case this permit is effective 30 days after issuance. The Permittee may notify the EPA, in writing, that this permit or a term or condition of it is rejected. Such notice should be made within 30 days of receipt of this permit and should include the reason or reasons for rejection.

17. *Permit Transfers:* Permit transfers shall be made in accordance with 40 CFR 49.159(f). The Air Program Director shall be notified in writing at the address shown below if the company is sold or changes its name.

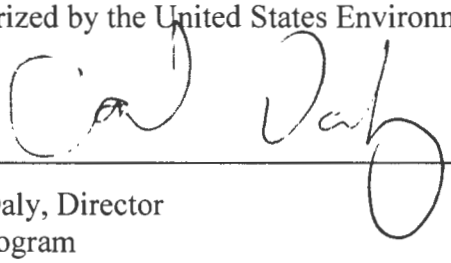
U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

18. *Invalidation of Permit:* This permit becomes invalid if construction is not commenced within 18 months after the effective date of this permit, construction is discontinued for 18 months or more, or construction is not completed within a reasonable time. The EPA may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between the construction of the approved phases of a phased construction project. The Permittee shall commence construction of each such phase within 18 months of the projected and approved commencement date.

19. *Notification of Start-Up:* The Permittee shall submit a notification of the anticipated date of initial start-up of this permitted source to the EPA within 60 days of such date, unless this permitted source is an existing source.

B. Authorization:

Authorized by the United States Environmental Protection Agency, Region 8



1/19/2016

Carl Daly, Director
Air Program

Date

Public Notice: Request For Comments

Proposed Air Quality Permits to Construct
Samson Resources
South Ignacio Central Delivery Point

Notice issued: October 24, 2014

Written comments due:
5 p.m., November 24, 2014

Where is the facility located?
Southern Ute Indian Reservation
South Ignacio Central Delivery Point
~9 miles southeast of Durango at the southeast ¼ of Section 32, Township 33N, Range 7W
Latitude 37.053917 N
Longitude -107.625222W

What is being proposed?
This permit action will apply to an existing facility operating on the Southern Ute Indian Reservation in Colorado.

This facility is an existing coal-bed methane gas compression facility. The facility currently holds a Federal operating permit issued by the U.S. EPA Region 8 Air Program pursuant to the Title V Operating Permit Program at 40 CFR Part 71 (Part 71). The permit contains emission limits created by the EPA. The creation the emission limits in the Part 71 permit was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through pre-construction permitting programs, such as exists in state jurisdictions.

Upon promulgation of the Tribal Minor New Source Review Program at 40 CFR Part 49 (MNSR), implemented by the Federal government, and the approval of the Southern Ute Indian Tribe's Title V Permit to Operate Program (Part 70) implemented by the Southern Ute Indian Tribe, it is now necessary to transfer these limits to the appropriate MNSR permits before the Southern Ute Indian Tribe issues new Part 70 permits.

Proposed Permit Requirements:
The permit proposes requirements to use air pollution controls and limit the emissions from dehydration systems and engines operating at the facility. The South Ignacio Central Delivery Point permit proposes requirements to limit the emissions of carbon monoxide, nitrogen oxides, benzene, formaldehyde, and total hazardous air pollutants.

What are the effects on air quality?
These actions will have no adverse air quality impacts. The emissions at this existing facility will not be increasing due to this permit action. In addition, this action does not authorize the construction of any new emission sources, or emission increases from existing sources, nor does it otherwise authorize any other physical modifications to the facility or its operations.

Where can I send comments?
EPA accepts comments by mail, fax and e-mail.

US EPA Region 8 Air Program, 8P-AR
Attn: Federal Minor NSR Coordinator
1595 Wynkoop Street,
Denver, CO 80202
R8AirPermitting@epa.gov
Fax: 303-312-6064

How can I review documents?
You can review an electronic copy of the proposed permits and related documents at the following locations:

Southern Ute Indian Tribe
Environmental Programs Division
71 Mike Frost Way
Ignacio, Colorado 81137
Attn: Brenda Jarrell, Air Quality Program Manager

and

US EPA Region 8 Office:
1595 Wynkoop Street, Denver, CO 80202
(Please call Claudia Smith at 303-312-6520 in advance of your visit.)
US EPA Region 8 Website:
http://www2.epa.gov/region8/air-permit-public-comment-opportunities

Permit number:
South Ignacio Central Delivery Point:
SMNSR-SU-000031-2011.001

What happens next?
EPA will review and consider all comments received during the comment period. Following this review, the EPA may issue the permits as proposed, issue modified permits based on comments, or deny the permits.

Tribal Minor New Source Review in Indian Country

United States Environmental Protection Agency

Region 8
Air Program
1595 Wynkoop Street
Denver, CO 80202
Phone 800-227-8917

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, Colorado 80202-1129
Phone (800)-227-8917
http://www2.epa.gov/aboutepa/epa-region-8-mountains-and-plains

Ref: 8P-AR

Mr. Brad Rogers
Samson Resources
370 17th Street, Suite 3000
Denver, Colorado 80202

OCT 17 2014

Re: Samson Resources, South Ignacio Central Delivery Point,
Permit # SMNSR-SU-000031-2011.001, Proposed Synthetic Minor New Source Review Permit

Dear Mr. Rogers:

The U.S. Environmental Protection Agency Region 8 has completed its review of the Samson Resources application requesting a synthetic minor new source review permit pursuant to the Tribal Minor New Source Review Permit Program at 40 CFR Part 49 (MNSR) for the South Ignacio Central Delivery Point (CDP), located on the Southern Ute Indian Reservation.

Enclosed are the proposed permit and the corresponding technical support document. The regulations at 40 CFR 49.157 require that the affected community and the general public have the opportunity to submit written comments on any proposed MNSR permit. All written comments submitted within thirty (30) calendar days after the public notice is published will be considered by the EPA in making its final permit decision. Enclosed is a copy of the public notice which will be published on the EPA's website located at: http://www.epa.gov/region8/air/permitting/pubcomment.html, on October 24, 2014. The public comment period will end at 5:00 p.m. on November 24, 2014.

The conditions contained in the proposed permit will become effective and enforceable by the EPA if the permit is issued final. If you are unable to accept any term or condition of the draft permit, please submit your written comments, along with the reason(s) for non-acceptance to:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, Colorado 80202

or

R8AirPermitting@epa.gov

If you have any questions concerning the enclosed proposed permit or technical support document, please contact Claudia Smith of my staff at (303) 312-6520.

Sincerely,

Callie A. Videtich
Acting Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

Enclosures

cc: Brenda Jarrell, Air Quality Program Manager, Southern Ute Indian Tribe Environmental Program

Air Pollution Control
40 CFR 49.151 Federal Minor New Source Review In Indian Country
Technical Support Document
Proposed Permit #SMNSR-SU-000031-2011.001

Samson Resources Company
South Ignacio Central Delivery Point
Southern Ute Indian Reservation
La Plata County, Colorado

In accordance with the requirements of the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR Part 49, this Federal permit to construct is being issued under authority of the Clean Air Act (CAA). The EPA has prepared this technical support document describing the conditions of this MNSR permit and presents information that is germane to this permit action.

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I. Introduction

On September 1, 2011, the EPA (we) received an application from Samson Resources Company (Samson) requesting a synthetic minor permit for the South Ignacio Central Delivery Point (CDP) in accordance with the requirements of the MNSR Permit Program. EPA received an updated application on January 11, 2012 that replaced the previous application.

This permit action applies to an existing facility operating on the Southern Ute Indian Reservation in Colorado.

This MNSR permit action does not authorize the construction of any new emission sources, or emission increases from existing units, nor does it otherwise authorize any other physical modifications to the facility or its operations. This permit is intended only to incorporate required and requested emission limits and provisions from an August 10, 2009, operating permit renewal that the EPA issued to Samson for the South Ignacio CDP in accordance with the Title V Operating Permit Program at 40 CFR Part 71 (Part 71). The limits were originally established in the initial Part 71 operating permit we issued on April 2, 2004, and two Part 71 significant permit modifications we issued on November 30, 2005, and July 14, 2008.

This MNSR permit reflects the incorporation of requirements created in the Part 71 permits EPA issued at the request of Samson. Samson requested these requirements in order to establish the South Ignacio CDP as a synthetic minor source for the purpose of avoiding major source requirements for hazardous air pollutants (HAP) in accordance with the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63 (also known as Maximum Achievable Control Technology (MACT)).

South Ignacio CDP began operations in December of 1991, and currently operates eight (8) natural gas fired reciprocating internal combustion engines used for natural gas compression and two (2) tri-ethylene glycol (TEG) natural gas dehydration systems. Seven (7) of the eight (8) compressor engines are operating under enforceable carbon monoxide (CO) and formaldehyde (CH_2O) emission limits requested by Samson. The eighth engine is operating under enforceable CO and nitrogen oxide (NO_X) emission limits required by a July 1, 2002 Consent Agreement (#CAA-08-2002-09.) These emission limits provide enforceable recognition of the catalytic control systems installed on each of the engines, which reduces the potential emission of CO and NO_X pollutants below major source thresholds.

The two (2) TEG dehydration systems are each operating under enforceable benzene emission limits of 0.9 ton per year (tpy). Finally, the entire facility operates under both an enforceable CH_2O emission cap and an enforceable total HAP cap. These emission limits were requested by Samson as a means to avoid MACT requirements for major HAP sources (10/25 tpy) – allowing the facility to become a synthetic minor HAP source prior to the compliance dates for the NESHAP for Reciprocating Internal Combustion Engines (RICE) (MACT ZZZZ) for the engines and for NESHAP for Oil and Gas Production Facilities (MACT HH) for the TEG dehydration systems.

We issued the initial Part 71 operating permit with CO and NO_X emission limits on the existing five (5) compressor engines and enforceable restrictions on facility-wide CH_2O emissions on April 2, 2004. We issued a significantly modified Part 71 operating permit on November 30, 2005, approving construction of the 6^{th}, 7^{th}, and 8^{th} compressor engines and the 2^{nd} TEG dehydration system, and containing the enforceable CO and CH_2O restrictions on the 6^{th}, 7^{th}, and 8^{th} engines. We issued a significantly

modified Part 71 operating permit on July 14, 2008, containing the enforceable benzene restrictions on the two (2) dehydrators and an enforceable facility-wide restriction on total HAPs.

The creation of the legally and practically enforceable limits in a Part 71 operating permit was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Section 49.153(a)(3)(iv) of the MNSR rule provides the EPA with the authority to require at its discretion existing sources whose limits were established through mechanisms such as a consent decree to apply for a permit under the MNSR Permit Program to transfer the limits to a MNSR permit, effectively creating legally and practically enforceable requirements without the use of the emission limits in the Part 71 operating permit. The MNSR regulations at 40 CFR 49.158(c)(2)(ii) and (iii) also provide the EPA with the discretion to require any additional requirements, including control technology requirements, based on the specific circumstances of the source.

Upon compliance with this MNSR permit, the legally and practically enforceable reductions in potential emissions can be used when determining the applicability of other CAA requirements, such as the Prevention of Significant Deterioration (PSD) permit program at 40 CFR Part 52 and the Part 71 operating permit program.

II. Facility Description

The South Ignacio CDP compresses and dehydrates inlet coal-bed methane gas. Gas entering the facility from the field is first fed to an inlet separator that removes water gravimetrically. Separator overhead gas is fed from a common suction header to one of eight (8) RICE used to compress the gas. The compressors discharge gas to a common discharge header that feeds to scrubbers. Scrubbers separate and collect liquids that may have formed during compression. The compressed gas is then fed to two (2) TEG dehydration systems operating in parallel. TEG is circulated counter-currently and absorbs water. Rich TEG is circulated to a reboiler, where moisture is driven to the atmosphere by heating the glycol. Dry gas exits the contactors and is directed to one of two sales lines, where it is metered and exits the facility. The gas processing capacity of the facility is 70 million standard cubic feet per day (MMscfd).

The emission units identified in Table 1 are currently installed and/or operating at the facility. The information provided in this table is for informational purposes only and is not intended to be viewed as enforceable restrictions or open for public comment. The units and/or control requirements identified here either existed prior to the promulgation of the MNSR Permit Program or have been approved through the alternative methods as identified, below. Table 2 lists the facility-wide potential emissions of New Source Review (NSR)-regulated pollutants accounting for all legally and practically enforceable control requirements that currently apply to the facility.

Table 1. Existing Emission Units

Unit/Emissions Description	Controls	Original Preconstruction Approval Date & Permit Number
Natural gas-fired, 4-stroke rich burn (4SRB) compressor engine with a maximum site rating of 1,680 hp	Non-selective Catalytic Reduction (NSCR) and air-to-fuel ratio (AFR) controller	Final Consent Agreement with EPA #CAA-08-2002-09 required control of NO_X and CO emissions using NSCR and application for a Part 71 permit containing enforceable emission limits to reflect Consent Agreement requirements. Initial control requirements established in the April 2, 2004 Part 71 Permit # V-SU-0031-01.00. Revised control requirements established in the November 30, 2005 and July 14, 2008 Part 71 Permits # V-SU-0031-01.01 and # V-SU-0031-01.04.
Two (2) Natural gas-fired, 4-stroke lean burn (4 SLB) compressor engines with a maximum site rating of 1,267 hp	Oxidation Catalyst	No pre-construction approval required for the installation of the engines. Installed prior to the promulgation of the MNSR permitting program. Initial control requirements established in the November 30, 2005 Part 71 Permit # V-SU-0031-01.01. Revised control requirements established in the July 14, 2008 Part 71 Permit # V-SU-0031-01.04.
Natural gas-fired, 4SLB compressor engine with a maximum site rating of 1,336 hp	Oxidation Catalyst	No pre-construction approval required for the installation of the engine. Installed prior to the promulgation of the MNSR permitting program. Initial control requirements established in the April 2, 2004 Part 71 Permit # V-SU-0031-01.00. Revised control requirements established in the November 30, 2005 and July 14, 2008 Part 71 Permits # V-SU-0031-01.01 and # V-SU-0031-01.04.
Natural gas-fired, 4SLB compressor engine with a maximum site rating of 1,400 hp	Oxidation Catalyst	No pre-construction approval required for the installation of the engines. Installed prior to the promulgation of the MNSR permitting program. Initial control requirements established in the April 2, 2004 Part 71 Permit # V-SU-0031-01.00. Revised control requirements established in the November 30, 2005 and July 14, 2008 Part 71 Permits # V-SU-0031-01.01 and # V-SU-0031-01.04.
Three (3) Natural gas-fired, 4SLB compressor engines with a maximum site rating of 1,400 hp	Oxidation Catalyst	Pre-construction approval and initial control requirements established in the November 30, 2005 Part 71 Permit # V-SU-0031-01.01. Revised control requirements established in the July 14, 2008 Part 71 Permit # V-SU-0031-01.04.
TEG dehydration system with a maximum natural gas processing capacity of 30 MMscfd & 0.6 million British thermal units per hour (MMBtu/hr) TEG reboiler	Enclosed Combustion Device	No pre-construction approval required for the installation of the TEG dehydration system. Installed prior to the promulgation of the MNSR permitting program. Control requirements established in the July 14, 2008 Part 71 Permit # V-SU-0031-01.04.

Unit/Emissions Description	Controls	Original Preconstruction Approval Date & Permit Number
TEG dehydration system with a maximum natural gas processing capacity of 40 MMscfd & 0.6 MMBtu/hr TEG reboiler	Enclosed Combustion Device	Pre-construction approval established in the November 30, 2005 Part 71 Permit # V-SU-0031-01.01.Pre-construction approval of replacement of original 30 MMscfd unit with the 40 MMscfd unit and associated control requirements established in the July 14, 2008 Part 71 Permit #V-SU-0031-01.04.
Facility fugitive emissions	None	No pre-construction approval required for installation of emission units contributing to fugitive emissions. Installed prior to promulgation of the MNSR permitting program.
Compressor cylinder rod packing vent emissions	None	No pre-construction approval required for installation of the compressor cylinder rod packing and vent. Installed prior to promulgation of the MNSR permitting program.
Miscellaneous organic liquid storage tanks	None	No pre-construction approval required for the installation of the organic liquid storage tanks. Installed prior to the promulgation of the MNSR permitting program.
Five (5) 0.12 MMBtu/hr natural gas-fired tank heaters	None	No pre-construction approval required for the installation of the heaters and burners. Installed prior to the promulgation of the MNSR permitting program.

Table 2. Facility-Wide Emissions

Pollutant	Controlled Potential Emissions (tons per year)
PM	0.0
PM_{10}	0.0
$PM_{2.5}$	0.0
SO_2	0.0
NO_X	232.7
CO	148.9
VOC	110.3
Greenhouse Gases	
CO_2 (mass basis)	42,481.0
CH_4 (mass basis)	490.2
N_2O (mass basis)	0.1
HFCs (mass basis)	NA
PFCs (mass basis)	NA
SF_6 (mass basis)	NA
GHG_{total} (mass basis)	42,971.0
CO_2e (Total)	52,799.0
Hazardous Air Pollutants (HAPs)	
Acetaldehyde	NA
Acrolein	NA
Benzene	1.8
Ethyl-Benzene	NA
Toluene	NA
n-Hexane	NA
Xylene	NA
Formaldehyde	9.5
Total HAPs	**23.0***

PM – Particulate Matter
PM_{10} – Particulate Matter less than 10 microns in size
$PM_{2.5}$ – Particulate Matter less than 2.5 microns in size
SO_2 – Sulfur Dioxide
NO_X – Nitrogen Oxides
CO – Carbon Monoxide
VOC – Volatile Organic Compounds
CO_2 – Carbon dioxide
CH_4 – Methane
N_2O – Nitrous oxide
HFCs – Hydrofluorocarbons
PFCs – Perfluorocarbons
SF_6 – Sulfur hexafluoride
CO_2e – Equivalent CO_2. A measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP)
NA – Not Available, not provided in application

HFCs, PFCs, and SF_6 emissions are not created during oil and gas production operations.

*Total is represented as the current and proposed allowable emission limit and is inclusive of, but not limited to, the individual HAPs listed above.

III. Proposed Synthetic Minor MNSR Permit Action

A. Engine Controls

The natural gas industry uses engines to compress natural gas as it is processed and prior to further pipeline distribution. Samson uses seven (7) natural gas-fired, 4SLB compressor engines. Lean-burn engines produce NO_X, CO, volatile organic compounds (VOC) and HAP emissions. The HAP emissions consist primarily of CH_2O.

The primary form of emission control for these types of engines is oxidation catalyst. The oxidation catalyst is effective for CO, VOC (including HAPs that are VOCs), and CH_2O. These catalysts do not typically control NO_X emissions. However, lean-burn engines are designed to operate with more dilute natural gas streams (a higher air-to-fuel ratio). Because they operate on more dilute natural gas streams, lean-burn engines also operate at lower combustion temperatures producing less NO_X emissions.

We are proposing the use of oxidation catalyst on each of the seven (7) 4SLB compressor engines at the facility. In addition, we have proposed the following requested CO and CH_2O pound per hour (lb/hr) emissions limits on each of the seven (7) 4SLB compressor engines:

1. Emissions from each of the two (2) natural gas-fired 4SLB 1,267 hp engines shall not exceed:

   (i) 2.79 lb/hr of CO emissions; and
   (ii) 0.29 lb/hr of CH_2O emissions.

2. Emissions from the one (1) natural gas-fired 4SLB 1,336 hp engine shall not exceed:

   (i) 2.94 lb/hr of CO emissions; and
   (ii) 0.25 lb/hr of CH_2O emissions.

3. Emissions from each of the four (4) natural gas-fired 4SLB 1,400 hp engines shall not exceed:

   (i) 3.08 lb/hr of CO emissions; and
   (ii) 0.31 lb/hr of CH_2O emissions.

The CO and CH_2O limits are based on a manufacturer-specified 93% reduction of CO and 60% reduction of CH_2O using the oxidation catalyst as required by conditions previously established in the Part 71 operating permit for the facility.

Samson also uses one (1) natural gas-fired 4SRB compressor engine. Rich burn engines produce NO_X, CO, small amounts of VOC, and very small amounts of CH_2O emissions (CH_2O is the primary HAP pollutant). The primary form of emission control for rich burn engines is NSCR. NSCR is most effective for reducing NO_X and CO emissions. With respect to NO_X and CO, the NSCR enhances the rate of the reduction of NO_X to nitrogen dioxide (N_2), oxidation of CO to CO_2, and oxidation of any remaining hydrocarbons to carbon dioxide (CO_2) and water (H_2O). Because these reactions take place only in low-oxygen, or reducing atmospheres, the exhaust must contain less than 0.5% O_2. This means that NSCR systems can function only on stoichiometric or rich-burn engines, and they require precise control of the air-to-fuel ratio in order to maintain satisfactory catalysis.

We are proposing the use of a NSCR and an AFR controller on the 4SRB compressor engine at the facility. In addition, we have proposed the requested 9.2 lb/hr NO_X, 12.9 lb/hr CO, and 0.07 lb/hr CH_2O emission limits for the engine.

We are incorporating the engine requirements from the Part 71 operating permit, and the synthetic minor MNSR permit application into this MNSR permit. We made several changes to the transferred Part 71 permit requirements, including, but not limited to the following:

1. **Increased the frequency of monitoring engine exhaust temperature at the inlet to the catalyst control system from once per day to continuous.** Catalyst operating efficiency is greatly affected by the temperature of the engine exhaust to be controlled. As such, the Part 71 permit has the requirement to maintain the optimal temperature range at all times, but the frequency of monitoring is only once per day. Thus to ensure

compliance with the acceptable temperature range in the MNSR permit, the monitoring requirement has been changed from daily to continuous.

2. **Added a series of actions to be taken in the event of a deviation from the required temperature range of the engine exhaust to the catalyst bed or in the event of a deviation from the required pressure drop range of the engine exhaust across the catalyst bed for the eight (8) controlled compressor engines.** The actions are to ensure that there is not a complete failure of the catalytic control system due to plugging, fouling, destruction, poisoning, etc. In either case, the required actions begin with equipment inspections and end with the possible removal and cleaning of the catalyst or catalyst replacement.

3. **Added a maximum 200-hour period for which each rebuilt and replaced engine can operate without the catalytic control system, accompanied by a recordkeeping provision to track break-in periods.** This provision takes into account the time needed for engine "break-in" before putting it into full-time, continuous operation. Engine "break-in" can damage the catalyst.

4. **Added requirements to monitor for NO_X emissions in addition to testing and monitoring for CO emissions from the seven (7) 4SLB compressor engines, and added requirements to perform NO_X testing and/or monitoring of all eight (8) compressor engines simultaneously with CO testing and monitoring. Also added requirement to restrict the adjustment of engines prior to and during emission testing.** These provisions have been added to ensure that the respective NO_X and/or CO emission limits for each engine in this permit are being met under normal operating conditions. In general, there is a fundamental relationship between engine operating parameters and exhaust emissions.

   We are proposing NO_X monitoring requirements for all eight (8) engines, which were not previously established in the Title V operating permit. We are proposing this additional monitoring using the authority at 40 CFR 49.151(ii)(C).

   We are proposing that Samson monitor for NO_X emissions of all seven (7) 4SLB engines, using a portable analyzer and EPA-approved protocol, quarterly and simultaneously with any required testing or monitoring for compliance with the CO emission limits in the permit. We are also proposing that Samson conduct required NO_X testing and monitoring of the one (1) 4SRB engine simultaneously with required CO testing and monitoring of the engine. We are also proposing a restriction on adjusting engine settings and operating parameters prior to and during emission testing or monitoring for both the seven (7) 4SLB engines and the one (1) 4SRB engine. We are providing a clarification that artificially increasing an engine load to meet testing requirements is not considered engine tuning or adjustments.

   According to standard stoichiometric principles, emission levels of NO_X and CO from natural gas combustion are only independent to a point; thereafter, they are inversely proportional. Lean burn engines emit lower levels of NO_X, but higher levels of CO than rich burn engines. This is because a reduction of NO_X requires the addition of O_2 to the combustion process, which after a point can lead to combustion instability and result in higher CO and unburned hydrocarbon levels due to incomplete combustion. However,

the reduction of CO using oxidation catalysts requires high temperatures, which can lead to increased NO_X formation, because NO_X produced by natural gas-fired spark ignition engine is primarily thermal NO_X. Therefore, as CO emissions are reduced through emission controls, NO_X emissions will increase after a certain point. It is feasible for owners and operators of RICE to adjust or tune certain engine operating parameters prior to testing for particular pollutant emissions to assure compliance with an emission limit. Requiring NO_X emissions monitoring at the same time as CO emissions testing and monitoring encourages an operator to test engines at as close to normal operating conditions as possible and ensure that operating settings are not adjusted prior to a test such that the NO_X emission rates increase to a level that may lead to exceedances of major source emission thresholds if the engine were operated at those settings for an entire year.

B. TEG Dehydration Systems

The natural gas industry commonly uses the glycol absorption process to remove naturally occurring water from raw natural gas. Most commonly, the glycol absorbent used is TEG. The TEG dehydration process produces VOC and HAP emissions from pressure reduction of rich glycol (immediately post absorption and prior to stripping and regeneration) and from the stripping of the rich glycol to regenerate lean glycol to be reused in the process. The HAP emissions consist primarily of benzene, toluene, ethlybenzene, and xylenes.

The primary form of emission control is to capture and route the emissions through a closed-vent system to an enclosed combustion device, flare, or other combustion device to destroy the hydrocarbon content of the vapors.

Samson's TEG Dehydration Process at the South Ignacio CDP is capable of processing 70 MMscf of natural gas per day using two (2) TEG dehydrators. The following are the dehydrators currently operating at the South Ignacio CDP:

1. One (1), 30 MMscfd dehydration unit with a 0.6 MMBtu/hr natural gas fired TEG reboiler and flash tank and equipped with an enclosed combustion device to control HAP emissions; and

2. One (1), 40 MMscfd dehydration unit with a 0.6 MMBtu/hr natural gas fired TEG reboiler and flash tank and equipped with an enclosed combustion device to control HAP emissions.

We are proposing 0.9 tpy benzene emission limits for each TEG dehydration system. We are also proposing requirements for each TEG dehydration system to be controlled using an enclosed combustion device capable of reducing HAP emissions from the still vent by at least 98.0% by weight. These limits are based on the manufacturer-specified HAP destruction efficiencies of the enclosed combustion devices, consistent with the conditions previously established in the Part 71 permit for the facility.

We are incorporating the TEG dehydration system requirements from the Part 71 permit, and the synthetic minor MNSR permit application into this MNSR permit. We are proposing necessary changes to the transferred Part 71 permit requirements that should be noted. **We significantly enhanced the control and operational requirements and the monitoring requirements to**

include specific requirements for the closed vent system routing emissions to the enclosed combustion device, and specific requirements to ensure the enclosed combustion device is operated properly to ensure compliance with the specified benzene emission limit and HAP destruction efficiency. The closed vent system routing emissions to the enclosed combustion device must be designed and maintained to operate in a leak-free condition to ensure that all of the emissions from each dehydration system are routed to the respective enclosed combustion device and to ensure that the specified HAP destruction efficiency of the enclosed combustion device will allow Samson to meet the requested benzene and total HAP emission limits. Enclosed combustion device operating efficiencies are significantly affected by the temperature and presence of the source of combustion (continuous burning pilot flame or automatic igniter). As such, the Part 71 permit only contained monitoring requirements to calculate HAP emissions from the TEG dehydration systems using GRI GlyCalc, the most recent inlet gas analyses, and assumed control specifications, but contained no requirements to monitor operation of the control systems. Thus to ensure compliance with the requested emission limits in the MNSR permit, we are proposing additional control, operational, and monitoring requirements for the closed vent systems and enclosed combustion devices.

C. Facility-Wide Emission Restrictions

We are also proposing facility-wide total HAP and CH_2O emission limits of 23.0 tpy and 9.5 tpy, respectively, at Samson's request, to maintain the facility's status as an area source of HAP emissions for the purposes of applicability to MACT requirements. The total HAP and CH_2O facility-wide limits are based on limits previously established in the Part 71 operating permit for the facility at Samson's request.

IV. Air Quality Review

The MNSR Regulations at 40 CFR 49.154(d) require that an Air Quality Impact Assessment (AQIA) modeling analysis be performed if there is reason to be concerned that new construction would cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD increment violation. If an AQIA reveals that the proposed construction could cause or contribute to a NAAQS or PSD increment violation, such impacts must be addressed before a pre-construction permit can be issued.

The emissions at this existing facility will not be increasing due to issuance of this MNSR permit and the emissions will continue to be well controlled at all times. This MNSR permit does not authorize the construction of any new emission sources, or emission increases from existing units, nor does it otherwise authorize any other physical modifications to the facility or its operations and the substantive requirements of the Part 71 permit (emission controls and reductions) have already been fulfilled at this facility. In short, issuance of this MNSR permit will have no adverse air quality impacts; therefore, we have determined that an AQIA modeling analysis is not required for the proposed MNSR permit.

V. Tribal Consultations and Communications

We offer Tribal Government Leaders an opportunity to consult on each proposed MNSR permit action. The Tribal Government Leaders are asked to respond to the EPA's offer to consult within 30 days. The Chairman of the Southern Ute Indian Tribe was offered an opportunity to consult on this MNSR permit action via letter dated September 25, 2012. To date, we have not received a response to our offer to consult on this MNSR permit action.

All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the EPA and the Tribe per the application instructions (see http://www2.epa.gov/region8/tribal-minor-new-source-review-permitting). The Tribe has 10 business days from the receipt of the application to respond to us with questions and comments on the application. In the event an AQIA is triggered, a copy of that document is emailed to the Tribe within 5 business days from the date we receive it.

Additionally, the Tribe is notified of the public comment period for the proposed MNSR permit and provided copies of the notice of public comment opportunity to post in various locations of their choosing on the Reservation. The Tribe is also notified of the issuance of the final MNSR permit.

VI. Environmental Justice

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order calls on each federal agency to make environmental justice a part of its mission by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

The EPA defines "Environmental Justice" to include meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. The EPA's goal is to address the needs of overburdened populations or communities to participate in the permitting process. *Overburdened* is used to describe the minority, low-income, tribal and indigenous populations or communities in the United States that potentially experience disproportionate environmental harms and risks due to exposures or cumulative impacts or greater vulnerability to environmental hazards.

This discussion describes the EPA's efforts to identify environmental justice communities and assess potential effects in connection with issuing the proposed CAA synthetic minor MNSR permit in La Plata County within the exterior boundaries of the Southern Ute Indian Reservation.

A. Environmental Impacts to Potentially Overburdened Communities

This MNSR permit action does not authorize the construction of any new air emission sources, or air emission increases from existing units, nor does it otherwise authorize any other physical modifications to the associated facility or its operations. The air emissions at the existing facility will not increase due to the permit action and the emissions will continue to be well controlled at all times. This permit action will have no adverse air quality impacts.

Furthermore, the permit contains a provision stating, "*The permitted source shall not cause or contribute to a National Ambient Air Quality Standard violation or a PSD increment violation.*" Noncompliance with this permit provision is a violation of the permit and is grounds for enforcement action and for permit termination or revocation. As a result, the EPA concludes that issuance of the permit will not have disproportionately high or adverse human health effects on communities in the vicinity of the Southern Ute Indian Reservation.

B. Enhanced Public Participation

Given the presence of potentially overburdened communities in the vicinity of the facility, we are providing an enhanced public participation process for this permit.

1. Interested parties can subscribe to an EPA listserve that notifies them of public comment opportunities on the Southern Ute Indian Reservation for proposed air pollution control permits via email at http://www2.epa.gov/region8/air-permit-public-comment-opportunities.

2. All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the Southern Ute Tribe and the EPA per the application instructions (see http://www2.epa.gov/region8/tribal-minor-new-source-review-permitting).

3. The Tribe has 10 business days to respond to the EPA with questions and comments on the application.

4. In the event an AQIA is triggered, we email a copy of that document to the Tribe within 5 business days from the date we receive it.

5. We notify the Tribe of the public comment period for the proposed permit and provide copies of the notice of public comment opportunity to post in various locations of their choosing on the Reservation. We also notify the Tribe of the issuance of the final permit.

6. We offer the Tribal Government Leaders an opportunity to consult on each proposed permit action. We ask the Tribal Government Leaders to respond to us within 30 days. We offered an opportunity to consult on this permit action to the Chairman of the Southern Ute Indian Tribe via letter dated September 25, 2012.

VII. Authority

Requirements under 40 CFR 49.151 to obtain a MNSR permit apply to new and modified minor stationary sources, and minor modifications at existing major stationary sources ("major" as defined in 40 CFR 52.21). In addition, the MNSR program provides a mechanism for an otherwise major stationary source to voluntarily accept restrictions on its potential to emit to become a synthetic minor source. The EPA is charged with direct implementation of these provisions where there is no approved Tribal implementation plan for implementation of the MNSR regulations. Pursuant to Section 301(d)(4) of the CAA (42 U.S.C. §7601(d)), the EPA is authorized to implement the MNSR regulations at 40 CFR 49.151 in Indian country. The Samson South Ignacio CDP is located within the exterior boundaries of the Southern Ute Indian Reservation in the southwestern part of the State of Colorado. The exact location is Latitude 37.053917N, Longitude -107.625222W, in La Plata County, Colorado.

VIII. Public Notice and Comment, Hearing, and Appeals

A. Public Comment Period

In accordance with 40 CFR 49.157, the EPA must provide public notice and a 30-day public comment period to ensure that the affected community and the general public have reasonable

access to the application and proposed permit information. The application, the proposed permit, this technical support document, and all supporting materials for the proposed permit are available at:

Southern Ute Indian Tribe
Environmental Programs Office
151 County Road 517
Ignacio, Colorado 81137

And

U.S. EPA
Region 8 Air Program Office
1595 Wynkoop Street (8P-AR)
Denver, Colorado 80202-1129

All documents are available for review at our office Monday through Friday from 8:00 a.m. to 4:00 p.m. (excluding Federal holidays). Additionally, the proposed permit and technical support document can be reviewed on our website at http://www2.epa.gov/region8/air-permit-public-comment-opportunities.

Any person may submit written comments on the proposed permit and may request a public hearing during the public comment period. These comments must raise any reasonably ascertainable issue with supporting arguments by the close of the public comment period (including any public hearing). Comments may be sent to the EPA address above, or sent via an email to r8airpermitting@epa.gov, with the topic "Comments on MNSR Permit for Samson South Ignacio CDP".

B. Public Hearing

A request for a public hearing must be in writing and must state the nature of the issues proposed to be raised at the hearing. The EPA will hold a hearing whenever there is, on the basis of requests, a significant degree of public interest in a draft MNSR permit. The EPA may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the MNSR permit decision.

C. Final MNSR Permit Action

In accordance with 40 CFR 49.159, a final permit becomes effective 30 days after permit issuance, unless: (1) a later effective date is specified in the permit; or (2) appeal of the final permit is made as detailed in the next section; or (3) we may make the permit effective immediately upon issuance if no comments resulted in a change in the proposed permit or a denial of the permit. We will send notice of the final permit action to any individual who commented on the proposed permit during the public comment period. In addition, we will add the source to a list of final NSR permit actions, which is posted on our website at http://www2.epa.gov/region8/nsr-and-psd-permits-issued-region-8. Anyone may request a copy of the final MNSR permit at any time by contacting the Region 8 Tribal Air Permit Program at (800) 227-8917 or sending an email to r8airpermitting@epa.gov.

D. Appeals to the Environmental Appeals Board (EAB)

In accordance with 40 CFR 49.159, within 30 days after a final permit decision has been issued, any person who filed comments on the proposed permit or participated in the public hearing may petition the EAB to review any condition of the permit decision. The 30-day period within which a person may request review under this section begins when the Region has fulfilled the notice requirements for the final permit decision. Motions to reconsider a final order by the EAB must be filed within 10 days after service of the final order. A petition to the EAB is, under Section 307(b) of the Act, a prerequisite to seeking judicial review of the final agency action. For purposes of judicial review, final agency action occurs when we deny or issue a final permit and agency review procedures are exhausted.

United States Environmental Protection Agency
Region 8, Air Program
1595 Wynkoop Street
Denver, CO 80202

Air Pollution Control
Synthetic Minor Source Permit to Construct

40 CFR 49.151

 # SMNSR-SU-000031-2011.001

Permit to Construct to establish legally and practically enforceable limitations and requirements on sources at an existing facility

Permittee:

Samson Resources Company

Permitted Facility:

South Ignacio Central Delivery Point (CDP)
Southern Ute Indian Reservation
La Plata County, Colorado

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I. Conditional Permit to Construct

A. General Information

Facility:	Samson Resources Company, South Ignacio CDP
Permit Number:	SMNSR-SU-000031-2011.001
SIC Code and SIC Description:	1311- Crude Petroleum and Natural Gas

Site Location:	Corporate Office Location
South Ignacio CDP	Samson Resources Company
SE ¼, Sec 32 T33N R7W	Samson Plaza
Southern Ute Indian Reservation	Two West Second Street
La Plata County, CO	Tulsa, Oklahoma 74103-3103

The equipment listed in this permit may only be operated by the Samson Resources Company (Samson) at the following location:

Latitude 37.053917N, Longitude -107.625222W

B. Background

On July 1, 2011, the EPA promulgated the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR Part 49. The rule became effective on August 30, 2011. The purpose of the rule is to establish a preconstruction permitting program for new and modified minor sources and minor modifications at existing major sources. In addition, the rule provides a mechanism to create legally and practically enforceable restrictions upon request to recognize emission controls, limits in hours of operation, limits on throughputs, etc. creating synthetic minor sources. In other words, an otherwise major stationary source may receive restrictions on its total potential to emit to become a synthetic minor source for purposes of the Prevention of Significant Deterioration permit Program at 40 CFR Part 52 (PSD) and/or the Title V Operating Permit Program at 40 CFR Part 71 (Part 71). This mechanism is voluntary and may also be used to establish an otherwise major source of hazardous air pollutants (HAP) as a synthetically minor source of HAP.

Section 49.153(a)(3)(iv) of the MNSR rule provides the EPA with the authority to require at its discretion existing sources whose limits were established through mechanisms such as a consent decree to apply for a permit under the MNSR Permit Program to transfer the limits to a MNSR permit.

C. Proposal

Through this permit action, the EPA is incorporating legally and practically enforceable emission limits that were originally established in a July 1, 2002 Consent Agreement (#CAA-08-2002-09), and incorporated into the initial Part 71 operating permit the EPA issued to the facility on April 2, 2004. The Part 71 operating permit was significantly modified on November 30, 2005, approving construction of the 6^{th}, 7^{th}, and 8^{th} compressor engines and the 2^{nd} tri-ethylene glycol (TEG) dehydration system, and containing enforceable restrictions on emissions from the 6^{th}, 7^{th}, and 8^{th} engines. The Part 71 permit was significantly modified again on July 14, 2008, establishing enforceable restrictions on the two (2) dehydrators and an enforceable facility-wide restriction. The Part 71 operating permit was renewed on August 10, 2009. Specifically, through these Part 71 operating permit actions, the EPA had established legally and practically enforceable requirements to control carbon monoxide (CO), nitrogen oxides (NO_X), benzene, formaldehyde (CH_2O), and total HAP emissions from existing emission units at the

facility. The EPA also established facility-wide CH_2O and total HAP emission limits, as well as emission unit-specific benzene emission limits, to create a synthetic minor source of HAP emissions. Two (2) TEG dehydration units at the facility are equipped with enclosed combustion devices that combust HAP emissions from the TEG dehydration process to meet the emission unit-specific benzene emission limits and contribute to meeting the facility-wide total HAP emission limits. In addition to the controls on the TEG dehydration units, seven (7) natural gas-fired 4-stroke lean-burn (4SLB) reciprocating internal combustion engines used for natural gas compression, ranging from 1,267 horsepower (hp) to 1,400 hp, and one (1) natural gas-fired 1,680 hp 4-stroke rich-burn (4SRB) reciprocating internal combustion engine used for electric power generation, are equipped with catalytic emission control systems that contribute to meeting the facility-wide CH_2O and total HAP emission limits, as well as engine-specific CO, NO_X, and CH_2O emission limits.

D. Applicability

1. This permit is being issued under authority of the MNSR permit program.

2. The requirements in this permit have been created, at the Permittee's request, to establish legally and practically enforceable restrictions for limiting benzene TEG dehydration unit emissions, CO and NO_X engine emissions, and facility-wide CH_2O and total HAP emissions.

3. Any conditions established for this facility or any specific units at this facility pursuant to any permit issued under the authority of the PSD permit program or the MNSR permit program shall continue to apply.

4. By issuing this permit, the EPA does not assume any risk of loss which may occur as a result of the operation of the permitted facility by the Permittee, Owner, and/or Operator, if the conditions of this permit are not met by the Permittee, Owner, and/or Operator.

E. Facility-Wide Requirements

1. Emission Limits

   (a) Facility-wide emissions of CH_2O shall not exceed 9.5 tons during any consecutive 12 months.

   (b) Facility-wide emissions of total HAPs shall not exceed 23.0 tons during any consecutive 12 months.

   (c) Emission limits shall apply at all times, unless otherwise specified in this permit.

2. CH_2O Monitoring Requirements

   (a) Facility-wide actual CH_2O emissions shall be calculated by the Permittee, in tons, and recorded at the end of each month, beginning with the first calendar month that this permit is effective.

   (b) Prior to 12 full months of facility-wide emissions calculations, the Permittee shall, at the end of each calendar month, add the emissions for that month to the calculated emissions for all previous calendar months and record the total. Thereafter, the Permittee shall, at the end of each calendar month, add the facility-wide emissions for that month to the

calculated facility-wide emissions for the preceding 11 months and record a new 12-month total.

(c) The Permittee shall include emissions from all controlled and uncontrolled emission sources at the facility in the calculations, including but not limited to insignificant emission units, as defined in 40 CFR 71.5(c)(11)(ii).

(d) The facility-wide emissions of CH_2O shall be calculated as follows:

(i) Emission units with control devices:

(A) For engines equipped with catalytic control systems, CH_2O emissions for the month shall be calculated by multiplying the most recent performance test results for CH_2O for each engine in pounds per hour (lb/hr), by the number of operating hours for the engine for that month. If data on operating hours are not available for that unit for that month, full-time operation of the unit for that month (24 hours per day, 7 days per week) shall be assumed.

(B) Monthly emissions for any engine break-in period, as specified in this permit, where the engine was operated without the catalytic control system installed, shall be calculated by multiplying the manufacturer-specified CH_2O emission factors for an uncontrolled engine by the hours the engine operated without the emission control system installed for that month.

(C) The calculated CH_2O emissions for each engine with catalytic control systems shall be added together to calculate the total CH_2O emissions for controlled engines for that month.

(ii) Emission units without control devices. For remaining emission units at the facility, emissions for the month for each unit shall be calculated by multiplying the CH_2O emission factor for that unit, in lb/hr, by the number of operating hours for that unit for that month. If data on operating hours are not available for a unit for that month, full-time operation of the unit for that month (24 hours per day, 7 days per week) shall be assumed.

3. Total HAP Monitoring Requirements

(a) Facility-wide actual HAP emissions shall be calculated by the Permittee, in tons, and recorded at the end of each month, beginning with the first calendar month that this permit is effective.

(b) Prior to 12 full months of facility-wide emissions calculations, the Permittee shall, at the end of each calendar month, add the emissions for that month to the calculated emissions for all previous calendar months and record the total. Thereafter, the Permittee shall, at the end of each calendar month, add the facility-wide emissions for that month to the calculated facility-wide emissions for the preceding 11 months and record a new 12-month total.

(c) The Permittee shall include emissions from all controlled and uncontrolled emission sources at the facility in the calculations, including but not limited to insignificant emission units, as defined in 40 CFR 71.5(c)(11)(ii).

(d) The facility-wide emissions of total HAPs shall be calculated as follows:

(i) TEG Dehydration systems. Total HAP emissions from each TEG dehydration system shall be obtained from the requirements for determining total HAPs from each dehydration system still vent in this permit;
(ii) CH_2O Emissions. CH_2O emissions shall be obtained from the requirements for determining facility-wide CH_2O emissions in this permit;
(iii) All other HAP emissions. For remaining emission units at the facility, emissions for the month for each unit shall be calculated by multiplying the HAP emission factors for that unit, in lb/hr, by the number of operating hours for that unit for that month. If data on operating hours are not available for a unit for that month, full-time operation of that unit for that month (24 hours per day, 7 days per week) shall be assumed. The Permittee shall provide the basis for the HAP emission calculations with the next annual emissions report required by this permit.

4. Recordkeeping Requirements

The Permittee shall maintain the following records:

(a) The actual monthly and rolling 12-month facility-wide CH_2O and HAP emissions, in tons per year (tpy);

(b) All input parameters and calculations used to determine the monthly emissions from all controlled and uncontrolled emission sources at the facility; and

(c) All deviations from the requirements of this permit.

F. Requirements for Engines

1. Construction and Operational Limits:

(a) The Permittee shall install and operate emission controls as specified in this permit on one (1) 4SRB reciprocating internal combustion engine for electric power generation meeting the following specifications:

(i) Operated as a 4SRB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,680 hp.

(b) The Permittee shall install and operate emission controls as specified in this permit on two (2) 4SLB reciprocating internal combustion engines for natural gas compression, each meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,267 hp.

(c) The Permittee shall install and operate emission controls as specified in this permit on one (1) 4SLB reciprocating internal combustion engine for natural gas compression, meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,336 hp.

(d) The Permittee shall install and operate emission controls as specified in this permit on four (4) 4SLB reciprocating internal combustion engines for natural gas compression, each meeting the following specifications:

(i) Operated as a 4SLB engine;
(ii) Fired with natural gas; and
(iii) Limited to a maximum site rating of 1,400 hp.

(e) Only the engines that are operated and controlled as specified in this permit are approved for installation under this permit.

2. Emission Limits

(a) Emissions from the one (1) 4SRB 1,680 hp engine shall not exceed the following:

(i) CO: 12.9 lb/hr;
(ii) NO_X: 9.2 lb/hr; and
(iii) CH_2O: 0.07 lb/hr.

(b) Emissions from each of the two (2) 4SLB 1,267 hp engines shall not exceed the following:

(i) CO: 2.79 lb/hr; and
(ii) CH_2O: 0.29 lb/hr.

(c) Emissions from the one (1) 4SLB 1,336 hp engine shall not exceed the following:

(i) CO: 2.94 lb/hr; and
(ii) CH_2O: 0.25 lb/hr.

(d) Emissions from each of the four (4) 4SLB 1,400 hp engines shall not exceed the following:

(iii) CO: 3.08 lb/hr; and
(iv) CH_2O: 0.31 lb/hr.

(e) Emission limits shall apply at all times, unless otherwise specified in this permit.

3. Control and Operational Requirements

(a) The Permittee shall ensure that the one (1) 4SRB engine is equipped with a non-selective catalytic reduction (NSCR) control system and air-to-fuel ratio (AFR) control system capable of reducing uncontrolled NO_X, CO and CH_2O emissions to meet the engine specific emission limits in this permit.

(b) The Permittee shall replace the oxygen (O_2) sensor on the AFR controller on the one (1) 4SRB engine within every 2,190 hours of engine run time.

(c) The Permittee shall ensure that the seven (7) 4SLB engines are all equipped with oxidation catalytic control systems capable of reducing uncontrolled CO and CH_2O emissions to meet the engine specific emission limits in this permit.

(d) The Permittee shall install, operate, and maintain temperature sensing devices (e.g., thermocouple or resistance temperature detectors) before the inlet to the catalyst bed on each engine in order to continuously monitor the engine exhaust temperature at the inlet to the catalyst bed. Each temperature sensing device shall be calibrated and operated according to manufacturer specifications or equivalent specifications developed by the Permittee or vendor.

(e) Except during startups, which shall not exceed 30 minutes, the engine exhaust temperature of each engine at the inlet to the catalyst bed shall be maintained at all times the engines operate within the following limits:

(i) For the one (1) 4SRB engine, an inlet temperature of at least 750 °F and no more than 1,250 °F.
(ii) For the seven (7) 4SLB engines, an inlet temperature of at least 500 ºF and no more than 1,250 ºF.

(f) During operation, the pressure drop across the catalyst bed on each engine shall be maintained to within ±2 inches of water from the baseline pressure drop measured during the most recent performance test. The baseline pressure drop for the catalyst bed shall be determined at 100% ± 10% of the engine load measured during the most recent performance test.

(g) The Permittee shall only fire the engines with natural gas. The natural gas shall be pipeline-quality in all respects except that the carbon dioxide (CO_2) concentration in the gas shall not be required to be within pipeline-quality.

(h) The Permittee shall follow, for each engine and any respective catalytic control system, the manufacturer recommended maintenance schedule and procedures, or equivalent maintenance schedule and procedures developed by the Permittee or vendor, to ensure optimum performance of each engine and its respective catalytic control system.

(i) The Permittee may rebuild or replace an existing permitted engine with an engine of the same hp rating, and configured to operate in the same manner as the engine being rebuilt or replaced. Any emission limits, requirements, control technologies, testing or other provisions that apply to the permitted engines that are replaced shall also apply to the rebuilt or replaced engines.

(j) The Permittee may resume operation without the catalytic control system during an engine break-in period, not to exceed 200 operating hours, for rebuilt and replaced engines.

4. <u>Performance Testing Requirements</u>

(a) Performance tests shall be conducted on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller for measuring NO_X, CO, and CH_2O emissions and on each of the seven (7) 4SLB engines equipped with catalytic control systems for measuring CO and CH_2O emissions, to demonstrate compliance with each respective emission

limitation in this permit. The performance tests shall be conducted in accordance with appropriate reference methods specified in 40 CFR Part 60, Appendix A, 40 CFR Part 63, Appendix A, or an appropriate EPA-approved American Society for Testing and Materials (ASTM) method. The Permittee may submit to the EPA a written request for approval of an alternate test method, but shall only use that alternate test method after obtaining written approval from the EPA.

(i) The initial performance test shall be conducted within 90 calendar days of startup of a new engine.
(ii) Performance tests shall be conducted within 90 calendar days of startup of all rebuilt and replaced engines.
(iii) Performance tests shall be conducted within 90 calendar days of each catalyst replacement.
(iv) Subsequent performance tests for CH_2O emissions shall be performed once every calendar quarter.

(A) The first subsequent performance test shall be conducted within 90 days of the initial performance test for each engine.
(B) For any one (1) engine, if the results of two (2) consecutive subsequent quarterly performance tests demonstrate compliance with CH_2O emission limits, required testing frequency for CH_2O may change from quarterly to semi-annually.
(C) For any one (1) engine, if the results of any subsequent semi-annual performance test demonstrates non-compliance with the CH_2O emission limits, required monitoring frequency for CH_2O shall change back to quarterly.

(b) The Permittee shall not perform engine tuning or make any adjustments to engine settings, catalytic control system settings, processes or operational parameters immediately prior to the engine testing or during the engine testing. Any such tuning or adjustments may result in a determination by the EPA that the test is invalid. Artificially increasing an engine load to meet test requirements is not considered engine tuning or adjustments.

(c) The Permittee shall not abort any engine tests that demonstrate non-compliance with any NO_X, CO, or CH_2O emission limits in this permit.

(d) Performance tests conducted on the one (1) 4SRB engine for measuring NO_X, CO, and CH_2O emissions and on each of the seven (7) 4SLB engines for measuring CO and CH_2O emissions shall meet the following requirements:

(i) The pressure drop across each catalyst bed and the inlet temperature to each catalyst bed shall be measured and recorded during all performance tests.

(ii) All performance tests for NO_X and CO emissions on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller shall be performed simultaneously.

(iii) The Permittee shall measure NO_X emissions from each of the seven (7) 4SLB engines simultaneously with all performance tests for CO emissions. NO_X emissions shall be measured using a portable analyzer and protocol approved in

writing by the EPA. *[Note to Permittee: Although the permit does not contain NO_X emission limits for these engines, NO_X measurement requirements have been included as an indicator to ensure compliance with Condition C.4(b) above.]*

(iv) All performance tests shall be conducted at a maximum operating rate (90% to 110% of the maximum achievable load available at the time of the test). The Permittee may submit to the EPA a written request for approval of an alternate load level for testing, but shall only test at that alternate load level after obtaining written approval from the EPA.

(v) During each test run, data shall be collected on all parameters necessary to document how emissions were measured and calculated (such as test run length, minimum sample volume, volumetric flow rate, moisture and oxygen corrections, etc.).

(vi) Each test shall consist of at least three 1-hour or longer valid test runs. Emission results shall be reported as the arithmetic average of all valid test runs and shall be in terms of the emission limits in this permit.

(vii) Performance test plans shall be submitted to the EPA for approval 60 calendar days prior to the date the test is planned.

(viii) Performance test plans that have already been approved by the EPA for the emission units approved in this permit may be used in lieu of new test plans unless the EPA requires the submittal and approval of new test plans. The Permittee may submit new plans for EPA approval at any time.

(ix) The test plans shall include and address the following elements:

(A) Purpose of the test;
(B) Engines and catalytic control systems to be tested;
(C) Expected engine operating rate(s) during the test;
(D) Sampling and analysis procedures (sampling locations, test methods, laboratory identification);
(E) Quality assurance plan (calibration procedures and frequency, sample recovery and field documentation, chain of custody procedures); and
(F) Data processing and reporting (description of data handling and quality control procedures, report content).

(e) The Permittee shall notify the EPA at least 30 calendar days prior to scheduled performance testing. The Permittee shall notify the EPA at least 1 week prior to scheduled performance testing if the testing cannot be performed.

(f) If the results of a complete and valid performance test of the emissions from any permitted engine demonstrate noncompliance with the emission limits in this permit, the engine shall be shut down as soon as safely possible, and appropriate corrective action shall be taken (e.g., repairs, catalyst cleaning, catalyst replacement). The Permittee shall notify the EPA in writing within 24 hours of each such shut down. The engine must be retested within 7 days of being restarted and the emissions must meet the applicable limits in this permit. If the retest shows that the emissions continue to exceed the limits in this permit, the engine

shall again be shut down as soon as safely possible, and the engine may not operate, except for purposes of startup and testing, until the Permittee demonstrates through testing that the emissions do not exceed the emission limits in this permit.

(g) If a permitted engine is not operating, the Permittee does not need to start up the engine solely to conduct a performance test. The Permittee may conduct the performance test when the engine is started up again.

5. Monitoring Requirements

(a) The Permittee shall continuously measure the engine exhaust temperature at the inlet to the catalyst bed on the one (1) 4SRB engine equipped with a NSCR control system and AFR controller and each of the seven (7) 4SLB engines.

(b) Except during startups not to exceed 30 minutes, if the engine exhaust temperature at the inlet to the catalyst bed deviates from the acceptable ranges specified in this permit then the following actions shall be taken. The Permittee's completion of any or all of these actions shall not constitute, nor qualify as, an exemption from any other emission limits in this permit.

(i) Within 24 hours upon determining a deviation of the engine exhaust temperature at the inlet to the catalyst bed, the Permittee shall investigate. The investigation shall include testing the temperature sensing device, inspecting the engine for performance problems and assessing the catalytic control system for possible damage that could affect catalytic system effectiveness (including, but not limited to, catalyst housing damage, and fouled, destroyed or poisoned catalyst).

(ii) If the engine exhaust temperature at the inlet to the catalyst bed can be corrected by following the engine manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor and the catalytic control system has not been damaged, then the Permittee shall correct the engine exhaust temperature at the inlet to the catalyst bed within 24 hours of inspecting the engine and catalytic control system.

(iii) If the engine exhaust temperature at the inlet to the catalyst bed cannot be corrected using the engine manufacturer recommended procedures or equivalent procedures developed by the Permittee or vendor, or the catalytic control system has been damaged, then the affected engine shall cease operating immediately and shall not be returned to routine service until the following has been met:

(A) The engine exhaust temperature at the inlet to the catalyst bed is measured and found to be within the acceptable temperature range for that engine; and
(B) The catalytic control system has been repaired or replaced, if necessary.

(c) The Permittee shall monitor the pressure drop across the catalyst bed of the one (1) 4SRB engine equipped with a NSCR control system and AFR controller and each of the seven (7) 4SLB engines once every calendar week using pressure sensing devices before and after the catalyst bed to obtain a direct reading of the pressure drop (also referred to as the differential pressure). *[Note to Permittee: Differential pressure measurements, in general, are used to show the pressure across the filter elements. This information will determine*

when the elements in the catalyst bed are fouling, blocked or blown out and thus require cleaning or replacement.]

(d) The Permittee shall perform the first measurement of the pressure drop across each catalyst bed no more than 7 days from the date of the initial performance test. Thereafter, the Permittee shall measure the pressure drop across the catalyst bed, at a minimum every 7 days. Subsequent performance tests, as required in this permit, can be used to meet the periodic pressure drop monitoring requirement provided it occurs within the 7-day window. The pressure drop reading can be a one-time measurement on that day, the average of performance test runs, or a 12-hour average of all the measurements on that day if continuous readings are taken.

(e) If the pressure drop reading exceeds ± 2 inches of water from the baseline pressure drop reading taken during the most recent performance test, then the following actions shall be taken. The Permittee's completion of any or all of these actions shall not constitute, nor qualify as, an exemption from any other emission limits in this permit:

(i) Within 24 hours of determining a deviation of the pressure drop across the catalyst bed, the Permittee shall investigate. The investigation shall include testing the pressure transducers and assessing the catalytic control system for possible damage that could affect catalytic system effectiveness (including, but not limited to, catalyst housing damage, and plugged, fouled, destroyed or poisoned catalyst).

(ii) If the pressure drop across the catalyst bed can be corrected by following the catalytic control system manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor, and the catalytic control system has not been damaged, then the Permittee shall correct the problem within 24 hours of inspecting the catalytic control system.

(iii) If the pressure drop across the catalyst bed cannot be corrected using the catalytic control system manufacturer's recommended procedures or equivalent procedures developed by the Permittee or vendor, or the catalytic control system is damaged, then the Permittee shall do one of the following:

(A) Conduct a performance test as specified in this permit to ensure that the CH_2O emission limits are being met and to re-establish the pressure drop across the catalyst bed; or

(B) Cease operating the affected engine immediately. The engine shall not be returned to routine service until the pressure drop is measured and found to be within the acceptable pressure range for that engine as determined from the most recent performance test. Corrective action may include removal and cleaning of the catalyst or replacement of the catalyst.

(f) The Permittee shall monitor CO and NO_X emissions from the exhaust of the catalytic control system on each engine at least quarterly, to demonstrate compliance with the engine emission limits in this permit. To meet this requirement, the Permittee shall:

(i) Measure CO and NO_X emissions at the normal operating load using a portable analyzer and a monitoring protocol approved by the EPA or conduct a performance test as specified in this permit;

(ii) Measure the CO and NO_X emissions simultaneously; and
(iii) Commence monitoring for CO and NO_X emissions within 90 calendar days of the Permittee's submittal of the initial performance test results for NO_X and/or CO emissions, as appropriate, to the EPA.

(g) The Permittee shall not perform engine tuning or make any adjustments to engine settings, catalytic control system settings, processes or operational parameters the day of or during measurements. Any such tuning or adjustments may result in a determination by the EPA that the result is invalid. Artificially increasing an engine load to meet testing requirements is not considered engine tuning or adjustments.

(h) For each of the seven (7) 4SLB engines, if the results of consecutive quarterly portable analyzer measurements demonstrate compliance with the CO emission limits, the required monitoring frequency may change from quarterly to semi-annually.

(i) For the one (1) 4SRB engine, if the results of consecutive quarterly portable analyzer measurements demonstrate compliance with the NO_X and CO emission limits, the required monitoring frequency may change from quarterly to semi-annually.

(j) For any one (1) engine, if the results of consecutive semi-annual portable analyzer measurements demonstrate non-compliance with the NO_X and/or CO emission limits, the required test frequency shall revert back to quarterly.

(k) The Permittee shall submit portable analyzer specifications and monitoring protocols to the EPA at the following address for approval at least 45 calendar days prior to the date of initial portable analyzer monitoring:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

(l) Portable analyzer specifications and monitoring protocols that have already been approved by the EPA for the emission units approved in this permit may be used in lieu of new protocols unless the EPA determines it is necessary to require the submittal and approval of a new protocol. The Permittee may submit a new protocol for EPA approval at any time.

(m) The Permittee is not required to conduct parametric monitoring of exhaust temperature and catalyst differential pressure on engines that have not operated during the monitoring period. The Permittee shall certify that the engine(s) did not operate during the monitoring period in the annual report specified in this permit.

6. Recordkeeping Requirements

(a) Records shall be kept of manufacturer and/or vendor specifications and maintenance requirements developed by the manufacturer, vendor, or Permittee for each engine, and each catalytic control system, temperature-sensing device, and pressure-measuring device required in this permit.

(b) Records shall be kept of all calibration and maintenance conducted for each engine, and each catalytic control system, temperature-sensing device, and pressure-measuring device required in this permit.

(c) Records shall be kept that are sufficient to demonstrate that the fuel for the engines is pipeline quality natural gas in all respects, with the exception of CO_2 concentrations.

(d) Records shall be kept of all temperature measurements required in this permit, as well as a description of any corrective actions taken pursuant to this permit.

(e) Records shall be kept of all pressure drop measurements required in this permit, as well as a description of any corrective actions taken pursuant to this permit.

(f) Records shall be kept of all required testing and monitoring in this permit. The records shall include the following:

(i) The date, place, and time of sampling or measurements;
(ii) The date(s) analyses were performed;
(iii) The company or entity that performed the analyses;
(iv) The analytical techniques or methods used;
(v) The results of such analyses or measurements; and
(vi) The operating conditions as existing at the time of sampling or measurement.

(g) Records shall be kept of all catalyst replacements or repairs, AFR controller replacements, engine rebuilds and replacements.

(h) Records shall be kept of each rebuilt or replaced engine break-in period, pursuant to the requirements of this permit, where an existing engine that has been rebuilt or replaced resumes operation without the catalyst control system, for a period not to exceed 200 hours.

(i) Records shall be kept of each time any of the eight (8) engines are shut-down due to a deviation in the inlet temperature to the catalyst bed or pressure drop across a catalyst bed. The Permittee shall include in the record the cause of the problem, the corrective action taken, and the timeframe for bringing the pressure drop and inlet temperature range into compliance.

G. Requirements for TEG Dehydration Systems

1. Construction and Operational Limits

(a) The Permittee may install and operate no more than one (1) TEG dehydration unit meeting the following specifications:

(i) Limited to a maximum natural gas processing capacity of 30 million standard cubic feet per day (MMscfd);
(ii) Equipped with a natural gas-fired TEG reboiler limited to a maximum heat input capacity of 0.6 million British thermal units per hour (MMBtu/hr).

(b) The Permittee may install and operate no more than one (1) TEG dehydration unit meeting the following specifications:

(i) Limited to a maximum natural gas processing capacity of 40 MMscfd;
(ii) Equipped with a natural gas-fired TEG reboiler limited to a maximum heat input capacity of 0.6 MMBtu/hr.

(c) Only the TEG dehydration units that are operated and controlled as specified in this permit may be installed and operated.

2. Emission Limits: Emissions of benzene from each of the TEG dehydration systems approved in this permit for installation and operation at the facility shall not exceed 0.9 tons in any consecutive 12 months. The emission limits shall apply at all times.

3. Control and Operational Requirements

(a) *TEG Dehydration Units.* The Permittee shall meet the following requirements for the TEG dehydration unit:

(i) Each TEG dehydration unit must be equipped with flash gas separators that route the flash gas back into the sales line, condensers, or an enclosed combustor capable of 98.0% benzene emission destruction efficiency.
(ii) All emissions from each TEG dehydration unit shall be routed through a closed-vent system to an emissions control system as specified in this permit.
(iii) The Permittee shall follow, for each TEG dehydration unit and respective emission control system, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance.

(b) *Closed-Vent Systems.* The Permittee shall meet the following requirements for the closed-vent systems:

(i) Each closed-vent system shall route all hydrocarbon emissions from the dehydration units to the control system required by this permit.

(ii) All vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain and collect gases, vapors, and fumes and transport them to control equipment shall be maintained and operated during any time the control equipment is operating.

(iii) Each closed-vent system shall be designed to operate with no detectable emissions.

(iv) If any closed-vent system contains one or more bypass devices that could be used to divert all or a portion of the gases, vapors, or fumes from entering the control devices, the Permittee shall meet the one of following requirements for each bypass device:

(A) At the inlet to the bypass device that could divert the stream away from the control device and into the atmosphere, properly install, calibrate, maintain, and operate a flow indicator that is capable of taking periodic readings and sounding an alarm when the bypass device is open such that the stream is

being, or could be, diverted away from the control device and into the atmosphere;

(B) Secure the bypass device valve installed at the inlet to the bypass device in the non-diverting position using a car-seal or a lock-and-key type configuration;

(C) Low leg drains, high point bleeds, analyzer vents, open-ended valves or lines, and safety devices are not subject to the requirements applicable to bypass devices.

(v) The Permittee shall minimize leaks of hydrocarbon emissions from all vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain, collect, and transport gases, vapors, and fumes to the control device.

(c) *Enclosed Combustion Devices.* The Permittee shall meet the following requirements for each enclosed combustion device:

(i) For each enclosed combustion device, the Permittee shall follow the manufacturer's written operating instructions, procedures and maintenance schedule to ensure good air pollution control practices for minimizing emissions.

(ii) The Permittee shall ensure that each enclosed combustion device has sufficient capacity to achieve at least a 98.0% benzene emission destruction efficiency for the minimum and maximum hydrocarbon volumetric flow rate and BTU content routed to the device.

(iii) The Permittee must ensure that each enclosed combustion device is:

(A) A model demonstrated by a manufacturer to the meet the benzene destruction efficiency requirements of this permit using the procedures specified in 40 CFR 60.5413(d) for VOC emissions by the due date of the first annual report as specified in 40 CFR 49.147(b); or

(B) Demonstrated by the Permittee to meet the benzene destruction efficiency requirements of this permit by using the EPA approved performance test methods specified in 40 CFR 63.772 (e)(i) – (iii) for hazardous air pollutants, by the due date of the first annual report.

(iv) The Permittee must ensure that each enclosed combustion device is:

(A) Operated properly at all times that natural gas is routed to it;

(B) Operated with a liquid knock-out system to collect any condensable vapors (to prevent liquids from going through the control device);

(C) Equipped with a flash-back flame arrestor;

(D) Equipped with one of the following:

I. A continuous burning pilot flame, a thermocouple, and a malfunction alarm and notification system if the pilot flame fails; or

II. An electronically controlled auto-ignition system with a malfunction alarm and notification system if the pilot flame fails while produced natural gas or natural gas emissions are flowing to the enclosed combustor;

(E) Maintained in a leak-free condition; and

(F) Operated with no visible smoke emissions.

(d) The Permittee shall follow, for each TEG dehydration unit and respective emission control system, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance.

4. Testing Requirements

The Permittee shall obtain extended wet gas analyses of the inlet wet gas stream to each TEG dehydration system at least once per calendar month. The analysis shall include the inlet gas temperature and pressure at which the sample was taken.

5. Monitoring Requirements

(a) The Permittee shall monitor each closed vent system for leaks of hydrocarbon emissions from all vent lines, connections, fittings, valves, relief valves, or any other appurtenance employed to contain, collect, and transport gases, vapors, and fumes to the enclosed combustion devices as follows:

(i) Visit the facility on a quarterly basis to inspect all closed vent systems for defects that could result in air emissions and document each inspection. Defects include, but are not limited to, visible cracks, holes, or gaps in piping; loose connections; or broken or missing caps or other closure devices. If a quarterly visit is not feasible due to sudden, infrequent, and unavoidable events (i.e., weather, road conditions), every effort shall be made to visit the facility as close to quarterly as possible;
(ii) The inspections shall be based on audio, visual, and olfactory procedures; and
(iii) Any leaks detected in any closed vent system shall be addressed immediately unless the repair requires resources not currently available. If the resources are not available, the leak shall be repaired no later than 15 days after initial detection of the leak.

(b) The Permittee shall monitor each enclosed combustion device to confirm proper operation as follows:

(i) Continuously monitor the proper functioning of each enclosed combustion device's combustion source using a thermocouple or other or other heat sensing monitoring device and a recording device that indicates the continuous ignition of the flame while gas is flowing to it;
(ii) Visually inspect the combustion source (continuous burning pilot flame or automatic igniter) to ensure proper operation whenever an operator is on site, at a minimum, quarterly; and

(iii) Visually confirm that no smoke is present during operation of each smokeless enclosed combustion device whenever an operator is on site; at a minimum, quarterly.

(c) Benzene and total HAP emissions from each of the TEG dehydration systems shall be determined monthly using the most recent version of the GRI GlyCalc model and the following input parameters:

(i) Current month's inlet wet gas stream properties;
(ii) Temperature and pressure of the gas provided in the inlet wet gas analysis;
(iii) The emission control device efficiency, unless the closed-vent system or control device was bypassed or down or a malfunction alarm was triggered. In such cases, the emission control device efficiency used in the calculation shall be 0.0%; and
(iv) The maximum gas throughput and glycol pump recirculation rate for each TEG dehydration system as follows:

TEG Dehydration Unit Description	**Maximum Glycol Pump Recirculation Rate**
30 MMscfd maximum gas throughput	15 gallons per minute
40 MMscfd maximum gas throughput	17 gallons per minute

(d) Benzene and total HAP emissions from each TEG dehydration system shall be calculated and recorded at the end of each month, beginning with the first full calendar month after operations commenced. Prior to 12 full months of operation, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for all previous months since operations commenced, where applicable, and record the total. Thereafter, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for the preceding 11 months and record a new 12 month total.

6. Recordkeeping Requirements

The Permittee shall keep records of the following:

(a) The monthly benzene, total HAP emissions, GRI GlyCalc model input parameters and GRI GlyCalc model reports for each TEG dehydration system.

(b) Written, site-specific designs, operating instructions, operating procedures, and maintenance schedules.

(c) All required monitoring of the control device operations;

(d) The exceedances of the operating parameters specified in manufacturers' or vendors' guarantees or engineering specifications with regard to the TEG dehydration units, closed vent systems and control devices. The records shall include each TEG dehydration unit, closed-vent system, enclosed combustion device total operating times during the calendar

month in which the exceedance occurred, the date, time and length of time that the parameters were exceeded, and the corrective actions taken and any preventative measures adopted to operate the facility within that operating parameter;

(e) Any instances in which any closed-vent system or control device was bypassed or down in each calendar month, the reason for each incident, its duration, and the corrective actions taken and any preventative measures adopted to avoid such bypasses or downtimes;

(f) Any instances in which the pilot flame is not present in the combustor or the auto ignition system was not operating, the date and times of the observation and the corrective actions taken and any preventative measures adopted to limit the malfunctions;

(g) Any instances in which the thermocouple (or other heat sensing monitoring device) installed to detect the presence of a flame in the combustor is not operational, the time period during which it was not operational, and the corrective measures taken;

(h) Any instances in which the recording device installed to record data from the thermocouple is not operational;

(i) Any time periods in which visible emissions are observed emanating from a control system; and

(j) The emissions calculations included in the consecutive 12-month facility-wide total.

(k) Each leak detection inspection. All leak detection inspection records must include, at a minimum, the following information:

(i) A description of the methods used for the inspection;
(ii) The date of the inspection;
(iii) The findings of the inspection;
(iv) Any corrective action taken and the date of the corrective action;
(v) Reason for any delays to corrective actions; and
(vi) The inspector's name and signature.
(vii) All input parameters and calculations used to determine the monthly emissions.

H. Requirements for Records Retention

1. The Permittee shall retain all records required by this permit for a period of at least 5 years from the date the record was created.

2. Records shall be kept in the vicinity of the facility, such as at the facility, the location that has day-to-day operational control over the facility, or the location that has day-to-day responsibility for compliance of the facility.

I. Requirements for Reporting

1. Annual Emission Reports

(a) The Permittee shall submit a written annual report of the actual annual emissions from all emission units at the facility each year no later than April 1st. The annual report shall cover

the period for the previous calendar year. All reports must be certified to truth and accuracy by the by the person primarily responsible for Clean Air Act compliance of the Permittee.

(b) The report shall include NO_X, CO, total HAP, CH_2O, and benzene emissions.

(c) The report shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

The report may be submitted via electronic mail to r8AirPermitting@epa.gov.

2. All other documents required to be submitted under this permit, with the exception of the **Annual Emission Reports**, shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

Documents may be submitted electronically to r8airreportenforcement@epa.gov.

3. The Permittee shall promptly submit to the EPA a written report of any deviations of permit requirements, a description of the probable cause of such deviations, and any corrective actions or preventative measures taken. A "prompt" deviation report is one that is post marked or submitted via electronic mail to r8airreportenforcement@epa.gov as follows:

(a) Within 30 days from the discovery of any deviation of permit requirements that is left un-corrected for more than 5 days after discovering the deviation; and

(b) By April 1st for the discovery of a deviation of recordkeeping or other permit conditions during the preceding calendar year that do not affect the Permittee's ability to meet the emission limits.

4. The Permittee shall submit a written report for any required performance tests to the EPA within 60 days after completing the tests.

5. The Permittee shall submit any record or report required by this permit upon EPA request.

II. General Provisions

A. Conditional Approval:

Pursuant to the authority of 40 CFR 49.151, the EPA hereby conditionally grants this permit. This authorization is expressly conditioned as follows:

1. *Document Retention and Availability:* This permit and any required attachments shall be retained and made available for inspection upon request at the location set forth herein.

2. *Permit Application:* The Permittee shall abide by all representations, statements of intent and agreements contained in the application submitted by the Permittee. The EPA shall be notified 10 days in advance of any significant deviation from this permit application as well as any plans, specifications or supporting data furnished.

3. *Permit Deviations:* The issuance of this permit may be suspended or revoked if the EPA determines that a significant deviation from the permit application, specifications, and supporting data furnished has been or is to be made. If the proposed source is constructed, operated, or modified not in accordance with the terms of this permit, the Permittee will be subject to appropriate enforcement action.

4. *Compliance with Permit:* The Permittee shall comply with all conditions of this permit, including emission limitations that apply to the affected emissions units at the permitted facility/source. Noncompliance with any permit term or condition is a violation of this permit and may constitute a violation of the Clean Air Act and is grounds for enforcement action and for a permit termination or revocation.

5. *Fugitive Emissions:* The Permittee shall take all reasonable precautions to prevent and/or minimize fugitive emissions during the construction period.

6. *National Ambient Air Quality Standard and PSD Increment:* The permitted source shall not cause or contribute to a National Ambient Air Quality Standard violation or a PSD increment violation.

7. *Compliance with Federal and Tribal Rules, Regulations, and Orders:* Issuance of this permit does not relieve the Permittee of the responsibility to comply fully with all other applicable federal and tribal rules, regulations, and orders now or hereafter in effect.

8. *Enforcement:* It is not a defense, for the Permittee, in an enforcement action, to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

9. *Facility/Source Modifications:* For proposed modifications, as defined at 40 CFR 49.152(d), that would increase an emissions unit allowable emissions of a pollutant above its existing permitted annual allowable emissions limit, the Permittee shall first obtain a permit modification pursuant to the MNSR regulations approving the increase. For a proposed modification that is not otherwise subject to review under the PSD or MNSR regulations, such proposed increase in the annual allowable emissions limit shall be approved through an administrative permit revision as provided at 40 CFR 49.159(f).

10. *Relaxation of Legally and Practically Enforceable Limits:* At such time that a new or modified source within this permitted facility/source or modification of this permitted facility/source becomes a major stationary source or major modification solely by virtue of a relaxation in any legally and practically enforceable limitation which was established after August 7, 1980, on the capacity of this permitted facility/source to otherwise emit a pollutant, such as a restriction on hours of operation, then the requirements of the PSD regulations shall apply to the source or modification as though construction had not yet commenced on the source or modification.

11. *Revise, Reopen, Revoke and Reissue, or Terminate for Cause:* This permit may be revised, reopened, revoked and reissued, or terminated for cause. The filing of a request by the Permittee, for a permit revision, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. The EPA may reopen this permit for a cause on its own initiative, e.g., if this permit contains a material mistake or the Permittee fails to assure compliance with the applicable requirements.

12. *Severability Clause:* The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.

13. *Property Rights:* This permit does not convey any property rights of any sort or any exclusive privilege.

14. *Information Requests:* The Permittee shall furnish to the EPA, within a reasonable time, any information that the EPA may request in writing to determine whether cause exists for revising, revoking and reissuing, or terminating this permit or to determine compliance with this permit. For any such information claimed to be confidential, you shall also submit a claim of confidentiality in accordance with 40 CFR Part 2, Subpart B.

15. *Inspection and Entry:* The EPA or its authorized representatives may inspect this permitted facility/source during normal business hours for the purpose of ascertaining compliance with all conditions of this permit. Upon presentation of proper credentials, the Permittee shall allow the EPA or its authorized representative to:

    (a) Enter upon the premises where this permitted facility/source is located or emissions-related activity is conducted, or where records are required to be kept under the conditions of this permit;

    (b) Have access to and copy, at reasonable times, any records that are required to be kept under the conditions of this permit;

    (c) Inspect, during normal business hours or while this permitted facility/source is in operation, any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit;

    (d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this permit or other applicable requirements; and

    (e) Record any inspection by use of written, electronic, magnetic and photographic media.

16. *Permit Effective Date:* This permit is effective immediately upon issuance unless comments resulted in a change in the proposed permit, in which case this permit is effective 30 days after issuance. The Permittee may notify the EPA, in writing, that this permit or a term or condition of it is rejected. Such notice should be made within 30 days of receipt of this permit and should include the reason or reasons for rejection.

17. *Permit Transfers:* Permit transfers shall be made in accordance with 40 CFR 49.159(f). The Air Program Director shall be notified in writing at the address shown below if the company is sold or changes its name.

    U.S. Environmental Protection Agency, Region 8
    Office of Partnerships and Regulatory Assistance
    Tribal Air Permitting Program, 8P-AR
    1595 Wynkoop Street
    Denver, Colorado 80202

18. *Invalidation of Permit:* This permit becomes invalid if construction is not commenced within 18 months after the effective date of this permit, construction is discontinued for 18 months or more, or construction is not completed within a reasonable time. The EPA may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between the construction of the approved phases of a phased construction project. The Permittee shall commence construction of each such phase within 18 months of the projected and approved commencement date.

19. *Notification of Start-Up:* The Permittee shall submit a notification of the anticipated date of initial start-up of this permitted source to the EPA within 60 days of such date, unless this permitted source is an existing source.

B. Authorization:

Authorized by the United States Environmental Protection Agency, Region 8

_____

Callie A. Videtich Date
Acting Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

Samson Resources

PO Box 9
Bayfield, CO 81122
USA
970/884-5085
Fax 970/563-4296

February 19, 2014

Ms. Claudia Smith
US EPA Region 8 Air Program
1595 Wynkoop Street
Mail Code 8P-AR
Denver, CO 80202

Re: Additional Information Request
Jaques Compressor Station (V-SU-0043-06.02)
South Ignacio Central Delivery Point (V-SU-0031-08.00)
Samson Resources Company

Dear Ms Smith:

The Samson Resources Company (Samson) is herein submitting the additional information requested for the synthetic minor permit applications for the Jaques Compressor Station and South Ignacio Central Delivery Point. The facilities are located in Section 26, Township 33 North, Range 8 West, and Section 32, Township 33 North, Range 7 West in La Plata County, Colorado.

Greenhouse Gas (GHG) Emissions
Greenhouse gas emission estimates and sample calculations were included as the final section of the application for both the Jaques Compressor Station and South Ignacio Central Delivery Point. These sections are attached to this letter.

South Ignacio Emission Limits
Samson would like to maintain the same emission limits for the engines as those in the Part 71 Operating Permit. Samson would like to keep the existing CO emission limits for all of the engines and the NO_X emission limit for E1. The engine emissions presented in the application for the South Ignacio Central Delivery Point matched the permitted values and the potential to emit of each engine was calculated based on the controlled values. The original application contains these calculations and emission limits.

Jaques Dehydration Units
The backup TEG dehydration unit, D3, was not included in the application for the Jaques Compressor Station because this unit is no longer needed or operational. This unit has not

operated at the facility since July of 2009. The unit was disconnected from service in early of 2009. The unit was removed from the facility September 2009.

If you require any additional information please feel free to contact me at (720) 239-4406 or via email at bradr@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Brad M. Rogers
Senior Environmental Specialist

Cc: CPI

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
Jaques Compressor Station

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L5794LT	5137.13	112.45	0.01
E2	Waukesha L5794LT	5137.13	112.45	0.01
E3	Waukesha L5794LT	5137.13	112.45	0.01
E4	Waukesha L5794LT	5137.13	112.45	0.01
E5	Waukesha L5794LT	5137.13	112.45	0.01
E6	Waukesha L5794LT	5137.13	112.45	0.01
D1	0.375 MMBtu/hr Reboiler	191.59	0.00	0.00
	Glycol Process Vents	16.78	2.83	0.00
D2	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	27.20	4.60	0.00
FUG	Fugitive Leaks	2.75	18.24	0.00
IEUs	Insignificant Units	1982.04	0.03	0.00
Total		33681.77	700.40	0.06
CO_2e		33681.77	14708.32	19.62

Total GHG PTE **34,382 tpy**
Total CO_2e **48,410 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.41	6.19	241.14	2.41	3.24	0.08	5,137.13	40 CFR Part 98, Subpart C, Table C-1
Methane	1.250	12.521	54.843	9.37	41.06	1598.55	15.99	21.48	0.56	112.45	AP-42 Table 3.2-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	18	MMscfd
D2 Annual Throughput	30	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	3.83	16.78	3.83	16.78
Methane	0.647	2.83	0.647	2.83
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	6.21	27.20	6.21	27.20
Methane	1.05	4.60	1.05	4.60
N_2O	0.0	0	0.0	0.0

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Dehydration Unit Reboilers
Hours of Operation	8760 hrs
D1 Rating	0.375 MMBtu/hr
D2 Rating	1.25 MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	43.74	191.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.003	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Fugitive GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Fugitive Emissions
CO_2	12.881 wt%
CH_4	85.392 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.33	1.44	2.18	9.56
Connectors	86	2.00E-04	0.00	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.29	1.27	1.92	8.41
Total			**0.63**	**2.75**	**4.17**	**18.24**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size	CO_2		Methane		N_2O	
		(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
IEU8	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
IEU13	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
IEU15	Production Unit Burner	0.50	58.32	255.45	0.00	0.00	0.000	0.00
Heater/Burner Total				**1731.95**		**0.03**		**0.00**

Pump Engines

Unit ID	Description	Rating	CO_2		Methane		N_2O	
		(hp)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU9	Ford 460 Pump Engine	34	35.30	154.60	0.00	0.00	0.00	0.00
IEU12	Ford Pump Engine	21	21.80	95.49	0.00	0.00	0.00	0.00
Pump Engine Total				**250.09**		**0.00**		**0.00**
IEU Total				**1982.04**		**0.03**		**0.00**

Example GHG Emission Calculations
Jaques Compressor Station

Cylinder Rod Packing Vents

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 1.41\ \frac{lb\ CO_2}{hr}$$

$$1.41\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 2.41\ tpy\ CO_2$$

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 9.37\ \frac{lb\ CH_4}{hr}$$

$$9.37\ \frac{lb\ CH_4}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 41.06\ tpy\ CH_4$$

Blowdown Emissions

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 241.14\ \frac{lb\ CO_2}{event}$$

$$241.14\ \frac{lb\ CO_2}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 2.41\ tpy\ CO_2$$

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 1598.55\ \frac{lb\ CH_4}{event}$$

$$1598.55\ \frac{lb\ CH_4}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 15.99\ tpy\ CH_4$$

Starter Emissions

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} * \frac{0.5\ min}{event} = 3.24\ \frac{lb\ CO_2}{event}$$

$$3.24\ \frac{lb\ CO_2}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.08\ tpy\ CO_2$$

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} * \frac{0.5\ min}{event} = 21.48\ \frac{lb\ CH_4}{event}$$

$$21.48\ \frac{lb\ CH_4}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.56\ tpy\ CH_4$$

Reboilers/Heaters/Burners

$$\frac{1.25\ MMBtu}{hr} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 145.81\ \frac{lb\ CO_2}{hr}$$

$$145.81\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 638.63\ tpy\ CO_2$$

Pump Engines

$$21\ hp * \frac{8900\ Btu}{hp - hr} * \frac{MMBtu}{1{,}000{,}000\ Btu} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 21.80\ \frac{lb\ CO_2}{hr}$$

$$21.80\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 95.49\ tpy\ CO_2$$

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
South Ignacio Central Delivery Point

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L7044GSI	6700.59	57.93	0.01
E2	Waukesha L7042GL	4491.21	57.90	0.01
E3	Waukesha L7042GL	4491.21	57.90	0.01
E4	Waukesha L7042GL	4735.31	57.90	0.01
E5	Waukesha L5794LT	5137.33	57.91	0.01
E6	Waukesha L5794LT	5137.33	57.91	0.01
E7	Waukesha L5794LT	5137.33	57.91	0.01
E8	Waukesha L5794LT	5137.33	57.91	0.01
D1	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	85.41	3.99	0.00
D2	0.75 MMBtu/hr Reboiler	383.18	0.01	0.00
	Glycol Process Vents	96.80	4.51	0.00
FUG	Fugitive Leaks	2.83	18.38	0.00
IEUs	Insignificant Units	306.54	0.01	0.00
Total		42481.04	490.17	0.08
CO_2e		42481.04	10293.49	24.67

Total GHG PTE **42,971 tpy**
Total CO_2e **52,799 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E1	
	Waukesha L7044GSI Compressor Engine	
Combustion	4 Stroke Rich Burn	
Rating	1680	hp
Operating Hours	8760	hours/year
Fuel Consuption	7780	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,528	6,692	1.45	6.34	246.77	2.47	3.32	0.09	6,700.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.026	0.114	9.41	41.21	1604.59	16.05	21.56	0.56	57.93	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.003	0.013	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E2, E3	
	Waukesha L7042GL Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1267	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,023	4,482	1.45	6.34	246.77	2.47	3.32	0.09	4,491.21	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.077	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.008	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E4	
	Waukesha L7042GL Compressor Engine	
Combustion	4 Stroke Lean Burn	
Rating	1336	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,079	4,726	1.45	6.34	246.77	2.47	3.32	0.09	4,735.31	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.081	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.009	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E5, E6, E7, E8	
	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.45	6.34	246.77	2.47	3.32	0.09	5,137.33	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.020	0.088	9.41	41.21	1604.59	16.05	21.56	0.56	57.91	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Dehydration Unit Reboilers
Hours of Operation	8760 hrs
D1 Rating	1.25 MMBtu/hr
D2 Rating	0.75 MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	87.48	383.18	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.002	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	30	MMscfd
D2 Annual Throughput	40	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	19.5	85.41	19.5	85.41
Methane	0.911	3.99	0.911	3.99
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	22.1	96.80	22.1	96.80
Methane	1.03	4.51	1.03	4.51
N_2O	0.0	0	0.0	0.0

Fugitive GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Fugitive Emissions
CO_2	13.232 wt%
CH_4	86.038 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.34	1.48	2.20	9.64
Connectors	86	2.00E-04	0.01	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.30	1.30	1.93	8.47
Total			**0.65**	**2.83**	**4.20**	**18.38**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size (MMBtu/hr)	CO_2		Methane		N_2O	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
Heater/Burner Total				**306.54**		**0.01**		**0.00**

Smith, Claudia

From: Brad Rogers <bradr@samson.com>
Sent: Thursday, February 20, 2014 9:31 AM
To: Smith, Claudia
Cc: Paser, Kathleen; Wortman, Eric; Jarrell, Brenda
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications
Attachments: Response to EPA info Request - Samson Resources Jaques and South Ignacio - Feb 2014.pdf

Hi Claudia,

Please find attached the additional information that your department has requested for Samson's Jaques and S. Ignacio faciliites. IF you need additional information, please do not hesitate to contact me. You should receive the original hardcopy by FEDEX tomorrow. Thank you.

Regards,

Brad M. Rogers
Sr. Environmental Specialist
Samson Resources
370 17th Street, Suite 3000
Denver, CO 80202
(o) 720.239.4406
(c) 303.229.1228
bradr@samson.com

Samson Resources

From: Smith, Claudia [mailto:Smith.Claudia@epa.gov]
Sent: Tuesday, February 04, 2014 2:42 PM
To: Brad Rogers
Cc: Paser, Kathleen; Wortman, Eric; Jarrell, Brenda
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

Smith, Claudia

From: Smith, Claudia
Sent: Tuesday, February 04, 2014 2:42 PM
To: 'Brad Rogers'
Cc: Paser, Kathleen; Wortman, Eric; 'Jarrell, Brenda'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

We have still not received a response from you or anyone else at Samson regarding the questions we had on the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. If we do not hear from you by **Friday, February 21, 2014**, we are going to assume that you are no longer requesting these permits and will close out the files for these permit actions.

Please note that once the Southern Ute Air Quality Program issues the Part 70 permit, the Part 71 permit automatically expires and you will lose any federal, legal, and practical enforceability for the limits in the current Part 71 permits.

If you have any questions, please contact me.

Thank you,

Claudia

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

****
US EPA Region 8
1595 Wynkoop Street
Mail Code 8P-AR
Denver, Colorado 80202
****

From: Smith, Claudia
Sent: Friday, September 27, 2013 10:57 AM
To: Brad Rogers
Cc: Paser, Kathleen; Wortman, Eric
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

Just another friendly follow-up on the status of the requested additional information for both the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. The Southern Ute Air Quality Program has been asking us about the status of the Part 71 transfer permits. As a reminder, once the AQP issues the P70 permit the P71 permit automatically expires and you will lose enforceability on the synthetic limits established in those permits, unless we issue a synthetic minor NSR permit containing all of the enforceable limits you wish to maintain from the Part 71 permit before that time.

I will be going on maternity leave starting on October 7th, potentially sooner, so I am copying Kathleen Paser, who will be covering these permit actions while I am out.

Thanks,

Claudia

From: Smith, Claudia
Sent: Thursday, August 08, 2013 4:24 PM
To: 'Brad Rogers'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

I am just following up on the status of the requested information for both the Jaques and S. Ignacio SMNSR permit applications.

Thanks,

Clauida

From: Brad Rogers [mailto:bradr@samson.com]
Sent: Tuesday, July 02, 2013 2:13 PM
To: Smith, Claudia
Cc: Wortman, Eric; Paser, Kathleen
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Thanks for the update Claudia. We are currently working on the information you have requested for the Jaques and will do the same for South Ignacio. I'll definitely let you know if we have any questions regarding the applications.

Thanks,

Brad M. Rogers
Sr. Environmental Specialist
Samson Resources
370 17th Street, Suite 3000
Denver, CO 80202
(o) 720.239.4406
(c) 303.229.1228
bradr@samson.com

From: Smith, Claudia [mailto:Smith.Claudia@epa.gov]
Sent: Tuesday, July 02, 2013 1:25 PM
To: Brad Rogers
Cc: Wortman, Eric; Paser, Kathleen
Subject: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

Based on my review of the South Ignacio CDP application, some of the information I previously (recently) asked for regarding the Jaques application also apply to the South Ignacio CDP application, particularly, the need for GHG calculations. I also had some additional questions on the applications

Eric Wortman originally corresponded with Scott Rose in an email dated September 13, 2011, determining the South Ignacio CDP application incomplete, asking several questions, and requesting additional information. Samson submitted a revised application in January 2012, but that application did not address all of Eric's questions/needs. At the time Katie Romero was the permit engineer assigned to the permit action. Katie is no longer employed at EPA, so if any further correspondence was made just with her, I apologize, but we have no accessible record of that and I am not sure that we could get access to her old email account very easily, if at all. I am currently the permit engineer assigned to both permits, but for safe measure in case anything happens to me, Eric Wortman and/or Kathleen Paser (both copied on this email) should be copied on all correspondence.

On to the questions/additional information needed – I am including the questions I already asked in previous correspondence, so that they are conveniently all in one place:

- **Both** the applications for Jaques Compressor Station and South Ignacio CDP will need an addendum that includes GHG calculations. Although the Tribal Minor NSR Rule does not require regulation of GHGs, when issuing synthetic minor NSR permits, we need to verify that we are not issuing a permit to a major source of GHGs.

- **South Ignacio CDP:** The engines at South Ignacio CDP currently have part 71 emission limits for CO (engine E1 also has a limit for NOx) and Samson's original and revised applications did not include requests for synthetic minor limits for those pollutants from the engines, only for total HAP and formaldehyde. I suspect you still want the enforceable CO and NO_X emission limits. If so, I will need an addendum to the application with the emission limits requested and all of the necessary supporting information for the additional limits.
- **Jaques Compressor Station:** Application has no mention of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit? If that dehy is still at the facility and connected and you still need limits for it, I will need an addendum to the application including the requested limits and an updated equipment list, emissions calculations, and any necessary supporting documentation.

Thanks, and if you have any questions, call me at (303) 312-6520, or email me.

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

****
US EPA Region 8
1595 Wynkoop Street
Mail Code 8P-AR
Denver, Colorado 80202
****

From: Smith, Claudia
Sent: Wednesday, June 19, 2013 3:16 PM
To: 'bradr@samson.com'
Cc: Wortman, Eric
Subject: Question on Jaques Compressor Station SMNSR Permit Application

Brad,

I am working on drafting the proposed synthetic minor NSR permit for the Jaques Compressor Station and notice there is no mention in the November 2011 application of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from

the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit?

Thank you,

Claudia Young Smith

Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

****
US EPA Region 8
1595 Wynkoop Street
Mail Code 8P-AR
Denver, Colorado 80202
****

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

MEMO TO FILE

DATE: November 2, 2012

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
National Historic Preservation Act

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
FRED # 99978

205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
FRED # 97581

205c AirTribal SU Red Cedar Sambrito Compressor Station
SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001

FRED #84627
205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment with regard to such undertakings. Under the ACHP's implementing regulations at 36 C.F.R. Part 800, Section 106 consultation is generally with state and tribal historic preservation officials in the first instance, with opportunities for the ACHP to become directly involved in certain cases. An "undertaking" is "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval." 36 C.F.R. § 800.16(y).

If an undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the federal agency has no further obligations under 36 C.F.R. § 800.3(a)(1). Because this permit will authorize new construction and related activities at an existing site, this undertaking does have the potential to cause effects on historic properties.

Under the NHPA Section 106 implementing regulations, federal agencies consult with relevant historic preservation partners to determine the area of potential effect (APE) of the undertaking, to identify historic properties that may exist in that area, and to assess and address any adverse effects that may be caused on such properties by the undertaking. Specifically, 36 C.F.R. § 800.4(b)(1) of the regulations states that federal agency officials shall make a "reasonable and good faith effort" to identify historic properties.

This memorandum describes EPA's efforts to identify historic properties and assess potential effects in connection with issuing draft synthetic minor New Source Review (NSR) permits for existing oil and gas production facilities located within the exterior boundaries of the Southern Ute Indian Reservation in La Plata County, Colorado.

Region 8, Air Program Determination

The EPA has reviewed the proposed action for potential impacts on historic properties in the APE. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. Because the EPA has determined that the federal action will have no effect, the agency is making the finding of "*No historic properties affected*" for the APE.

Area of Potential Effects (APE)

The APE for the existing facilities are the locations within the areas currently occupied by each facility.

Regulation 36 C.F.R. 800.16(d) defines "area of potential effects" - as:

> "… the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR §49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	Location
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Process and Construction Information

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area.

Registered Historic Places

The National Park Service maintains an internet resource that can be used to determine whether any registered historic places are within the area of potential effect. The resource is:

1. National Register of Historic Places database, http://www.nps.gov/history/nr/research/index.htm

An additional site is available to provide additional information on these historic places. The resource is:

2. National Register of Historic Places, http://www.nationalregisterofhistoricplaces.com/
    a. County information, http://www.nationalregisterofhistoricplaces.com/ut/Uintah/state.html
    b. Historic Districts within a county, http://www.nationalregisterofhistoricplaces.com/ut/Uintah/districts.html

A search of registered historic places or districts was not undertaken because this is an administrative action with no physical changes to the existing facilities or surrounding area.

State and Tribal Consultation

To comply with our obligations under Section 106 of the NHPS, we consulted with the Colorado State Historic Preservation Officer (SHPO) and requested any information the SHPO had regarding any historic properties within the APE. The EPA sent a letter to the Colorado SHPO on November 2, 2012 requesting concurrence with our determination of "*No historic properties affected*". The Colorado SHPO concurred in writing with our determination in a letter dated November 9, 2012 and received on November 14, 2012.

We also consulted with the tribal government by sending a letter to the Tribal Chairman with cc: to the Environmental Programs Division Head and Air Quality Program Manager inviting them to consult with us and provide information concerning historic properties relating to these proposed permits and our determination of "*No historic properties affected*" for the APE. The EPA sent the letter on November 9, 2012 and is waiting for the Tribe's response.

Attachment:

Map of Facilities Located on the Southern Ute Indian Reservation
Letter to Colorado State Historic Preservation Officer dated November 2, 2012
Letter from Colorado State Historic Preservation Officer dated November 9, 2012
Letter to Chairman Newton Southern Ute Indian Tribe dated November 9, 2012

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
Treating Site #6B
Treating Site #7B
Ute Compressor Station
Jaques Compressor Station
South Ignacio Central Delivery
Sambrito Compressor Station

Durango
Bayfield
Ignacio

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
City Boundary - NAVTEQ (2011);
County Boundary - U.S. Census Bureau (2010);
State Boundary - U.S. Census Bureau (2010);
Base - Microsoft Bing web service (2012).

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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

N

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EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

NOV 02 2012

Ref: P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Edward Nichols, President and CEO
History Colorado
1200 Broadway
Denver, CO 80203

RE: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Mr. Nichols:

The Environmental Protection Agency Region 8 (EPA) has received federal Clean Air Act (CAA) permit applications and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for several existing oil production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. To comply with our obligations under Section 106 of the National Historic Preservation Act and its implementing regulations at 36 C.F.R. Part 800, we are consulting with you concerning our finding as to the potential effects and we are seeking any information you may have as to whether there are any historic properties within the area of potential effects for these facilities.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

The following table lists the companies, facilities and locations affected by the proposed permit actions.

Company and Facility	Section, Township, Range	Latitude / Longitude
BP America Production Company		
Treating Site 6B	S5, T32N, R9W	37.0571028 / -107.8457361
Treating Site 7	S3, T32N, R10W	37.0388778 / -107.9223722
Treating Site 8	S28, T33N, R10W	37.076025 / -107.9342472
Miera Compressor Facility	SE S8, T34N, R8W	37.1988 / -107.739683
Salvador I/II Compressor Station	S28, T33N, R7W	37.07905247 / -107.6182899
Wolf Point Compressor Facility	NW S16, T33N, R9W	37.10743378 / -107.8353513
ConocoPhillips Company		
Sunnyside Compressor Station,	S9, T33N, R9W	37.1194 / -107.8372
Argenta CDP Compressor Facility,	SW, SE S4, T33N, R10W	37.1294 / -107.9372
Ute Compressor Station,	S14-15,T32N, R11W	37.0173 / -108.0201
Red Cedar Gathering Company		
Arkansas Loop & Simpson Treating Plants	S1, T32N, R9W	37.052783 / -107.784875
Sambrito Compressor Station	SW S3, T32N, R6W	37.043769 / -107.493169
Samson Resources Company		
Jacques Compressor Station	NWS26, T33N, R8W	37.077944 / -107.691
South Ignacio Central Delivery	SE S32, T33N, R7W	37.0539167 / -107.6252222

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. If you have any concerns regarding our determination, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding. In addition, please send any comments or information concerning historic properties within the project areas to me within 30 days, so as to ensure that we will have ample time to review them. You can reach me by phone at (303) 312-6441 or email at parker-christensen.victoria@epa.gov. Thank you for your assistance.

Sincerely,

Victoria Parker-Christensen
Environmental Engineer
Air Program

Enclosure

cc: Mark Tobias, Section 106 Compliance Manager

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
Treating Site #6B
Treating Site #7B
Ute Compressor Station
Jaques Compressor Station
South Ignacio Central Delivery
Sambrito Compressor Station

Durango
Bayfield
Ignacio

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
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Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Ignacio
Treating Site #8
Jaques Compressor Station
Treating Site #6B
South Ignacio Central Delivery
Treating Site #7B
Sambrito Compressor Station
Ute Compressor Station
Archuleta
San Juan

N

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EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Date: November 2, 2012

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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

HISTORY Colorado

November 9, 2012

Victoria Parker-Christensen
Environmental Engineer
Air Program
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, Colorado 80202-1129

Re: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation, La Plata County, Colorado (CHS #62996)

Dear Ms. Parker-Christensen:

Thank you for your correspondence dated November 2, 2012 (received by our office on November 6, 2012) regarding the subject project.

Following our review of the documentation provided, we concur that a finding of no historic properties affected is appropriate for the proposed undertaking pursuant to 36 CFR 800.4(d)(1). This finding assumes that "no physical changes to the existing [thirteen] facilities or surrounding areas" will result from the implementation of this program.

Please remember that the consultation process does involve other consulting parties such as local governments and Tribes, which as stipulated in 36 CFR 800.3 are required to be notified of the undertaking. Additional information provided by the local government, Tribes or other consulting parties may cause our office to re-evaluate our comments and recommendations.

Should unidentified archaeological resources be discovered in the course of the projects, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) in consultation with our office.

Thank you for the opportunity to comment. If we may be of further assistance please contact Mark Tobias, Section 106 Compliance Manager, at (303) 866-4674 or mark.tobias@state.co.us.

Sincerely,

for Edward C. Nichols
State Historic Preservation Officer
ECN/MAT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

NOV 0 9 2012

Ref: 8P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Honorable Jimmy Newton Jr., Chairman
Southern Ute Indian Tribe
P.O. Box 737
Ignacio, Colorado 84026

RE: Notice to Consult – Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Chairman Newton:

The U.S. Environmental Protection Agency Region 8 (EPA) is initiating consultation and coordination with the Southern Ute Indian Tribe regarding potential impacts to historic, religious or cultural properties covered by section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 C.F.R. Part 800.

The EPA has received federal Clean Air Act (CAA) permit applications, as detailed in the enclosure, and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for 13 existing natural gas production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. As required by the NHPA, we are assessing whether approving the permits would cause any impacts on these properties. The EPA permit issuance process includes public notice of a draft permit, opportunity for public comment, as well as administrative and judicial review provisions. A copy of the draft permit document and technical support document will be available on the internet during the public comment period at www.epa.gov/region8/air/permitting/pubcomment.html.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA is proposing a finding of "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each

existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

We seek consultation with you concerning 1) how the Southern Ute Indian Tribe wishes us to address the NHPA consultation process, 2) the presence of historic properties within the areas of potential effects (APE) and 3) our proposed determination as to the potential effects of these proposed permit actions.

We want to ensure that we fulfill our obligations under the NHPA and that we are working with the appropriate representatives of the Tribe on air permitting matters. If a tribe does not have a federally designated Tribal Historic Preservation Officer (THPO), which is the case for the Southern Ute Indian Tribe, then federal agencies consult directly with the State Historic Preservation Officer (SHPO) concerning undertakings that may affect historic properties on tribal lands. The EPA initiated consultation with the Colorado SHPO on November 2, 2012. The enclosed letter to the Colorado SHPO describes the specific information for the facilities and seeks their concurrence with our proposed determination.

In addition, the NHPA and its implementing regulations require that the agencies consult with federally recognized tribes to ensure that tribes attaching religious or cultural significance to historic properties that may be affected by an undertaking have a reasonable opportunity to participate in the process. Therefore, please advise us as to the Tribe's preference for the process we should follow for the NHPA. Would you prefer that we communicate only with the SHPO, do you have a NHPA designated representative for the Tribe, or would you prefer that we communicate with the Tribal government as well as the SHPO and/or NHPA designated representative concerning any NHPA matters on the Reservation?

Also, to ensure that we are considering all relevant information, we would appreciate your assistance in identifying any historic properties of traditional religious or cultural importance to the Southern Ute Indian Tribe that may be located within the APE that may be directly or indirectly affected by these proposed permit actions. If the Tribe has any information concerning such properties, please contact us.

We understand that the Southern Ute Indian Tribe may not wish to divulge information about historic properties that have religious or cultural significance. The NHPA and its regulations provide a means to consider protecting information about a historic property if public disclosure might cause harm to the property, a significant invasion of privacy or impediments to traditional religious practices. We are open to working with the Tribe to seek to address any concerns that you may have regarding the sensitivity of information. If any properties are determined to be historic properties under the NHPA, the EPA would propose to consult with you on possible measures to avoid or minimize potential adverse effects.

As noted above, based on the administrative nature of the permit actions, we are proposing a finding of *"No historic properties affected"* as a result of issuing these permits. If you have any concerns regarding our determination or additional information about historic properties related to this permit, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding.

If you have questions or comments, please contact me directly at (303) 312-6308 or your staff can contact Victoria Parker-Christensen, Air Program, at (303) 312-6441 or parker-christensen.victoria@epa.gov. We are available to meet with you or your representatives to consult further regarding these permit actions.

Sincerely,

Howard M. Cantor, for
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

Enclosures

cc: Thomas Johnson, Southern Ute Indian Tribe, Environmental Programs Division Head
Brenda Jarrell, Southern Ute Indian Tribe, Air Quality Program Manager

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
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Treating Site #8
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Ute Compressor Station
Jaques Compressor Station
South Ignacio Central Delivery
Sambrito Compressor Station

Durango
Bayfield
Ignacio

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Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
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State Boundary - U.S. Census Bureau (2010);
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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
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serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

N

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EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

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Phone 800-227-8917
http://www.epa.gov/region08

NOV 02 2012

Ref: P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Edward Nichols, President and CEO
History Colorado
1200 Broadway
Denver, CO 80203

RE: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Mr. Nichols:

The Environmental Protection Agency Region 8 (EPA) has received federal Clean Air Act (CAA) permit applications and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for several existing oil production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. To comply with our obligations under Section 106 of the National Historic Preservation Act and its implementing regulations at 36 C.F.R. Part 800, we are consulting with you concerning our finding as to the potential effects and we are seeking any information you may have as to whether there are any historic properties within the area of potential effects for these facilities.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

The following table lists the companies, facilities and locations affected by the proposed permit actions.

Company and Facility	Section, Township, Range	Latitude / Longitude
BP America Production Company		
Treating Site 6B	S5, T32N, R9W	37.0571028 / -107.8457361
Treating Site 7	S3, T32N, R10W	37.0388778 / -107.9223722
Treating Site 8	S28, T33N, R10W	37.076025 / -107.9342472
Miera Compressor Facility	SE S8, T34N, R8W	37.1988 / -107.739683
Salvador I/II Compressor Station	S28, T33N, R7W	37.07905247 / -107.6182899
Wolf Point Compressor Facility	NW S16, T33N, R9W	37.10743378 / -107.8353513
ConocoPhillips Company		
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Argenta CDP Compressor Facility,	SW, SE S4, T33N, R10W	37.1294 / -107.9372
Ute Compressor Station,	S14-15,T32N, R11W	37.0173 / -108.0201
Red Cedar Gathering Company		
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Sambrito Compressor Station	SW S3, T32N, R6W	37.043769 / -107.493169
Samson Resources Company		
Jacques Compressor Station	NWS26, T33N, R8W	37.077944 / -107.691
South Ignacio Central Delivery	SE S32, T33N, R7W	37.0539167 / -107.6252222

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. If you have any concerns regarding our determination, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding. In addition, please send any comments or information concerning historic properties within the project areas to me within 30 days, so as to ensure that we will have ample time to review them. You can reach me by phone at (303) 312-6441 or email at parker-christensen.victoria@epa.gov. Thank you for your assistance.

Sincerely,

Victoria Parker-Christensen
Environmental Engineer
Air Program

Enclosure

cc: Mark Tobias, Section 106 Compliance Manager

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
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Synthetic Minor NSR PermitFacility
City Boundary
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Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Ignacio
Treating Site #8
Jaques Compressor Station
Treating Site #6B
South Ignacio Central Delivery
Treating Site #7B
Sambrito Compressor Station
Ute Compressor Station
Archuleta
San Juan

N

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
City Boundary - NAVTEQ (2011);
County Boundary - U.S. Census Bureau (2010);
State Boundary - U.S. Census Bureau (2010);
Base - Microsoft Bing web service (2012).

0 1 2 4 6 Miles
0 2.25 4.5 9 Kilometers

Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

MEMO TO FILE

DATE: November 12, 2013

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
Endangered Species Act

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
FRED # 99978

205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
FRED # 97581

205c AirTribal SU Red Cedar Sambrito Compressor Station
SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001
FRED #84627

205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

Pursuant to Section 7 of the Endangered Species Act (ESA), 16 U.S.C. §1536, and its implementing regulations at 50 CFR, part 402, the EPA is required to ensure that any action authorized, funded, or carried out by the Agency is not likely to jeopardize the continued existence of any Federally-listed endangered or threatened species or result in the destruction or adverse modification of such species' designated critical habitat. Under ESA, those agencies that authorize, fund, or carry out the federal action are commonly known as "action agencies." If an action agency determines that its federal action "may affect" listed species or critical habitat, it must consult with the U.S. Fish and Wildlife Service (FWS). If an action agency determines that the federal action will have no effect on listed species or critical habitat, the agency will make a "no effect" determination. In that case, the action agency does not initiate consultation with the FWS and its obligations under Section 7 are complete.

In complying with its duty under ESA, the EPA, as the action agency, examined the potential effects on listed species and designated critical habitat relating to issuing these Clean Air Act (CAA) synthetic minor New Source Review (NSR) permits.

Region 8 Air Program Determination

The EPA has concluded that the proposed synthetic minor NSR permit actions will have "*No effect"* on listed species or critical habitat. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. Because the EPA has determined that the federal action will have no effect, the agency made a *"No effect"* determination, did not initiate consultation with the FWS and its obligations under Section 7 are complete.

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the emission limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR

§49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	**Location**
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Process and Construction Information

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times.

Threatened and Endangered Species

The EPA accessed U.S. Fish and Wildlife Service (FWS) websites for information on threatened and endangered species and designated critical habitat for those species. FWS maintains a website titled *Environmental Conservation Online System* (ECOS, http://ecos.fws.gov/ecos/indexPublic.do) that provides access to databases for threatened and endangered species that may be present within the proposed project area and designated critical habitat for threatened and endangered species.

The EPA accessed the FWS Information, Planning, and Conservation System (IPaC) database (http://ecos.fws.gov/ipac) to identify species listed as threatened and endangered that have been documented as being present in La Plata County, Colorado, and received an official species list from the FWS Western Colorado Ecological Services Field Office on November 12, 2013. Information on critical habitat is available on-line at http://criticalhabitat.fws.gov/crithab/. The following threatened or endangered species may be found in La Plata County:

Birds

Mexican Spotted owl (*Strix occidentalis lucida*)
Threatened
Final designated critical habitat

Southwestern Willow flycatcher (*Empidonax traillii extimus*)
Endangered

Yellow-Billed Cuckoo (Coccyzus americanus)
Proposed Threatened

Butterfly

Uncompahge Fritillary butterfly (*Boloria acronema*)
Endangered

Fishes

Bonytail chub (*Gila elegans*)
Endangered

Humpback chub (*Gila cypha*)
Endangered
Final designated critical habitat

Colorado pikeminnow (*Ptychocheilus lucius*)
Endangered
Final designated critical habitat

Razorback sucker (*Xyrauchen texanus*)
Endangered
Final designated critical habitat

Mammals

Black-Footed ferret (*Mustela nigripes*)
Experimental Population, Non-Essential

Canada Lynx (*Lynx canadensis*)
Threatened

New Mexican meadow jumping mouse (Zapus hudsonius luteus)
Proposed Endangered

North American Wolverine (Gulo gulo luscus)
Proposed Threatened

Plants

Knowlton's cactus (*Pediocactus knowltonii*)
Endangered

Conclusion

The EPA has concluded that the proposed synthetic minor NSR permit actions will have "*No effect"* on listed species or critical habitat. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. Because the EPA has determined that the federal action will have no effect, the agency will make a *"No effect"* determination. In that case, the EPA does not initiate consultation with the FWS and its obligations under Section 7 are complete.

Attachments:
Map of Facilities Located on the Southern Ute Indian Reservation and FWS Designated Critical Habitat
FWS Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WESTERN COLORADO ECOLOGICAL SERVICES FIELD OFFICE
764 HORIZON DRIVE, BUILDING B
GRAND JUNCTION, CO 81506
PHONE: (970)243-2778 FAX: (970)245-6933
URL: www.fws.gov/mountain-prairie/es/Colorado/;
www.fws.gov/platteriver/

Consultation Tracking Number: 06E24100-2014-SLI-0018 November 12, 2013
Project Name: SUIT Oil and Gas T% to SMNSR Permits

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: SUIT Oil and Gas T% to SMNSR Permits

Official Species List

Provided by:

WESTERN COLORADO ECOLOGICAL SERVICES FIELD OFFICE
764 HORIZON DRIVE, BUILDING B
GRAND JUNCTION, CO 81506
(970) 243-2778
http://www.fws.gov/mountain-prairie/es/Colorado/
http://www.fws.gov/platteriver/

Consultation Tracking Number: 06E24100-2014-SLI-0018
Project Type: Oil Or Gas
Project Description: US EPA syn minor NSR permits for previously T5 permits in La Plata County in the Soutern Ute Indian Reservation

Project Counties: La Plata, CO

Endangered Species Act Species List

Species lists are not entirely based upon the current range of a species but may also take into consideration actions that affect a species that exists in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Please contact the designated FWS office if you have questions.

Black-Footed ferret *(Mustela nigripes)*

Population: entire population, except where EXPN

Listing Status: Endangered

Bonytail chub *(Gila elegans)*

Population: Entire

Listing Status: Endangered

Canada Lynx *(Lynx canadensis)*

Population: (Contiguous U.S. DPS)

Listing Status: Threatened

Colorado pikeminnow *(Ptychocheilus lucius)*

Population: except Salt and Verde R. drainages, AZ

Listing Status: Endangered

Humpback chub *(Gila cypha)*

Population: Entire

Listing Status: Endangered

Knowlton's cactus *(Pediocactus knowltonii)*

Listing Status: Endangered

Mexican Spotted owl *(Strix occidentalis lucida)*

Population: Entire

Listing Status: Threatened

New Mexico meadow jumping mouse *(Zapus hudsonius luteus)*

Listing Status: Proposed Endangered

North American wolverine *(Gulo gulo luscus)*

Listing Status: Proposed Threatened

Razorback sucker *(Xyrauchen texanus)*

Population: Entire

Listing Status: Endangered

Schmoll milk-vetch *(Astragalus schmolliae)*

Listing Status: Candidate

Southwestern Willow flycatcher *(Empidonax traillii extimus)*

Population: Entire

Listing Status: Endangered

Critical Habitat: Final designated

Uncompahgre Fritillary butterfly *(Boloria acrocnema)*

Population: Entire

Listing Status: Endangered

Yellow-Billed Cuckoo *(Coccyzus americanus)*

Population: Western U.S. DPS

Listing Status: Proposed Threatened

Southern Ute Indian Reservation
Clean Air Act, New Source Review Permit Program

N

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: October 22, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
Reservations - U.S. Census Bureau (2009);
Base - Microsoft Bing web service (2012).

EPA United States Environmental Protection Agency
REGION 8
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0 3.5 7 14 21 Miles
0 5 10 20 Kilometers

- Synthetic Minor NSR Permit Applicants
- City Boundary
- Colorado Pikeminnow - FWS Critical Habitat
- Razorback Sucker- FWS Critical Habitat
- State Boundary
- County Boundary

Area Enlarged

MEMO TO FILE

DATE: October 26, 2012

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
Environmental Justice

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
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205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
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SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001
FRED #84627

205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order calls on each federal agency to make environmental justice a part of its mission by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

EPA defines "Environmental Justice" to include meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices.

On June 10, 2011, the EPA promulgated a final Clean Air Act (CAA) Federal Implementation Plan (FIP) that implements New Source Review (NSR) preconstruction air pollution control requirements in Indian country. The FIP includes two NSR rules for the protection of air quality in Indian country. One of those rules, known as the minor NSR Rule, applies to new industrial facilities or modifications at existing industrial facilities with the potential to emit (PTE) certain pollutants equal to or more than the minor NSR thresholds but less than the major NSR thresholds, generally 100 to 250 tons per year. The EPA permit issuance process includes public notice of a draft permit, opportunity for public comment, as well as administrative and judicial review provisions.

This memorandum describes EPA's efforts to identify environmental justice communities and assess potential effects in connection with issuing CAA synthetic minor NSR permits in La Plata County within the exterior boundaries of the Southern Ute Indian Reservation (SUIR).

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the

PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the emission limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR §49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	**Location**
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Environmental Impacts to Potential Environmental Justice Communities

Air Emissions

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times.

Air Quality Review

The Federal Minor New Source Review Regulations at 40 CFR 49.154(d) require that an Air Quality Impact Assessment (AQIA) modeling analysis be performed if there is reason to be concerned that new construction would cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD increment violation. If an AQIA reveals that the proposed construction could cause or contribute to a NAAQS or PSD increment violation, such impacts must be addressed before a pre-construction permit can be issued.

The emissions, approved at present, from these existing facilities will not be increasing due to these permit actions and the emissions will continue to be well controlled at all times. These permit actions will have no air quality impacts; therefore, the EPA has determined that an AQIA modeling analysis is not required for any of the proposed permits.

Furthermore, each permit contains a provision stating, "*The permitted source shall not cause or contribute to a NAAQS violation or, in an attainment area, shall not cause or contribute to a PSD increment violation.*" Noncompliance with this permit provision is a violation of the permit and is grounds for enforcement action and for permit termination or revocation. As a result, the EPA concludes that issuance of the aforementioned synthetic minor NSR permits will not have disproportionately high and adverse human health effects on communities in the vicinity of the SUIR.

Tribal Consultation and Public Participation

The EPA offers the Tribal Government Leaders an opportunity to consult on each proposed permit action. The Tribal Government Leaders are asked to respond to the EPA's offer to consult within 30 days and if no response is received within that time, the EPA notifies the Tribal Government Leaders that the consultation period has closed. The Chairman of the Southern Ute Tribe has been offered an opportunity to consult on this permit action via letter dated September 25, 2012. To date, the EPA has not received a response to our offer to consult on this permit action and the Chairman will be notified when the consultation period has closed.

All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the EPA and the Tribal Environmental Director per the application instructions (see http://epa.gov/region8/air/permitting/tmnsr.html). The Tribal Environmental Office has 10 business days to respond to the EPA with questions and comments on the application. In the event an

Air Quality Impact Assessment (AQIA) is triggered, a copy of that document is emailed to the tribe within 5 business days of receipt by the EPA.

Given the presence of potential environmental justice communities in the vicinity of the facilities, the EPA is providing an enhanced public participation process for this permit. Interested parties can subscribe to an EPA listserve that notifies them of public comment opportunities on the Southern Ute Indian Reservation for draft air pollution control permits via email at http://epa.gov/region8/air/permitting/pubcomment.html.

Additionally, the Tribe's Environmental Director is notified of the public comment period for the proposed permit and provided copies of the notice of public comment opportunity to post in various locations on the Reservation that they deem fit. The Tribe is also notified of the issuance of the final permit.

http://www.epa.gov/region08
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917

SEP 2 5 2012

Ref: 8P-AR

The Honorable Jimmy Newton, Jr.
Chairman, Southern Ute Indian Tribe
P.O. Box 737
Ignacio, CO 81137-0737

Re: Notification of Consultation and Coordination on Issuance of Synthetic Minor New Source Review Permits for Existing Natural Gas Compression Facilities on the Southern Ute Indian Reservation

Dear Chairman Newton,

The U.S. Environmental Protection Agency Region 8 (EPA Region 8) is initiating consultation and coordination with the Southern Ute Indian Tribe regarding issuance of permits to approve federally and practically enforceable emission limit requirements for twelve (12) existing natural gas compression facilities on the Southern Ute Indian Reservation. These emission limit requirements were established in a Federal Title V (Part 71) Permit to Operate.

Upon promulgation of the Federal New Source Review Pre-Construction Permit program at 40 CFR Part 49.151 (Part 49) for sources constructing and operating in Indian country, the use of the Federal Part 71 permit to create these limits is no longer practiced. In addition, these emission limits will not automatically transfer to the Southern Ute's new Title V (Part 70) Permits to Operate that will be issued by the Tribe.

Upon the transfer of these limits to the Federal Part 49 preconstruction permit, the limits will become applicable requirements, similar to applicable requirements originating from New Source Performance Standards at 40 CFR Part 60 (NSPS) and National Emission Standards for Hazardous Air Pollutants at 40 CFR Part 63 (NESHAP) that can then be incorporated into the Southern Ute's new Part 70 permits.

The following facilities are requesting a transfer of enforceable synthetic minor air pollutant emission limits established in their Part 71 permits to a Part 49 permit:

ConocoPhillips Company Sunnyside Compressor Station
ConocoPhillips Company Argenta Compressor Station
ConocoPhillips Company Ute Compressor Station
Samson Resources Company Jaques Compressor Station
Samson Resources Company South Ignacio Compressor Station
Red Cedar Gathering Company ALP-Simpson Treating Plants
Red Cedar Gathering Company Sambrito Compressor Station
BP America Production Company Miera Compressor Facility
BP America Production Company Salvador Compressor Facility

BP America Production Company Treating Site 6B Compressor Facility
BP America Production Company Treating Site 7B Compressor Facility
BP America Production Company Treating Site 8 Compressor Facility
BP America Production Company Wolf Point Compressor Facility

This consultation and coordination process is being conducted based on the *EPA Policy on Consultation and Coordination with Indian Tribes* (www.epa.gov/tribal/consultation/consult-policy.htm). The EPA Region 8 invites you and your designated consultation representative(s) to participate in this process. The EPA Region 8's anticipated timeline for the consultation and coordination period is expected to extend to 30 days after you receive this letter.

Whether or not you decide to accept this offer for government-to-government consultation, the EPA Region 8 plans to regularly coordinate and communicate with the Southern Ute Tribe's Environmental Program Division Head Thomas Johnson and the Environmental Program Director, Brenda Jarrell, for facilities located within the exterior boundaries of the Southern Ute Indian Reservation. If you would prefer to designate an alternative representative for communication on air pollution control permitting matters, please notify us of that person's name and contact information. We will keep the tribal government informed and will seek your input on these permits.

The EPA Region 8 welcomes the opportunity to consult and coordinate with the Southern Ute Tribe. If you choose to consult about these permitting actions, we will work with your tribal government to develop a consultation plan including a description of the process we would follow, opportunity for your input, and timeline for us to provide feedback and to complete the consultation. We will send a draft consultation plan for your review as soon as practical after we receive your reply to this letter. The Agency's goal will be to ensure that you have an opportunity to provide tribal input into these permit actions.

We request that you reply in writing to this letter within the next 30 days if the Southern Ute Tribe desires to consult on these permit actions. The official EPA Region 8 contact person for this consultation and coordination process is Kathleen Paser, a permit engineer on my staff.

Thank you very much for your attention to this matter. Please contact me at (303) 312-6308 or your staff can contact Kathleen Paser at (303) 312-6526 or paser.kathleen@epa.gov should you have any questions on this action. We look forward to hearing from you on this important matter.

Sincerely,

Howard M. Cantor, for
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc: Thomas Johnson, Division Head, Environmental Program, Southern Ute Indian Tribe
Brenda Jarrell, Air Program Director, Southern Ute Indian Tribe

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

August 3, 2012

Ms. Kathleen Paser
Air and Radiation Program, 8P-AR
U.S. Environmental Protection Agency
Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Like-Kind Engine Replacement
South Ignacio Central Delivery Point (V-SU-0031-08.00)
Samson Resources Company

Dear Ms. Paser:

The Samson Resources Company is herein submitting notification of a like-kind engine replacement for Units E7 at the South Ignacio Central Delivery Point. The facility is located in the SE/4 of Section 32, Township 33 North, Range 7 West, in La Plata County, Colorado.

Unit E7, a 1400 hp Waukesha 5794LT lean burn reciprocating engine equipped with an oxidation catalyst with Serial Number C-15838/1 was taken out of service on May 28, 2012. The replacement engine is labeled with Serial Number C-15836/1 was originally manufactured August 31, 2005. The replacement engine was installed and put into service on May 30, 2012.

The facility is not a major source of HAP and will therefore be subject to the area source rules under 40 CFR part 63 subpart ZZZZ (RICE MACT). The engine is not subject to 40 CFR Part 60 subpart JJJJ because the engine was manufactured prior to July 1, 2007.

If you have any questions regarding this replacement please feel free to contact me at (918) 591-1370 or via email at srose@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Environmental Specialist

Cc: South Ignacio File

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791

January 9, 2012

Ms. Kathleen Paser
Federal Minor NSR Permit Coordinator
1595 Wynkoop Street (8P-AR)
Denver, CO 80202-1129

Re: Synthetic Minor Limit Request
South Ignacio Central Delivery Point
Samson Resources

Dear Ms. Paser:

Samson Resources Company (Samson) is herein submitting a synthetic minor limit request for its South Ignacio Central Delivery Point facility. This facility is currently permitted under permit V-SU-0031-08.00 under Title V Part 71. This permit has several emissions limitations that Samson would like to operate under and will therefore need to establish under the Minor NSR program.

Enclosed you will find the attachments documenting the limits requested as well as the methods for demonstrating compliance with those limits. Since Samson currently operates with these limits there will be no pre and post emission changes and Samson has enclosed a copy of the 2010 Emission Inventory for the facility. This facility is an existing facility operated by Samson since 2006.

Please feel free to contact me at (918) 591-1370 or srose@samson.com if you have any questions regarding this application.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Air Quality Specialist

Cc: File
Brenda Jarrell
Kyle Hunderman

SYNTHETIC MINOR PERMIT APPLICATION

SOUTH IGNACIO CENTRAL DELIVERY POINT

PART 71 OPERATING PERMIT: V-SU-0031-08.00

Prepared for:

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103

Prepared by:

Compliance Partners Inc.

4038 Timberline Road, Suite 100
Fort Collins, CO 80525

DECEMBER 2011

SYNTHETIC MINOR PERMIT APPLICATION
SOUTH IGNACIO CENTRAL DELIVERY POINT

CONTENTS

SYNTHETIC MINOR PERMIT APPLICATION
SOUTH IGNACIO CENTRAL DELIVERY POINT

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ADMINISTRATIVE AND PLANT-WIDE INFORMATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 8 Air Program
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Check List – Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form

- ○ **Proposed Construction of a New Facility**
- ○ **Proposed Construction of New Equipment at an Existing Facility**
- ○ **Proposed Modification of an Existing Facility**
- ✓ **Other – Please Explain** Synthetic Minor Permit Application

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Minor NSR Permitting Coordinator
U.S. EPA, Region 8
1595 Wynkoop Avenue, 8P-AR
Denver, CO 80202-1129

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact the EPA Region 8 Tribal Air Coordinator:

Alexis North, EPA Region 8 Tribal Air Coordinator
303-312-7005
north.alexis@epa.gov

A. GENERAL FACILITY INFORMATION

1. (a) **Company Name** Samson Resources Company (b) **Operator Name** Samson Resources Company		2. **Facility Name** South Ignacio Central Delivery Point	
3. Type of Operation Natural Gas Production		4. Portable Source? Yes (No) 5. Temporary Source? Yes (No)	
6. NAICS Code 211111		7. SIC Code 1311	
8. Physical Address (home base for portable sources) South Ignacio Road about nine miles southeast of Durango, CO			
9. Reservation* Southern Ute	10. County* La Plata	11a. Latitude* 37° 3' 14.1" N 37.053917	11b. Longitude* -107° 37' 30.8" W -107.625222
12a. Quarter Quarter Section* SE 1/4	12b. Section* 32	12c. Township* 33 North	12d. Range* 7 West

*Provide all proposed locations of operation for portable sources

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this facility. Provide as an attachment if additional space is necessary)

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-01.00
Date of the Permit Action April 2004

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-01.01
Date of the Permit Action October 2005

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-01.02
Date of the Permit Action January 2006

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-01.03
Date of the Permit Action January 2008

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-01.04
Date of the Permit Action July 2008

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this facility. Provide as an attachment if additional space is necessary)

Facility Name on the Permit South Ignacio Central Delivery Point
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0031-08.00
Date of the Permit Action August 2009

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

C. CONTACT INFORMATION

Company Contact Scott Rose		Title Air Quality Specialist
Mailing Address Two West Second Street	Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com		
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370	
Operator Contact (if different from company contact)		Title
Mailing Address		
Email Address		
Telephone Number	Facsimile Number	
Facility Contact Lynn Davis		Title Superintendent
Mailing Address PO Box 9	Bayfield, Colorado 81122	
Email Address ldavis@samson.com		
Telephone Number (970) 884-5085	Facsimile Number	
Compliance Contact Scott Rose	Title Air Quality Specialist	
Mailing Address Two West Second Street	Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com		
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370	

D. ATTACHMENTS

Include all of the following information (see the attached instructions)

- ✓ **FORM SYNMIN** - New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.
- ✓ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.
- ✓ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.
- ✓ A list and descriptions of all proposed emission units and air pollution-generating activities.
- ✓ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.
- ✓ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.
- ✓ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.
- ✓ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.
- ✓ **Criteria Pollutant Emissions** - Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.
- ✓ These estimates are to be made for each emission unit, emission generating activity, and the project/facility in total.
- ✓ **Modeling – Air Quality Impact Analysis (AQIA)**
- ✓ **ESA (Endangered Species Act)**
- ✓ **NHPA (National Historic Preservation Act)**

E. TABLE OF ESTIMATED EMISSIONS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Facility

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)	
PM	0	0	PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SOx - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds NH_3 - Ammonia Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}	0	0	
$PM_{2.5}$	0	0	
SO_x	0	0	
NO_x	232.7	232.7	
CO	148.9	148.9	
VOC	110.3	110.3	
Pb	0	0	
NH_3	0	0	
Fluorides	0	0	
H_2SO_4	0	0	
H_2S	0	0	
TRS	0	0	
RSC	0	0	

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Facility or Modification of an Existing Facility

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM	0	0	0	0
PM_{10}	0	0	0	0
$PM_{2.5}$	0	0	0	0
SO_x	0	0	0	0
NO_x	232.7	232.7	232.7	232.7
CO	148.9	148.9	148.9	148.9
VOC	110.3	110.3	110.3	110.3
Pb	0	0	0	0
NH_3	0	0	0	0
Fluorides	0	0	0	0
H_2SO_4	0	0	0	0
H_2S	0	0	0	0
TRS	0	0	0	0
RSC	0	0	0	0

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SOx - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
NH_3 - Ammonia
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 8 Air Program
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Checklist - Synthetic Minor Limit Request

(Form SYNMIN)

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Avenue, 8P-AR
Denver, CO 80202-1129

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact the EPA Region 8 Tribal Air Coordinator:

Alexis North, EPA Region 8 Tribal Air Coordinator
303-312-7005
north.alexis@epa.gov

A. GENERAL INFORMATION

Company Name Samson Resources Company	**Facility Name** South Ignacio Central Delivery Point	
Company Contact or Owner Name Scott Rose		Title Air Quality Specialist
Mailing Address Two West Second Street	Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com		
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370	

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

- ✓ **Item 1** - The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
- ✓ **Item 2** - The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.
- ✓ **Item 3** - A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.
- ✓ **Item 4** - Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
- ✓ **Item 5** – Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants before and after proposed emission controls.

Description of Operations
South Ignacio Central Delivery Point
SE ¼ Section 32, Township 33N, Range 7W
La Plata County, Colorado

The South Ignacio Central Delivery Point is owned and operated by Samson Resources. The facility is located within the exterior boundaries of the Southern Ute Indian Reservation in the SE ¼ of Section 32, Township 33 North, Range 7 West in La Plata County, Colorado. A facility location map is included as Figure 1.

The facility is comprised of equipment that dehydrates and compresses coal-bed methane gas from several wells to transmission pipeline specifications. Gas entering the facility from the field is first fed to an inlet separator that gravimetrically removes water that may have formed/condensed during transportation from the supplying gas wells. Separator overhead gas is fed to one of the eight compressor engines from a common suction header. The compressors discharge gas to a common discharge header that feeds to scrubbers. The scrubbers separate and collect liquids that may have formed during compression. The compressed gas is then fed to two dehydration units. Tri-ethylene glycol is circulated counter-currently and absorbs water from the saturated gas. Rich glycol is circulated to a reboiler, where moisture is driven to the atmosphere by heating the glycol. Dry gas exits the contactors and is directed to the sales line, where it is metered and exits the facility. The gas processing capacity of the facility is approximately 70 MMscfd with eight compressor engines operating. Figure 2 contains a simplified facility plot plan. A process flow diagram is attached as Figure 3.

Process equipment installed at the facility consists of eight natural gas-fired reciprocating engines, two triethylene glycol dehydration units equipped with reboiler burners, and a flare. The facility emission units are listed in Table 1. There are several insignificant emission units at this facility including various storage tanks and heaters. These units are listed in Table 2.

Table 1: South Ignacio Central Delivery Point Emission Units

Emission Unit ID	Description	Control Equipment
E1	1680 hp Waukesha L7044GSI Compressor Engine	Non-Selective Catalyst
E2	1267 hp Waukesha L7042GL Compressor Engine	Oxidation Catalyst
E3	1267 hp Waukesha L7042GL Compressor Engine	Oxidation Catalyst
E4	1336 hp Waukesha L7042GL Compressor Engine	Oxidation Catalyst
E5	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E6	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E7	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E8	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
D1	30 MMscfd PESCO Dehydration Unit Glycol Regenerator	PESCO Control Unit – Condenser & Flare Stack
D2	40 MMscfd PESCO Dehydration Unit Glycol Regenerator	PESCO Control Unit – Condenser & Flare Stack
FUG	Facility Fugitive Emissions	None
CRPV	Compressor Cylinder Rod Packing Vent Emissions	None

Table 2: South Ignacio Central Delivery Point Insignificant Emission Units

Emission Unit ID	Description
IEU1	16 – 500 gallon lubricating oil storage tanks
IEU2	11 – 500 gallon used oil storage tanks
IEU3	2 – 500 gallon ethylene glycol storage tanks
IEU4	4 – 1000 gallon produced water storage tanks
IEU5	1 – 400 bbl slop tank
IEU6	1 – 500 gallon methanol storage tank
IEU7	5 – 0.12 MMBtu/hr natural gas fired tank heaters

Samson is requesting three emission limitations for the facility so that it may retain its status as a synthetic minor source of HAP emissions. The first limitation is a facility-wide formaldehyde emission limit of 9.5 tons during any consecutive twelve months. The second limitation is that benzene emissions from each of the glycol dehydration units shall be limited to 0.9 tons per any consecutive 12 months. The third and final limitation is a facility-wide HAP emission limit of 23 tons during any consecutive 12 months. Compliance with these annual limits will be determined on a rolling 12-month basis. Emission control equipment, control efficiencies, and emission monitoring is discussed in the attached individual equipment sections of the application.

The facility potential to emit is contained in Table 3. The PTE in this table reflects enforceable emission control for engine formaldehyde emissions and dehydration unit benzene emissions and total HAP emissions. The facility-wide emission limits for formaldehyde and total HAP emissions have been incorporated into the facility PTE. All VOC emissions are represented on an uncontrolled basis. Table 4 lists the facility's 2010 emissions.

The South Ignacio Central Delivery Point is an existing, constructed, and operating facility. There are no increases in emission rates or facility potential to emit with this application so an ambient impact analysis has not been included. In addition the facility will have no adverse effects with respect to the ESA or NHPA. ESA and NHPA reports are attached.

Table 3: South Ignacio Central Delivery Point Potential to Emit

Unit	Model	hp	NO_X			CO			VOC			Formaldehyde			Benzene	Total HAP
			g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	tpy	tpy
E1	Waukesha L7044GSI	1680	2.5	9.25	40.5	3.5	12.95	56.7	0.5	1.85	8.1	0.02	0.07	0.32	0	0.3
E2	Waukesha L7042GL	1267	1.5	4.19	18.3	1.0	2.79	12.2	0.7	1.95	8.6	0.10	0.28	1.22	0	1.2
E3	Waukesha L7042GL	1267	1.5	4.19	18.3	1.0	2.79	12.2	0.7	1.95	8.6	0.10	0.28	1.22	0	1.2
E4	Waukesha L7042GL	1336	1.5	4.41	19.3	1.0	2.94	12.9	0.7	2.06	9	0.10	0.29	1.29	0	1.3
E5	Waukesha L5794LT	1400	2.5	7.71	33.8	1.0	3.08	13.5	0.5	1.54	6.8	0.10	0.31	1.35	0	1.4
E6	Waukesha L5794LT	1400	2.5	7.71	33.8	1.0	3.08	13.5	0.5	1.54	6.8	0.10	0.31	1.35	0	1.4
E7	Waukesha L5794LT	1400	2.5	7.71	33.8	1.0	3.08	13.5	0.5	1.54	6.8	0.10	0.31	1.35	0	1.4
E8	Waukesha L5794LT	1400	2.5	7.71	33.8	1.0	3.08	13.5	0.5	1.54	6.8	0.10	0.31	1.35	0	1.4
D1	TEG Dehydration Unit	18 MMscfd		0.12	0.5		0.10	0.4		4.64	20.31			0.0	0.9	13.4
D2	TEG Dehydration Unit	30 MMscfd		0.07	0.3		0.06	0.3		5.59	24.47			0.0	0.9	
FUG	Facility Fugitive Emissions				0.0			0.0			3.1			0.0	0.0	0.0
IEUs	Insignificant Units				0.3			0.2			0.9			0.0	0.0	0.0
Total					232.7			148.9			110.3			9.5	1.8	23.0

Table 4: South Ignacio Central Delivery Point 2010 Emissions

Unit	Model	hp	NO_X			CO			VOC			Formaldehyde			Benzene	Total HAP
			g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	tpy	tpy
E1	Waukesha L7044GSI	1680	2.5	9.25	21.9	3.5	12.95	54.8	0.5	1.85	7.8	0.02	0.07	0.4	0	0.4
E2	Waukesha L7042GL	1267	1.5	4.19	18.1	1.0	2.79	12.1	0.7	1.95	6.0	0.10	0.28	0.4	0	0.4
E3	Waukesha L7042GL	1267	1.5	4.19	11.1	1.0	2.79	11.7	0.7	1.95	0.2	0.10	0.28	0.3	0	0.3
E4	Waukesha L7042GL	1336	1.5	4.41	19.1	1.0	2.94	12.7	0.7	2.06	6.4	0.10	0.29	0.3	0	0.3
E5	Waukesha L5794LT	1400	2.5	7.71	33.1	1.0	3.08	13.3	0.5	1.54	6.6	0.10	0.31	0.4	0	0.4
E6	Waukesha L5794LT	1400	2.5	7.71	33.5	1.0	3.08	13.4	0.5	1.54	6.7	0.10	0.31	0.4	0	0.4
E7	Waukesha L5794LT	1400	2.5	7.71	33.2	1.0	3.08	13.3	0.5	1.54	6.6	0.10	0.31	0.3	0	0.3
E8	Waukesha L5794LT	1400	2.5	7.71	33.6	1.0	3.08	13.4	0.5	1.54	6.7	0.10	0.31	0.3	0	0.3
D1	TEG Dehydration Unit	18 MMscfd		0.04	0.5		0.03	0.1		0.02	0.1			0.0	0.03	0.07
D2	TEG Dehydration Unit	30 MMscfd		0.12	0.3		0.10	0.4		0.02	0.1			0.0	0.04	0.08
FUG	Facility Fugitive Emissions				0.0			0.0			3.1			0.0	0.0	0.0
IEUs	Insignificant Units				0.3			0.2			0.9			0.0	0.0	0.0
Total					204.7			145.4			51.2			2.8	0.1	3.0

Directions to the Facility

South Ignacio Central Delivery Point
Section 32, Township 33N, Range 7W
La Plata County, Colorado

The South Ignacio Central Delivery Point is located about nine miles southeast of Durango, Colorado. To get to the South Ignacio Central Delivery Point take US Highway 550 to the intersection with County Road 318. Go east onto County Road 318. Follow County Road 318 until the tee in the road. Turn right at the tee and drive to a guardrail in between mile markers 5 and 6. Turn at the next right and follow the road to the South Ignacio Central Delivery Point.

Regulatory Applicability Assessment
South Ignacio Central Delivery Point

40 CFR Part	Description	Applicable Requirement	Reason
Part 50	National Primary and Secondary Ambient Air Quality Standards	N	Ambient standards set forth by theses provisions are not directly enforceable upon a facility. The demonstration of the maintenance of an air quality standard is the responsibility of the Administrator and not that of a specific facility. It is recognized that the Administrator may incorporate requirements into a State or Federal Implementation Plan designed to mitigate an air quality violation which can apply to specific facilities, but the specific air quality standards are not direct applicable requirements to this facility.
Part 51	Requirements for Preparation, Adoption and submittal of Implementation Plans	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 52	Approval of Promulgation of Implementation Plans		
52.21	Prevention of Significant Deterioration	N	The facility is not a major stationary source as defined at 40 CFR 52.21(b). The facility has a potential to emit criteria pollutants below the 250 tpy PSD threshold.
52.24	New Source Review	N	The facility is not located in a nonattainment area
Part 53	Ambient Air Monitoring Reference and Equivalent Methods	N	This part sets forth requirements for the monitoring of ambient air. The facility is not required and does not perform ambient air monitoring.
Part 54	Prior Notice of Citizen Suits	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 55	Outer Continental Shelf Air Regulations	N	The facility is not located on the Outer Continental Shelf
Part 56	Regional Consistency	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 57	Primary Nonferrous Smelter Orders	N	The facility is not a Nonferrous Smelter
Part 58	Ambient Air Quality Surveillance	N	This part sets forth requirements for the monitoring of ambient air. The facility is not required and does not perform ambient air monitoring.
Part 59	Not Promulgated--Reserved		
Part 60	Standards of Performance for New Stationary Sources	N	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which may apply at the facility and may apply in general to natural gas transmission and/or processing facilities include:
Subpart K	VOL Storage Tanks	N	There are no storage tanks at this facility which were constructed prior to March 8, 1978
Subpart Ka	VOL Storage Tanks	N	There are no storage tanks at this facility which were constructed between May18, 1978 and July 23, 1984
Subpart Kb	VOL Storage Tanks	N	All tanks which contain VOL and which were constructed after July 23, 1984 either have capacities less than the applicability threshold of 40 m^3 (251.6 bbl) or have vapor pressures below the 15 kPa applicability threshold.
Subpart GG	Stationary Gas Turbines	N	There are no gas turbines located at this facility.
Subpart KKK	On-Shore Natural Gas Processing Facilities	N	This facility does not process natural gas to extract natural gas liquids.

Regulatory Applicability Assessment
South Ignacio Central Delivery Point

40 CFR Part	Description	Applicable Requirement	Reason
Subpart LLL	On-Shore Natural Gas Sweetening Plants	N	This facility does not process natural gas to remove sulfur compounds.
Subpart JJJJ	Standards of Performance for Ignition Internal Combustion Engines and National Emision Standrads for Hazardous Air Pollutants for Recipricating Internal Combustion Engines	Y	Unit E3 is subject to this Subpart. Future Internal Combustion Engines installed at this facility may be subject to this Subpart and will be in compliance.
Subpart KKKK	Standards of Performance for Stationary Gas Turbines	N	There are no gas turbines located at this facility.
Part 61	National Emission Standards for Hazardous Air Pollutants	N	This facility is not part of any source category for which provisions set forth by these regulations apply.
Part 62	Approval and Promulgation of State Plans for Designated Facilities and Pollutants	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 63	National Emission Standards for Hazardous Air Pollutants for Source Categories	Y	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which apply at the facility and may apply in general to natural gas transmission and/or processing facilities include:
Subpart HH	National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities	Y	This facility is is exempt from the general requirements for area sources. The monitoring and record keeping requirements for the benzene emission limits on each of the dehydration units meets the general recordkeeping requirements of this subpart.
Subpart HHH	National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities	N	Facility is not a natural gas transmission or storage facility.
Subpart ZZZZ	National Emission Standards for Hazardous Air Pollutants for Recipricating Internal Combustion Engines	Y	Unit E3 was constructed after June 12, 2006 and July 1, 2007 so it meets the requirements of JJJJ to be in complaince with this subpart. Unit E1 is an existing 4SRB and Units E2, E4, E5, E6, E7, and E8 are existing 4SLB and have until 10/19/13 to be in compliance with the emission limits of this subpart.
Part 64	Compliance Assurance Monitoring	N	No emission units at the facility are equipped with emission control technology or are limited by an applicable emission limitation.
Part 65	Not Promulgated--Reserved		
Part 66	Assessment and Collection of Noncompliance Penalties by EPA	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 67	EPA Approval of State Noncompliance Penalty Program	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 68	Chemical Accident Prevention Provisions	N	No substance listed by this regulations is stored on-site at the facility in quantities above applicable threshold values set forth by the regulation.
Part 69	Special Exemptions from the Requirements of the Clean Air Act	N	The facility is not located in an area covered by this regulation.
Part 70	State Operating Permit Programs	N	The facility is not located in an area under the jurisdiction of a regulatory authority which has an EPA-approved part 70 program.
Part 71	Federal Operating Permit Programs	Y	The facility is a major source subject to the provisions of this regulation.
Part 72	Permits Regulation	N	The facility is not an affected facility under the Acid Rain Program.
Part 73	Sulfur Dioxide Allowance System	N	The facility is not an affected facility under the Acid Rain Program.
Part 74	Sulfur Dioxide Opt-Ins	N	The facility has not elected to opt-in to the Acid Rain Program.
Part 75	Continuous Emissions Monitoring	N	The facility is not an affected facility under the Acid Rain Program.

Regulatory Applicability Assessment
South Ignacio Central Delivery Point

40 CFR Part	Description	Applicable Requirement	Reason
Part 76	Acid Rain Nitrogen Oxides Emission Reduction Program	N	The facility is not an affected facility under the Acid Rain Program.
Part 77	Excess Emissions	N	The facility is not an affected facility under the Acid Rain Program.
Part 78	Appeal Procedures for Acid Rain Program	N	The facility is not an affected facility under the Acid Rain Program.
Part 79	Registration of Fuels and Fuel Additives	N	The facility does not sell fuels or additives which are designated by this provision.
Part 80	Regulation of Fuels and Fuel Additives	N	The facility does not sell fuels or additives which are designated by this provision.
Part 81	Designation of Areas for Air Quality Planning Purposes	N	Provision of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to his facility.
Part 82	Protection of Stratospheric Ozone	N	The Facility does not engage in the distribution or sale of controlled substances, and it does not produce, transform, destroy, import, or export products containing controlled substances.
Part 85	Control of Air Pollution from Mobile Sources	N	The facility does not engage in vehicle manufacturing activities.
Part 86	Control of Air Pollution from New and In-Use Motor Vehicles and New and In-use Motor Vehicle Engines: Certification and Test Procedures	N	The facility does not engage in the certification or testing of motor vehicle engines.
Part 87	Control of Air Pollution from Aircraft and Aircraft Engines	N	The facility does not engage in the use of aircraft or aircraft engines.
Part 88	Clean-fuel Vehicles	N	These provisions apply to vehicle fleets and not to stationary sources.
Part 89	Control of Emissions from new and in-use Nonroad Engines	N	The facility does not engage in the use of nonraod engines as define by these provisions.
Part 90	Control of Emissions from Nonroad Spark-ignition Engines	N	The facility does not engage in the use of nonroad spark-ignition engines as defined by these provisions.
Part 91	Control of Emissions from Marine Spark-ignition Engines	N	The facility does not engage in the use of marine spark-ignition engines.
Part 92	Control of Emissions from Locomotives and Locomotive Engine	N	The facility does not engage in the use of locomotives or locomotive engines.
Part 93	Determining Conformity of Federal Actions to State or Federal Implementation Plans	N	The facility operations are not federal actions.
Part 94	Not Promulgated--Reserved		
Part 95	Mandatory Patent Licenses	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to his facility.
Parts 96-99	Not Promulgated--Reserved		

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Yellow-billed Cuckoo (Coccyzus	Western U.S. DPS	Candidate	Sacramento Fish And Wildlife		
Birds	Mexican spotted owl (Strix		Threatened	Arizona Ecological Services	Draft Recovery Plan for the	Draft Revision 1
Birds	Southwestern willow flycatcher		Endangered	Arizona Ecological Services	Final Recovery Plan for the	Final
Flowering Plants	Knowlton's cactus (Pediocactus		Endangered	New Mexico Ecological Services	Knowlton's (=Hedgehog) Cactus	Final
Insects	Uncompahgre fritillary butterfly		Endangered	Western Colorado Ecological	Uncompahgre Fritillary Butterfly	Final
Mammals	Black-footed ferret (Mustela	U.S.A. (specific portions of AZ,	Experimental Population, Non-	Office Of The Regional Director		
Mammals	Canada Lynx (Lynx canadensis)	(Contiguous U.S. DPS)	Threatened	Montana Ecological Services	Recovery Outline for the	Outline
Mammals	New Mexico meadow jumping		Candidate			
Mammals	North American wolverine (Gulo		Candidate	Montana Ecological Services		

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U.S. Department of the Interior

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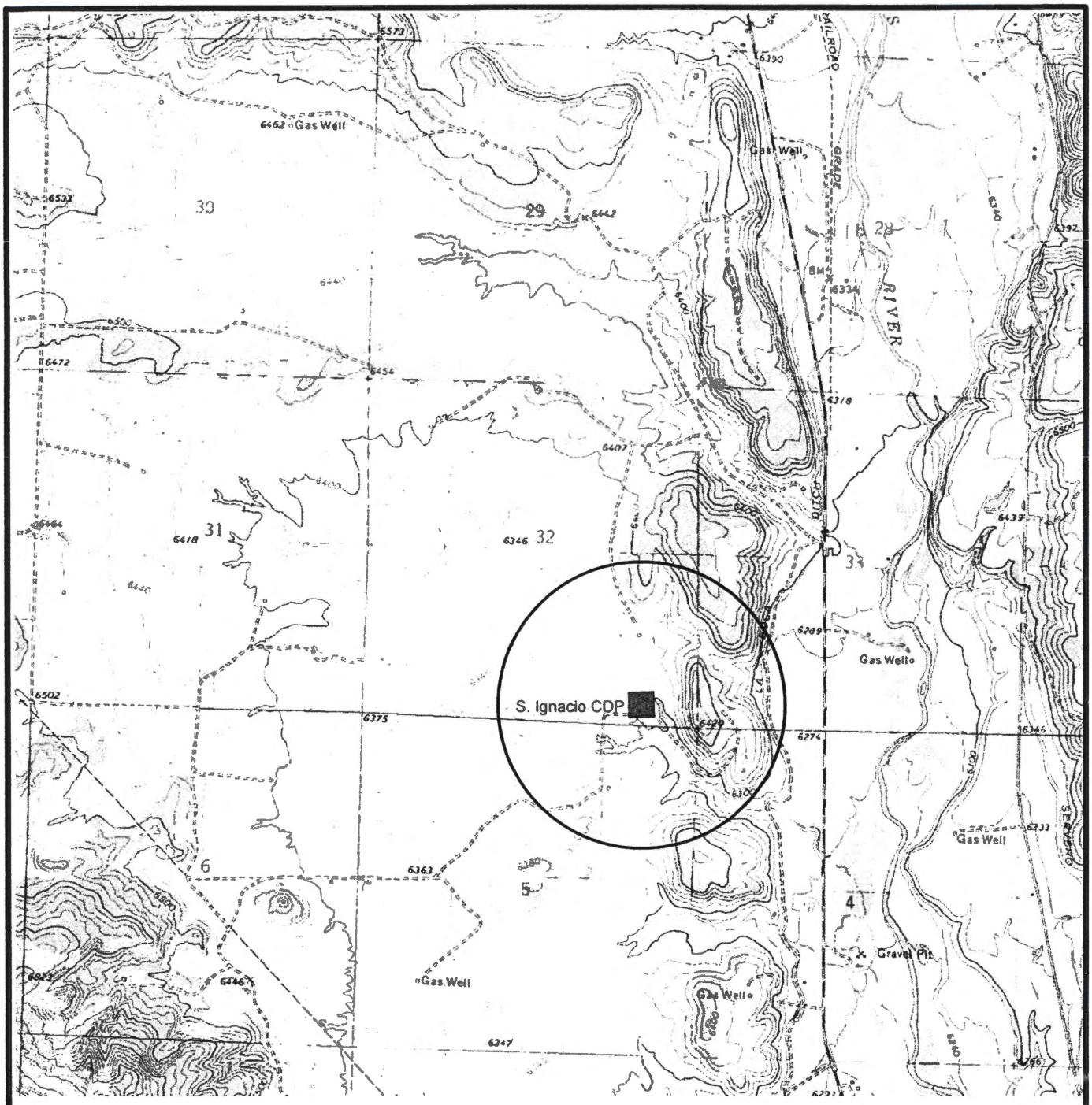
FIGURES



Compliance Partners
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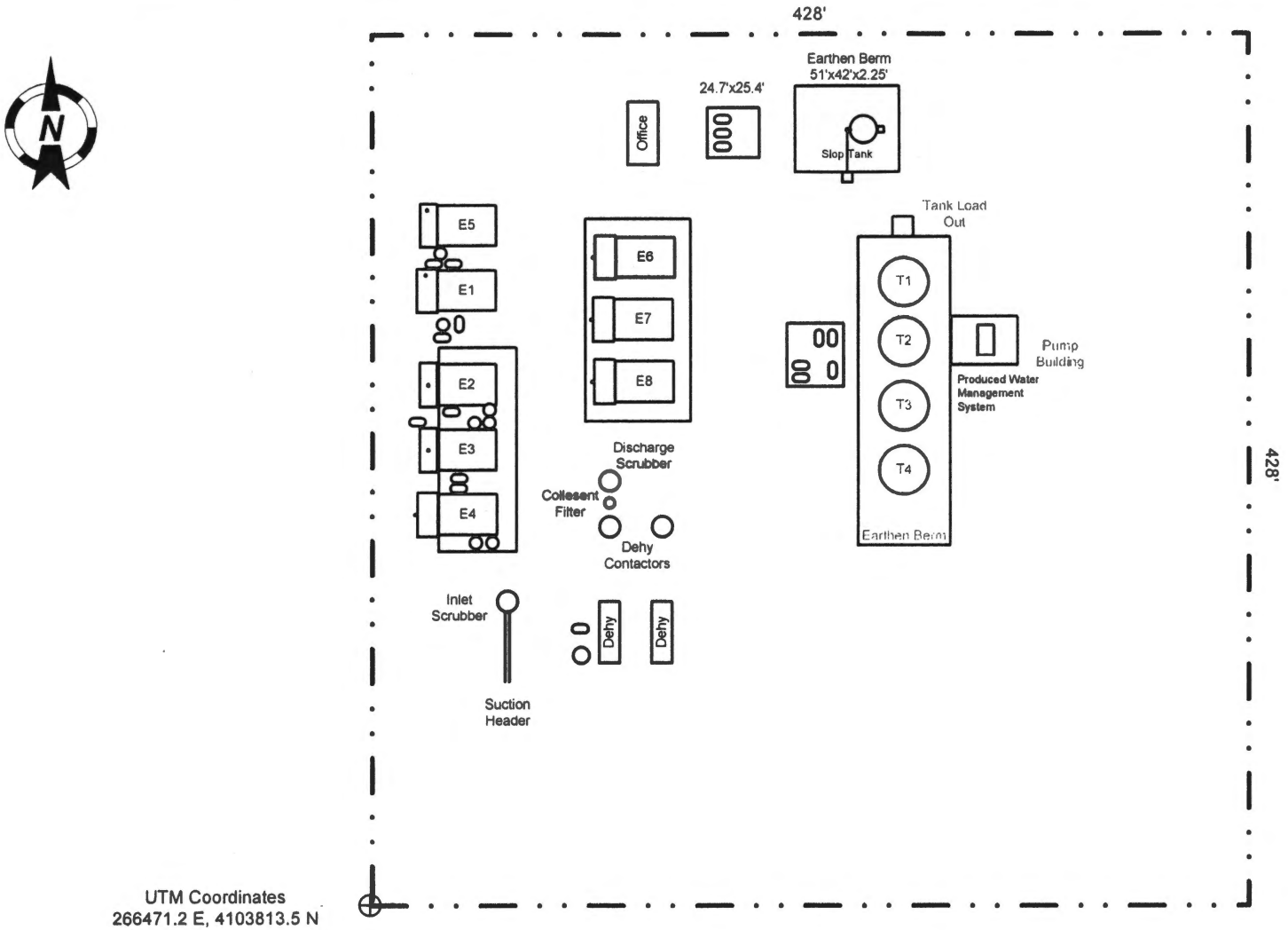
Ft. Collins, CO 80525 (970) 206-4443
www.compliance-partners.com

Samson

South Ignacio Central Delivery Point

General Facility Location
Section 32, Township 33N, Range 7W
La Plata County, Colorado

PROJECT NAME	FILENAME	SCALE	REVISED	FIGURE NUMBER
Samson - Permitting	Loc.srf	1 in = 700 m	08/20/2008	1



UTM Coordinates
266471.2 E, 4103813.5 N
(NAD 27, Zone 13, meters)

Compliance Partners
4038 Timberline Road, Suite 100, Ft. Collins, CO 80525
phone: 970/206-4443 fax: 720/489-3902
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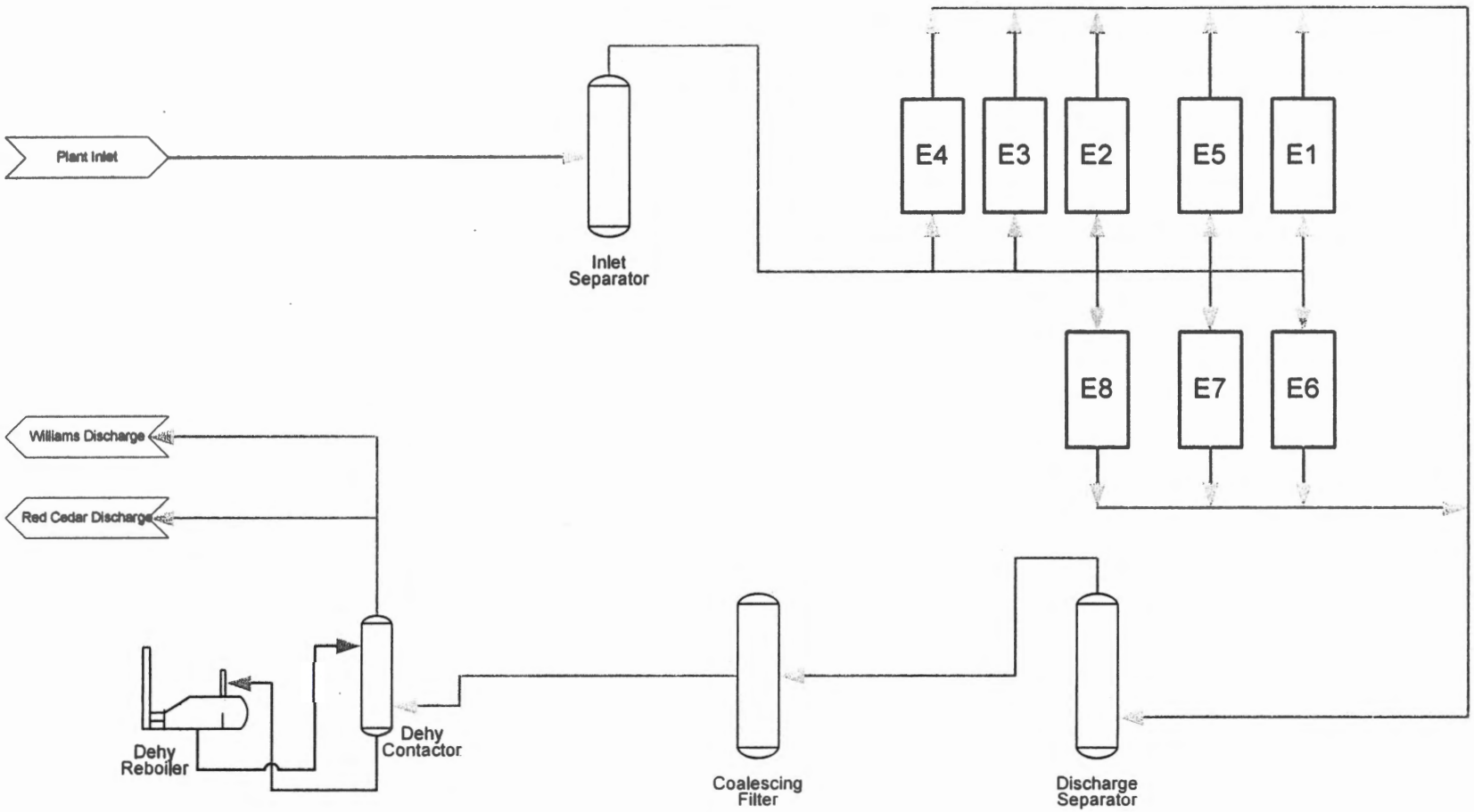
Samson

South Ignacio Central Delivery Point

TITLE

Simplified Plot Plan

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Samson - South Ignacio Permitting	SimPlot.vsd	1 in = 80 ft	08/20/2008	2



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Samson

South Ignacio Central Delivery Point

TITLE

Simplified Process Flow Diagram

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Samson - South Ignacio Permitting	Pfd.vsd	None	08/20/2008	3

INSIGNIFICANT EMISSIONS

Insignificant Emission Justification
South Ignacio Central Delivery Point

Reciprocating Compressors

Reciprocating compressors are sources of VOC emissions from compressor blowdown, starter gas, and cylinder rod packing leaks. Compressor blowdown, starter gas, and cylinder rod packing vent emissions for the compressors at this facility are insignificant.

Compressor Blowdown

Gas remaining in the compressor when shutdown will either remain pressurized in the compressor or it will be vented, usually to atmosphere. The total volume vented when the unit is blown down is a function of the compressor size and the size and pressure of the piping and vessels between the compressor suction and discharge isolation valves. The blowdown volume was based on equipment type and typical operating conditions, as well as the estimation of the VOC emissions from blowdown activities given the typical number of events per year. The facility's representative gas composition was used for these estimations. It should be noted that the number of blowdown events during a given year can change and Samson cannot commit to a limitation on the number of events that may occur. The blowdown emission calculation is illustrated below:

$$CBD = (40{,}927\,scf)\left(\frac{mole}{385\,scf}\right)\left(\frac{0.052\,moles_{VOC}}{100\,moles}\right)\left(\frac{55.438\,lb_{VOC}}{mole_{VOC}}\right)\left(\frac{20\,events}{yr}\right)\left(\frac{ton}{2000\,lb}\right) = 0.03\frac{ton_{VOC}}{yr}$$

Compressor blowdown VOC emissions are estimated to be 0.03 tpy for each compressor and 0.24 tpy VOC for all eight compressors at the facility.

Starter Gas

Compressor starter emissions were estimated using the starter's fuel usage at 110 psi and facility's representative gas composition. The example calculation for short term VOC emissions is presented below.

$$\frac{lb_{VOC}}{hr} = \left(1{,}100\frac{scf}{\min}\right)\left(\frac{mole}{385\,scf}\right)\left(\frac{0.052\,moles_{VOC}}{100\,moles}\right)\left(\frac{55.438\,lb_{VOC}}{mole_{VOC}}\right)\left(\frac{60\min}{hr}\right) = 4.9\frac{lb_{VOC}}{hr}$$

The starter was assumed to operate for 30 seconds per starting event resulting in 0.04 lbs of VOC emitted per starting event. It is estimated that there are 52 starting events per year for each engine. The VOC emissions are estimated at 0.001 tpy for each compressor and 0.01 tpy VOC for all eight compressors.

Cylinder Rod Packing Leaks

Compressor cylinder rod packing gas leakage is a continuous source of compressor emissions. Gas will leak from the packing and within the distance piece, and a vent is typically provided either at both the packing flange and distance piece, or just at the distance piece to direct this gas outside of any building the compressor may be housed within. EPA GasStar reports indicated vent rates of about 12 scfh for new state of the art best performing seals, and these rates can be as high as 900 scfh depending upon seal wear. Canadian/GRI research reports typical rod packing vent rates for standard seals of between 60 and 120 scfh. Vent rates are typically 30 percent higher when the compressor is idle and pressurized. The 60 scfh leakage rate along with a typical facility gas analysis was applied to determine VOC emissions from the facility gas compressor packing.

$$CRPV = \left(60\frac{scf}{hr-cyl}\right)\left(4\frac{cyl}{comp}\right)\left(\frac{mole}{385scf}\right)\left(\frac{0.052moles_{VOC}}{100moles}\right)\left(\frac{55.438lb_{VOC}}{mole_{VOC}}\right)\left(8760\frac{hr}{yr}\right)\left(\frac{ton}{2000lb}\right) = 0.08\frac{ton_{VOC}}{yr}$$

Cylinder rod packing vent VOC emissions are estimated to be 0.08 tpy for each compressor and 0.64 tpy VOC for all eight compressors at the facility.

Tanks

Emissions for the facility storage tanks were estimated using EPA Tanks 4.0.9d. Table 4 illustrates the emission units, the numbers of turnovers per year assumed when estimating emissions from the unit, and the emissions from each unit. The Tanks output for each unit is attached. The tanks at this facility are all insignificant emission units.

Table 4: South Ignacio Central Delivery Point Tank Emissions

Unit ID	Description	Turnovers per Year	VOC Emissions per Tank	VOC Emissions per Unit
			lb/yr	lb/yr
IEU1[1]	16 – 500 gal lubricating oil storage tanks	12	0.12	1.92
IEU2[1]	11 – 500 gal used oil storage tanks	12	0.12	1.32
IEU3[1]	2 – 500 gal ethylene glycol storage tanks	18	1.44	2.88
IEU4[2]	4 – 1000 gal produced water storage tanks	6	<0.1	<0.1
IEU5[3]	1 – 400 bbl slop tank	12	3.98	3.98
IEU6[4]	1 – 500 gal methanol storage tank	6	27.18	27.18

[1] Low vapor pressure.
[2] Low VOC content.
[3] Low vapor pressure, mostly water with some lubricating oil.
[4] Low throughput.

Tank Heaters

Emissions for the tank heaters were calculated using AP-42 emission factors. An example NO_X emission calculation for the 0.12 MMBtu/hr tank heater follows. The CO and VOC emissions were calculated the same way using their representative emission factors. Emissions from the other facility heaters and burners were calculated in the same manner. Table 5 lists the tank heater emissions.

$$\frac{lb_{NO_X}}{hr} = \left(0.12\frac{MMBtu}{hr}\right)\left(\frac{scf}{1020\ Btu}\right)\left(\frac{1x10^6\ Btu}{MMBtu}\right)\left(\frac{100\ lb_{NO_X}}{MMscf}\right)\left(\frac{MMscf}{1x10^6\ scf}\right)\left(\frac{975\ LHV}{1020\ LHV}\right) = 0.01\frac{lb_{NO_X}}{hr}$$

Table 5: South Ignacio Central Delivery Point Heater Emissions

Unit ID	Rating (MMBtu/hr)	Number	Description	Emissions per Heater			Emissions per Unit		
				NO_X (tpy)	CO (tpy)	VOC (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)
IEU7	0.12	5	Tank Heaters	0.05	0.04	0.00	0.25	0.21	0.00

TANKS 4.0.9D OUTPUT
LUBRICATING OIL STORAGE TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Lubricating Oil Storage Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	South Ignacio Lube Oil Tanks

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	12.00
Net Throughput(gal/yr):	6,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Lube Oil	All	55.23	38.46	72.00	45.42	0.0004	0.0002	0.0006	700.0000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations

Standing Losses (lb):	0.0925
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1249
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	514.8995
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.0850
Tank Paint Solar Absorptance (Shell):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1249
Daily Vapor Temperature Range (deg. R):	67.0659
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	514.8995
Daily Min. Liquid Surface Temp. (deg R):	498.1331
Daily Max. Liquid Surface Temp. (deg R):	531.6660
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0300
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	6,000.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	0.1225

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Lube Oil	0.03	0.09	0.12

TANKS 4.0.9D OUTPUT
USED OIL TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Used Oil Storage Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	South Ignacio Lube Oil Tanks

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	12.00
Net Throughput(gal/yr):	6,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Used Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Used Oil	All	55.23	38.46	72.00	45.42	0.0004	0.0002	0.0008	700.0000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Used Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.0925
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1249
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	514.8995
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.0850
Tank Paint Solar Absorptance (Shell):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1249
Daily Vapor Temperature Range (deg. R):	67.0659
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	514.8995
Daily Min. Liquid Surface Temp. (deg R):	498.1331
Daily Max. Liquid Surface Temp. (deg R):	531.6660
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0300
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	6,000.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	0.1225

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Used Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Used Oil	0.03	0.09	0.12

TANKS 4.0.9D OUTPUT
ETHYLENE GLYCOL STORAGE TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Ethylene Glycol Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	South Ignacio Ethylene Glycol Tanks

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	18.00
Net Throughput(gal/yr):	9,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Triethylene Glycol	All	51.76	37.44	66.07	44.16	0.0193	0.0193	0.0193	150.2000			74.12	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations

Standing Losses (lb):	0.8208
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0005
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	0.9980
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0005
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9980
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0193
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.6212
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Annual Net Throughput (gal/yr.):	9,000.0000
Annual Turnovers:	18.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.4420

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Triethylene Glycol	0.62	0.82	1.44

TANKS 4.0.9D OUTPUT
SLOP TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Slop Tank
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	South Ignacio Slop Tank

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.50
Liquid Height (ft) :	19.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	17,442.02
Turnovers:	12.00
Net Throughput(gal/yr):	209,304.20
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Slop Tank - Vertical Fixed Roof Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Slop/Lube Oil	All	55.23	38.46	72.00	45.42	0.0004	0.0002	0.0006	700.0000			207.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Slop Tank - Vertical Fixed Roof Tank
Ignacio, Colorado

Annual Emission Calculations	
Standing Losses (lb):	2.9295
Vapor Space Volume (cu ft):	1,268.0908
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1249
Vented Vapor Saturation Factor:	0.9998
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,268.0908
Tank Diameter (ft):	12.5000
Vapor Space Outage (ft):	10.3333
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0000
Shell Radius (ft):	6.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	514.8995
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.0850
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1249
Daily Vapor Temperature Range (deg. R):	67.0659
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	514.8995
Daily Min. Liquid Surface Temp. (deg R):	498.1331
Daily Max. Liquid Surface Temp. (deg R):	531.6660
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9998
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	10.3333
Working Losses (lb):	1.0465
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	209,304.2036
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	17,442.0170
Maximum Liquid Height (ft):	19.0000
Tank Diameter (ft):	12.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	3.9760

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Slop Tank - Vertical Fixed Roof Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Slop/Lube Oil	1.05	2.93	3.98

TANKS 4.0.9D OUTPUT
METHANOL TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Methanol StorageTank
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	South Ignacio Methanol Tank

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	6.00
Net Throughput(gal/yr):	3,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Methanol StorageTank - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	All	55.23	38.46	72.00	45.42	1.2389	0.7068	2.0832	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Methanol StorageTank - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations

Standing Losses (lb):	24.3481
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0072
Vapor Space Expansion Factor:	0.2625
Vented Vapor Saturation Factor:	0.8839
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0072
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2389
Daily Avg. Liquid Surface Temp. (deg. R):	514.8995
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	505.0850
Tank Paint Solar Absorptance (Shell):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2625
Daily Vapor Temperature Range (deg. R):	67.0659
Daily Vapor Pressure Range (psia):	1.3765
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2389
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.7068
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.0832
Daily Avg. Liquid Surface Temp. (deg R):	514.8995
Daily Min. Liquid Surface Temp. (deg R):	498.1331
Daily Max. Liquid Surface Temp. (deg R):	531.6660
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8839
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	1.2389
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	2.8353
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2389
Annual Net Throughput (gal/yr.):	3,000.0000
Annual Turnovers:	6.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	27.1834

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Methanol StorageTank - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	2.84	24.35	27.18

EMISSIONS UNITS

COMPRESSOR ENGINES

Emission Unit Description
Compressor Engines
South Ignacio Central Delivery Point

There are eight compressor engines at this facility; one Waukesha L7044GSI model, three Waukesha L7042GL models, and four Waukesha L5794LT models. The fuel for the engines is pipeline quality natural gas. The Waukesha L7044GSI engine, unit E1, is equipped with a non-selective catalyst (NSCR) for the control of NO_X, CO, and formaldehyde (CH_2O). The Waukesha L7042GL engines and the Waukesha L5794LT engines are each equipped with an oxidation catalyst for the control of CO and CH_2O. Detailed emission calculations are attached for each unit. The manufacturer's specification sheet and catalyst specification sheets are also attached. Table 7 lists the serial number, manufacture date and installation/startup date for each of the engines at the South Ignacio Central Delivery Point.

Table 7: South Ignacio Central Delivery Point Engine Information

Unit ID	Serial Number	Manufacture Date	Installation/Startup Date
E1	C-61982/1A	February 2004	08/01/2010
E2	C-60768/1	November 1997	01/29/2007
E3	C-12097/2	February 2008	03/14/2008
E4	C-12554/4	February 1998	09/30/2011
E5	C-15962/1	February 2006	08/24/2007
E6	C-15964/1	March 2006	08/18/2011
E7	C-15838/1	September 2005	03/29/2006
E8	C-15836/1	August 2005	04/05/2005

Performance tests are conducted on the engines at the South Ignacio Central Delivery Point to demonstrate compliance with the facility-wide formaldehyde limit, CO emission limits and Unit E1's NO_X emission limit. Unit E1 is tested quarterly to assess NO_X and CO emissions. Units E2, E3, E4, E5, E6, E7, and E8 are tested quarterly to assess CO emissions. All of the engines at the facility are tested quarterly to demonstrate compliance with the facility-wide formaldehyde emission limit. The testing may change to semi-annual if two consecutive quarterly test results show a sixty percent formaldehyde reduction. The NO_X (E1 only) and CO testing may also change to semi-annual if the monitoring results for two consecutive quarters demonstrate less than eighty percent of the permitted emission limits.

Unit E3 is subject to the requirements of 40 CFR Part 60, Subpart JJJJ. Performance tests are conducted on Unit E3 in accordance with 40 CFR 60.4244 every 8760 hours of operation or every three years, whichever comes first.

Reference method performance tests will be conducted for all replacement catalysts and engines to measure NO_X (E1 only), CO, and formaldehyde emissions to demonstrate compliance with the engine emission limits and the facility-wide formaldehyde emission limit. The performance tests will be conducted within 90 calendar days of catalyst change out or startup of the replacement engine.

The performance tests for NO_X and CO are conducted in accordance with the test methods specified in 40 CFR Part 60, Appendix A. EPA Reference Methods 7E and 10 are used to measure NO_X and CO emissions. The formaldehyde performance tests are performed in accordance with EPA Reference Method 320 or 323 of 40 CFR Part 63, Appendix A or Method CARB 430. The VOC performance tests are conducted in accordance with EPA Reference Method 25A and 18 of 40 CFR Part 63, Appendix A. All tests are performed at a maximum operating rate, 90% to 110% of engine design capacity. Each source test consists of at least three 1-hour or longer valid test runs. Emission results are reported as the arithmetic average of all valid test runs. During each test run data is collected on all parameters necessary to document how formaldehyde emissions were measured or calculated.

In addition to the performance tests, the catalysts are monitored to ensure correct operation so that the facility-wide formaldehyde limit is met. Unit E1 must operate with an engine exhaust temperature/catalyst inlet temperature between 750°F and 1250°F at all times the engine operates. Units E2, E3, E4, E5, E6, E7, and E8 are required to operate with an engine exhaust temperature/catalyst inlet temperature between 500°F and 1250°F at all times the engines operate. Measurements of the engine exhaust/catalyst inlet temperatures are taken on a daily basis. Weekly measurements of the pressure drop across each catalyst are performed and recorded. The pressure drop across each catalyst shall not deviate by more than two inches of water at maximum operating rate from the baseline pressure drop across the catalyst measured during the latest performance test. Corrective actions are taken if any measurement is not within the acceptable range.

Facility-wide emissions of formaldehyde will be calculated at the end of each calendar month from the results of the most recent performance test. The facility-wide emissions will be calculated by taking the emission factor in pounds per hour for each engine and multiplying by the number of operating hours for that month. If no hours are recorded the unit will be calculated as if it ran continuously during that month. The facility-wide emissions will include formaldehyde emissions from the engines and all other units including insignificant emissions units. The facility emissions for the month as described above will be added to the preceding 11 months to record a new rolling 12-month total.

EMISSION UNIT E1
WAUKESHA L7044GSI COMPRESSOR ENGINE

STANDARD EQUIPMENT

AIR CLEANER - Two, dry type with rain shield and service indicator.

BARRING DEVICE - Manual.

BEARINGS - Heavy duty, replaceable, precision type.

BREATHER - Closed system.

CONNECTING RODS - Drop forged steel, rifle drilled.

CONTROL SYSTEM - Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE - Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT - Forged steel, seven main bearings, counterweighted and dynamically balanced.

CYLINDERS - Removable wet type cylinder liners, chrome plated on outer diameter.

CYLINDER HEADS - Twelve interchangeable. Four valves per cylinder, with water cooled exhaust valve seats. Roller valve lifters and hydraulic push rods. Flange mounted ignition coils.

ENGINE MONITOR DEVICES - Thermocouples, K-type, are wired to a bulk head connector for jacket water temperature, lube oil temperature and intake manifold temperature. 25 foot (7.6 m) customer interface and standard thermocouple harnesses are provided for making connections to a customer supplied panel. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

ENGINE ROTATION - Counterclockwise when facing flywheel.

FLYWHEEL - Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88″ (810 mm) pilot bore, 30.25″ (768 mm) bolt circle, (12) 0.75″ 10 tapped holes; or 28.88″ (734 mm) pilot bore, 27.25″ (692 mm) bolt circle, (12) 0.625″-11 tapped holes and (12) 0.75″-10 tapped holes.

FLYWHEEL HOUSING - No. 00 SAE.

FUEL SYSTEM - Two natural gas, 4″ (102 mm) updraft carburetors and two Fisher Model 99, 2″ (51 mm) gas regulators, mounted. 25 psi (172 kPa) fuel inlet pressure required.

GOVERNOR - Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION SYSTEM - Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER - Air-to-water.

LEVELING BOLTS

LIFTING EYES - Requires 9.5 ton Working Load Limit (W.L.L.) anchor shackles.

LUBRICATION - Full pressure, gear type pump. Full flow lube oil filter with replaceable depth-type elements and flexible connections, shipped loose. MICROSPIN® bypass filter, engine mounted. Lube oil strainer, mounted. Air/gas motor driven prelube pump, requires final piping.

MANIFOLDS - Exhaust, (2) water cooled.

OIL COOLER - Shell and tube type, with thermostatic temperature controller and pressure regulating valve. Factory mounted.

OIL PAN - Base type. 90 gallon (340 L) capacity, including filter and cooler.

PAINT - Oilfield orange primer.

PISTONS - Aluminum with floating pin. Oil cooled. 8:1 compression ratio.

SHIPPING SKID - Steel for domestic truck or rail.

TURBOCHARGERS - (2) with water-cooled bearing housing and adjustable wastegates. Single vertical exhaust outlet at rear. Flexible stainless steel exhaust connection with 8″ (203 mm) pipe flange.

VIBRATION DAMPER - Viscous type.

WATER CIRCULATING SYSTEM

Auxiliary Circuit - Belt driven water circulating pump for intercooler and lube oil cooler.

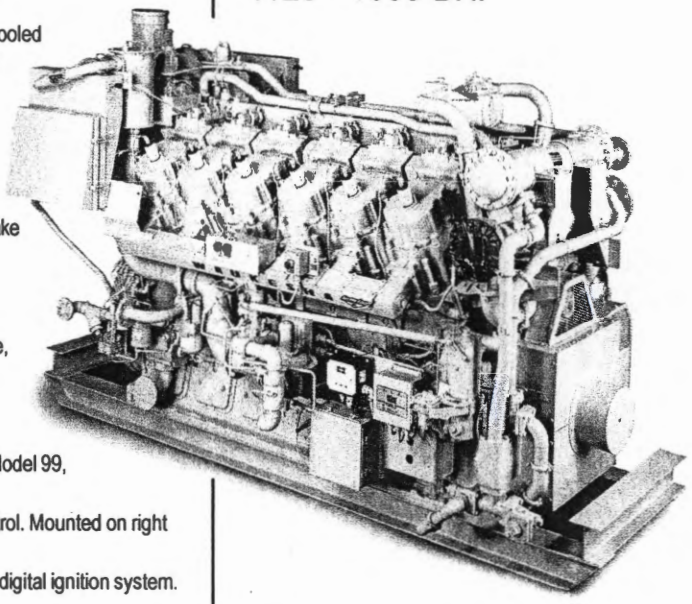
Engine Jacket - Belt driven water circulating pump. Cluster type thermostatic temperature regulating valve, full flow bypass type with 165° - 170° F (74° - 77° C) start to open thermostats. Flange connections and mating flanges for (2) 4″ (102 mm) inlets and (1) 5″ (127 mm) outlet.

WAUKESHA CUSTOM ENGINE CONTROL, DETONATION SENSING MODULE (DSM) – Includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Compatible with Waukesha CEC Ignition Module only. Detonation Sensing Module and filter are mounted and wired. Packager is responsible for 24V DC power supply and ground to the DSM. The DSM meets Canadian Standards Association Class I, Division 2, Group D hazardous location requirements.

Waukesha® SERIES FOUR® VHP

L7044GSI

VHP™ Series Four
1120 - 1680 BHP



Model L7044GSI Turbocharged and Intercooled, Twelve Cylinder, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders
V 12

Piston Displacement
7040 cu. in.
(115 L)

Bore & Stroke
9.375″ x 8.5″
(238 x 216 mm)

Compression Ratio
8:1

Jacket Water System Capacity
107 gal.
(405 L)

Lube Oil Capacity
90 gal.
(340 L)

Starting System
125 - 150 psi air/gas
24/32 V electric

Dry Weight
22,750 lb.
(10,320 kg)

Waukesha Engine ISO 9001 CERTIFIED

CONTINUOUS POWER RATINGS: L7044GSI VHP SERIES FOUR

Model	I.C. Water Inlet Temp. °F (°C) (Tcra)	C.R.	Brake Horsepower (kWb Output) 800 rpm	900 rpm	1000 rpm	1100 rpm	1200 rpm
L7044GSI	130° (54°)	8:1	1120 (836)	1260 (940)	1400 (1044)	1540 (1149)	1680 (1253)

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tcra (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV value, with a 91 Waukesha Knock Index®.

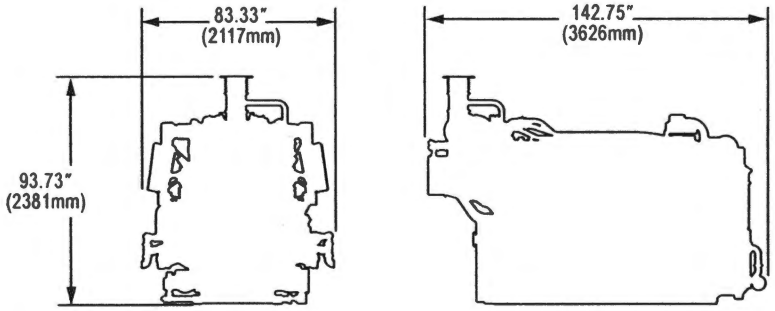
For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

PERFORMANCE: L7044GSI VHP SERIES FOUR

	English 130° F I.C. Water Temperature			Metric 54° C I.C. Water Temperature		
	RPM	1200	1000	RPM	1200	1000
Pre-Catalyst Settings	Power (Bhp)	1680	1400	Power (kWb)	1253	1044
	BSFC (Btu/bhp-hr)	7780	7685	BSFC (kJ/kW-hr)	11009	10874
	NOx (grams/bhp-hr)	12.6	12.1	NOx (g/nm³)	4.7	4.5
	CO (grams/bhp-hr)	13.8	12.2	CO (g/nm³)	5.1	4.5
	NMHC (grams/bhp–hr)	0.36	0.36	NMHC (g/nm³)	0.13	0.13
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	7595	7535	BSFC (g/nm³)	10747	10662
	NOx (grams/bhp-hr)	21.3	20.7	NOx (g/nm³)	7.9	7.7
	CO (grams/bhp-hr)	1.6	1.6	CO (g/nm³)	0.6	0.6
	NMHC (grams/bhp–hr)	0.30	0.30	NMHC (g/nm³)	0.11	0.11

NOTES:

1) Fuel consumption and exhaust emissions are based on ISO 3046/1-1995 standard reference conditions and commercial quality natural gas of 900 Btu/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) saturated lower heat value, Waukesha Knock Index® of 91 and 93% methane content by volume. ISO 3046/1-1995 standard reference conditions are 77°F (25°C) ambient temperature, 29.54 inches Hg (100 kPa) barometric pressure, 30% relative humidity (1kPa/0.3 inches Hg water vapor pressure).
2) S.I. exhaust emissions are corrected to 5% O_2 (0°C and 101.325 kPa).
3) Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



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Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

Bulletin 7045 0102

Emission Estimates
Emission Unit E1
South Ignacio Central Delivery Point

Unit E1 is a 1,680 horsepower Waukesha L7044GSI, a 4-stroke rich burn internal combustion engine. The engine is equipped with an NSCR catalyst. The level of control achieved by the catalyst is a federally enforceable permit condition. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Rich-burn Engine with NSCR Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	2.5	g/hp-hr
CO	3.5	g/hp-hr
VOC	0.5	g/hp-hr
Formaldehyde	0.02	g/hp-hr

Site-Rated Horsepower: 1,680 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}680\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 40.5\ tpy$$

$$CO = \frac{(3.5\ g/hp\text{-}hr)(1{,}680\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 56.7\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}680\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 8.1\ tpy$$

$$CH_2O = \frac{(0.02\ g/hp\text{-}hr)(1{,}680\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 0.3\ tpy$$

EMISSION UNIT E2
WAUKESHA L7042GL COMPRESSOR ENGINE

STANDARD EQUIPMENT

AIR CLEANER – Two, dry type with rain shield and service indicator.

BARRING DEVICE – Manual.

BEARINGS – Heavy duty, replaceable, precision type.

BREATHER – Closed system.

CONNECTING RODS – Drop forged steel, rifle drilled.

CONTROL SYSTEM – Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE – Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT – Counterweighted, forged steel, seven main bearings, and dynamically balanced.

CYLINDERS – Removable wet type cylinder liners, chrome plated on outer diameter. Induction hardened.

CYLINDER HEADS – Twelve interchangeable. Two hard faced intake and two hard faced exhaust valves per cylinder. Hard faced intake and exhaust valve seat inserts. Roller valve lifters and hydraulic push rods. Includes prechamber and related fuel control valves.

ENGINE ROTATION – Counterclockwise when facing flywheel.

ENGINE MONITORING DEVICES – Engine thermocouples, K-type, for jacket water temperature, lube oil temperature, intake manifold temperature, individual cylinder exhaust temperature and a common pre turbine temperatures, one on each bank. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

EXHAUST OUTLET – Single vertical at rear. Flexible stainless steel connection with 8″ (203 mm) pipe flange.

FLYWHEEL – Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88″ (810 mm) pilot bore, 30.25″ (768 mm) bolt circle, (12) 0.75″–10 tapped holes; or 28.88″ (734 mm) pilot bore, 27.25″ (692 mm) bolt circle, (12) 0.625″–11 tapped holes and (12) 0.75″–10 tapped holes.

FLYWHEEL HOUSING – No. 00 SAE.

FUEL SYSTEM – Dual natural gas, 4″ (102 mm) duplex updraft carburetors. Two Fisher Model 99, 2″ (51 mm) gas regulators, 30 – 50 psi (241 – 345 kPa) gas inlet pressure required. Prechamber fuel system and control logic.

GOVERNOR – Woodward UG–8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION – Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER – Air–to–water.

LEVELING BOLTS

LIFTING EYES

LUBRICATION – Full pressure. Gear type pump. Full flow filter, 36 gallon (136 litres) capacity, not mounted. Includes flexible connections. Includes lube oil strainer, mounted on engine. Air/gas motor driven prelube pump. Requires final piping.

MANIFOLDS – Exhaust, (2) water cooled.

OIL COOLER – With thermostatic temperature controller and pressure regulating valve. Not mounted.

OIL PAN – Base type. 90 gallon (340 litres) capacity including filter and cooler.

PAINT – Oilfield orange primer.

PISTONS – Aluminum with floating pin. 10.5:1 compression ratio. Oil cooled.

SHIPPING SKID – Steel for domestic truck or rail.

TURBOCHARGERS – Two, dry type. Wastegate controlled.

VIBRATION DAMPER – Two, viscous type. Guard included with remote mounted radiator or no radiator.

WATER CIRCULATING SYSTEM

Auxiliary Circuit – For oil cooler and intercooler. Pump is belt driven from crankshaft pulley. Includes thermostatic valve.

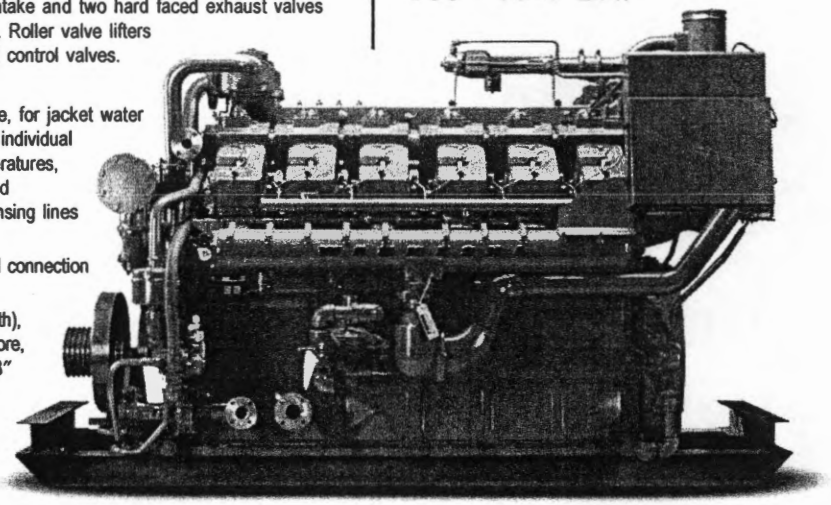
Engine Jacket – Belt driven water circulating pump, cluster type thermostatic temperature regulating valve, full flow bypass type. Flange connections and mating flanges for (2) 4″ (102 mm) inlets and (1) 5″ (127 mm) outlet.

WAUKESHA CUSTOM ENGINE CONTROL, DETONATION SENSING MODULE (DSM) – Includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Device is compatible with Waukesha CEC Ignition Module only. Sensors are mounted and wired to engine junction box. Detonation Sensing Module and filter are shipped loose. One 11 ft. cable provided for connection between engine junction box and filter. One each 15 ft. cable provided for connection between filter and DSM and Ignition Module and DSM. One 20 ft. cable provided for power and ground for filter. All cables are shipped loose. Packager is responsible for power supply and ground to the DSM. 24V DC power is required. The DSM meets Canadian Standards Association Class 1, Group D, Division 2, hazardous location requirements.

Waukesha® VHP

L7042GL

VHP™ Series Gas Engine
886 - 1547 BHP



Model L7042GL Turbocharged and Intercooled, Twelve Cylinder, Lean Combustion, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders
V 12

Piston Displacement
7040 cu. in.
(115 L)

Bore & Stroke
9.375″ x 8.5″
(238 x 216 mm)

Compression Ratio
10.5:1

Jacket Water System Capacity
107 gal.
(405 L)

Lube Oil Capacity
90 gal.
(340 L)

Starting System
125 - 150 psi air/gas
24/32V electric

Dry Weight
21,000 lb.
(9525 kg)

Full Load Exhaust Emissions
Nox - 1.50 g/bhp-hr
CO - 2.65 g/bhp-hr
HC - 1.00 g/bhp-hr
(non-methane)

Waukesha Engine ISO 9001 CERTIFIED

POWER RATINGS: L7042GL VHP SERIES GAS ENGINES

Model	I.C. Water Inlet Temp. °F (°C) (Tcra)	C.R.	Brake Horsepower (kWb Output) 800 rpm	900 rpm	1000 rpm	1100 rpm	1200 rpm
High Speed Turbo[1]	85° (29°)	10.5:1	928 (692)	1160 (865)	1289 (961)	1418 (1057)	1547 (1154)
High Speed Turbo[1]	130° (54°)	10.5:1	886 (661)	1108 (826)	1232 (919)	1355 (1010)	1478 (1102)
Low Speed Turbo[2]	85° (29°)	10.5:1	1031 (769)	1160 (865)	1289 (961)	— —	— —
Low Speed Turbo[2]	130° (54°)	10.5:1	985 (735)	1108 (826)	1232 (919)	— —	— —

[1]High speed turbocharger match – 1001-1200 rpm

[2]Low speed turbocharger match – 700-1000 rpm

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tcra (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV value, with a 91 Waukesha Knock Index®.

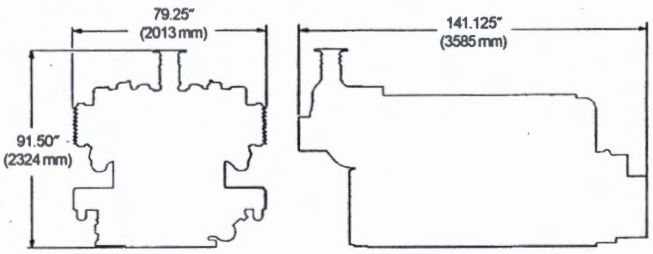
For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

PERFORMANCE: L7042GL VHP SERIES GAS ENGINES

	English	130° F ICW		85° F ICW		Metric	54° C ICW		29° C ICW	
	RPM	1200	1000	1200	1000	RPM	1200	1000	1200	1000
Low NO_x Settings	Power (Bhp)	1478	1232	1547	1289	Power (kWb)	1103	919	1154	962
	BSFC (Btu/bhp-hr)	7155	6815	7180	6840	BSFC (kJ/kW-hr)	10124	9643	10160	9679
	NOx (grams/bhp-hr)	0.90	0.90	0.70	0.70	NOx (g/nm³)	0.37	0.37	0.29	0.29
	CO (grams/bhp-hr)	2.75	2.65	2.65	2.55	CO (g/nm³)	1.14	1.10	1.10	1.05
	NMHC (grams/bhp–hr)	1.00	1.00	1.10	1.10	NMHC (g/nm³)	0.41	0.41	0.45	0.45
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	6910	6615	6935	6640	BSFC (kJ/kW-hr)	9778	9360	9813	9396
	NOx (grams/bhp-hr)	1.50	1.60	1.30	1.40	NOx (g/nm³)	0.62	0.66	0.54	0.58
	CO (grams/bhp-hr)	3.00	2.75	2.90	2.65	CO (g/nm³)	1.24	1.14	1.20	1.10
	NMHC (grams/bhp–hr)	0.70	1.00	0.80	1.10	NMHC (g/nm³)	0.29	0.41	0.33	0.45

NOTES:

1) Performance ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and Tcra limited to ± 10° F.
2) Fuel consumptions based on ISO 3046/1-1995 with a +5% tolerance for commercial quality natural gas having a 900 Btu/ft³ saturated low heat value.
3) Data based on standard conditions of 77° F (25° C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches Hg / 1 kPa water vapor pressure).
4) Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



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Bulletin 7005 0102

Emission Estimates
Emission Unit E2
South Ignacio Central Delivery Point

Unit E2 is a 1,267 horsepower Waukesha L7042GL, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	1.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.7	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,267 hp

$$NO_X = \frac{(1.5\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 18.3\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 12.2\ tpy$$

$$VOC = \frac{(0.7\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 8.6\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.2\ tpy$$

EMISSION UNIT E3
WAUKESHA L7042GL COMPRESSOR ENGINE

Emission Estimates
Emission Unit E3
South Ignacio Central Delivery Point

Unit E3 is a 1,267 horsepower Waukesha L7042GL, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	1.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.7	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,267 hp

$$NO_X = \frac{(1.5\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 18.3\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 12.2\ tpy$$

$$VOC = \frac{(0.7\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 8.6\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}267\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.2\ tpy$$

EMISSION UNIT E4
WAUKESHA L7042GL COMPRESSOR ENGINE

Emission Estimates
Emission Unit E4
South Ignacio Central Delivery Point

Unit E4 is a 1,336 horsepower Waukesha L7042GL, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	1.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.7	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,336 hp

$$NO_X = \frac{(1.5\ g/hp\text{-}hr)(1{,}336\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 19.3\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}336\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 12.9\ tpy$$

$$VOC = \frac{(0.7\ g/hp\text{-}hr)(1{,}336\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 9.0\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}336\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.3\ tpy$$

EMISSION UNITS E5, E6, E7, E8
WAUKESHA L5794LT COMPRESSOR ENGINES

STANDARD EQUIPMENT

AIR CLEANER - Two, dry type with rain shield and service indicator.

BARRING DEVICE - Manual.

BEARINGS - Heavy duty, replaceable, precision type.

BREATHER - Closed system.

CONNECTING RODS - Drop forged steel, rifle drilled.

CONTROL SYSTEM - Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE - Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT - Forged steel, seven main bearings, counterweighted and dynamically balanced.

CYLINDERS - Removable wet type cylinder liners.

CYLINDER HEADS - Twelve interchangeable. Four valves per cylinder, with water cooled exhaust valve seats. Roller valve lifters and hydraulic push rods. Flange mounted ignition coils.

DETONATION SENSING MODULE (DSM) - Waukesha Custom Engine Control Detonation Sensing Module includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Compatible with Waukesha CEC Ignition Module only. Detonation Sensing Module and filter are mounted and wired. Packager is responsible for 24V DC power supply and ground to the DSM. The DSM meets Canadian Standards Association Class 1, Division 2, Group D hazardous location requirements.

ENGINE MONITOR DEVICES - Thermocouples, K-type, are wired to a bulk head connector for jacket water temperature, lube oil temperature, intake manifold temperature, individual cylinder exhaust temperature and common pre-turbine temperatures, one on each bank. 25 foot (7.6 m) customer interface and standard thermocouple harnesses are provided for making connections to a customer supplied panel. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

ENGINE ROTATION - Counterclockwise when facing flywheel.

FLYWHEEL - Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88″ (810 mm) pilot bore, 30.25″ (768 mm) bolt circle, (12) 0.75″ 10 tapped holes; or 28.88″ (734 mm) pilot bore, 27.25″ (692 mm) bolt circle, (12) 0.625″-11 tapped holes and (12) 0.75″-10 tapped holes.

FLYWHEEL HOUSING - No. 00 SAE.

FUEL SYSTEM - Two natural gas, 4″ (102 mm) updraft carburetors and two Fisher Model 99, 2″ (51 mm) gas regulators, mounted. 30 - 50 psi (241 - 345 kPa) fuel inlet pressure required.

GOVERNOR - Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION SYSTEM - Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER - Air-to-water.

LEVELING BOLTS

LIFTING EYES - Requires 9.5 ton Working Load Limit (W.L.L.) anchor shackles.

LUBRICATION - Full pressure, gear type pump. Full flow lube oil filter, 36 gallon (136 litres) capacity, with replaceable depth-type elements and flexible connections, shipped loose. MICROSPIN® bypass filter, engine mounted. Lube oil strainer, mounted. Air/gas motor driven prelube pump, requires final piping.

MANIFOLDS - Exhaust (2) water cooled.

OIL COOLER - Shell and tube type, with thermostatic temperature controller and pressure regulating valve. Factory mounted.

OIL PAN - Base type. 90 gallon (340 L) capacity, including filter and cooler.

PAINT - Oilfield orange primer.

PISTONS - Aluminum with floating pin. Oil cooled. 10.2:1 compression ratio.

SHIPPING SKID - Steel for domestic truck or rail.

TURBOCHARGERS - (2) water-cooled bearing housing and differential wastegates. Single vertical exhaust outlet at rear. Flexible stainless steel exhaust connection with 8″ (203 mm) pipe flange.

VIBRATION DAMPER - Viscous type.

WATER CIRCULATING SYSTEM

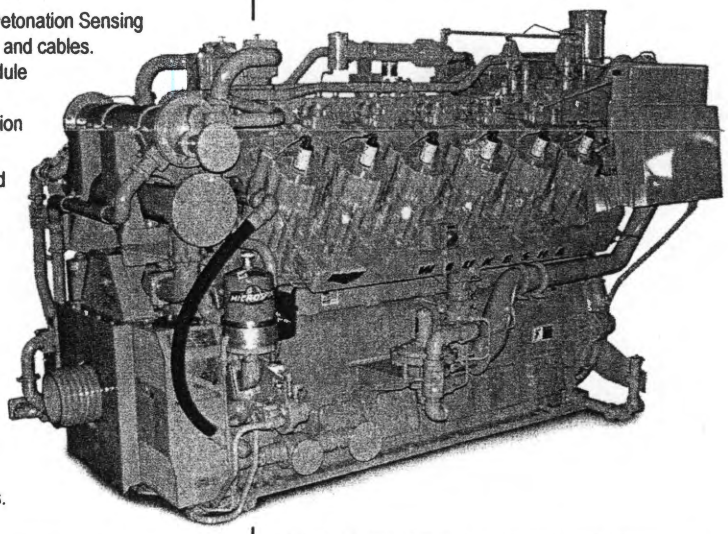
Auxiliary Circuit - Belt driven water circulating pump for intercooler and lube oil cooler. Includes thermostatic valve.

Engine Jacket - Belt driven water circulating pump. Cluster type thermostatic temperature regulating valve, full flow bypass type with 165° - 170° F (74° - 77° C) start to open thermostats. Flange connections and mating flanges for (2) 4″ (102 mm) inlets and (1) 5″ (127 mm) outlet.

Waukesha® SERIES FOUR® VHP

L5794LT

VHP™ Series Four
1205 - 1515 BHP



Model L5794LT Turbocharged and Intercooled, Twelve Cylinder, Lean Combustion, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders
V 12

Piston Displacement
5788 cu. in.
(95 L)

Bore & Stroke
8.5″ x 8.5″
(216 x 216 mm)

Compression Ratio
10.2:1

Jacket Water System Capacity
107 gal.
(405 L)

Lube Oil Capacity
90 gal.
(340 L)

Starting System
125 - 150 psi air/gas
24/32 V electric

Dry Weight
22,750 lb.
(10,320 kg)

Waukesha Engine ISO 9001 CERTIFIED

POWER RATINGS: L5794LT VHP SERIES FOUR

Model	I.C. Water Inlet Temp. °F (°C) (Tcra)	C.R.	Brake Horsepower (kWb Output) 1000 rpm	1100 rpm	1200 rpm
L5794LT	130° (54°)	10.2:1	1205 (899)	1325 (988)	1445 (1078)
L5794LT	85° (29°)	10.2:1	1260 (940)	1390 (1037)	1515 (1130)

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tcra (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV value, with a 91 Waukesha Knock Index®.

For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

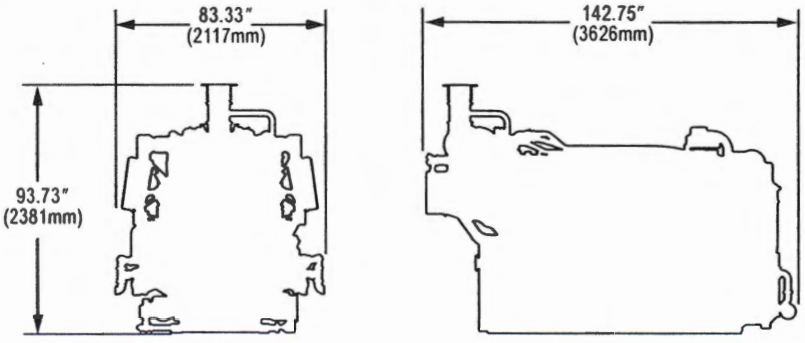
FUEL CONSUMPTION: L5794LT VHP SERIES FOUR

	English	130°F ICW		85°F ICW			Metric	54°C ICW		29° ICW	
Low NO_x Settings	RPM	1200	1000	1200	1000	Low NO_x Settings	RPM	1200	1000	1200	1000
	Power (Bhp)	1445	1205	1515*	1260*		Power (kWb)	1078	899	1130*	940*
	BSFC (Btu/bhp-hr)	7385	7395	7550	7490		BSFC (kJ/kW-hr)	10450	10465	10685	10600
	NOx (grams/bhp-hr)	1.60	1.70	1.00	1.15		NOx (g/nm³)	0.65	0.69	0.40	0.47
	CO (grams/bhp-hr)	1.70	1.65	1.60	1.60		CO (g/nm³)	0.69	0.67	0.65	0.65
	NMHC (grams/bhp-hr)	0.55	0.55	0.55	0.55		NMHC (g/nm³)	0.22	0.22	0.22	0.22
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	7080	6950	6955	6940	Low Fuel Consumption Settings	BSFC (kJ/kW-hr)	10020	9835	9840	9820
	NOx (grams/bhp-hr)	2.45	2.75	2.55	2.65		NOx (g/nm³)	0.99	1.11	1.03	1.07
	CO (grams/bhp-hr)	1.80	1.80	1.75	1.75		CO (g/nm³)	0.73	0.73	0.71	0.71
	NMHC (grams/bhp-hr)	0.50	0.50	0.50	0.50		NMHC (g/nm³)	0.20	0.20	0.20	0.20

*No overload is available at these settings.

NOTES:

1) Fuel consumption and exhaust emissions are based on ISO 3046/1-1995 standard reference conditions and commercial quality natural gas of 900 Btu/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) saturated lower heat value, Waukesha Knock Index® of 91 and 93% methane content by volume. ISO 3046/1-1995 standard reference conditions are 77°F (25°C) ambient temperature, 29.54 inches Hg (100 kPa) barometric pressure, 30% relative humidity (1kPa/0.3 inches Hg water vapor pressure).
2) S.I. exhaust emissions are corrected to 5% O_2 (0°C and 101.325 kPa).
3) Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



DRESSER
Waukesha

WAUKESHA ENGINE
DRESSER, INC.
1000 West St. Paul Avenue
Waukesha, WI 53188-4999
Phone: (262) 547-3311 Fax: (262) 549-2795
waukeshaengine.dresser.com

WAUKESHA ENGINE
DRESSER INDUSTRIAL PRODUCTS, B.V.
Farmsumerweg 43, Postbus 330
9900 AH Appingedam, The Netherlands
Phone: (31) 596-652222 Fax: (31) 596-628111

Bulletin 8023 0102

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION
434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

UE Compression	**Date**	**3/28/2005**
Greenwood Village, CO.	**Quote No.**	**463-4-175**
	Email:	lpullig@uec.unitedengines.com
	Phone:	**720-488-3523**
Les Pullig	**Fax:**	**720-488-3530**

ENGINE DATA	***Rich Burn***
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	891
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	3041
Exhaust Flow, scfh:	182443
Exhaust Flow, lb/hr:	13897
Exhaust MW:	28.9

TYPICAL (Rich Burn)	***MW***		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	***PRE***	***POST***	***% Reduction***
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	367.00	367.00	
NOx, ppmvd @ 15% O2:	196.67	196.67	
CO, g/Bhp-hr:	1.84	0.25	86.4%
CO, lb/hr:	5.86	0.80	
CO, tons/yr:	25.68	3.49	
CO, ppmv:	762.42	103.59	
CO, ppmvd @ 15% O2:	408.56	55.51	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	70.44	70.44	
NMHC as CH4, ppm @ 15% o2:	37.75	37.75	
CH2O as CH4, g/Bhp-hr:	0.16	0.06	62.5%
CH2O as CH4, lb/hr:	0.51	0.19	
CH2O as CH4, tons.yr.:	2.23	0.84	
CH2O as CH4, ppm:	66.30	24.86	
CH2O as CH4, ppm @ 15% o2:	35.53	13.32	

SCOPE OF SUPPLY	**BXO70-14**	***QXC70-14**
Exhaust Line Size, (inches)	**14**	**14**
Attenuation type	**None**	**Critical**
Drawing reference:	**10-OD4070-3**	**8200-1**
Housing:	**Stainless**	**Carbon**
Element(s)(Oxidation)	**1**	**1**
Back Pressure: estimated (inches H2O)	**5**	**7**
Net Price:	**$6,535.00**	**$6,765.00**
Delivery: ARO	**2-3 Weeks**	**6-8 Weeks**

***Integrated Converter/Silencer**
End in....End out
OXIDATION CATALYST

G. W. Kammerer, Engine Industries Sales Manag 281.353.2500 fax : 928-222-4111 email: kammew@jmusa.com

Price firm and valid for 30 days from date of quote, FOB point of Manufacture, excludes any applicable duties and taxes. Terms, net 30 days from date of invoice as offered under Jm's General Terms and Conditions. Warranty 13 months from date of shipment or 12 months from date of start-up. Written notice required. Maximum service temperature 1350 degree F. Minimum operating temperature 750 degrees F.

Data above calculated from engine manufactures data corresponding to catalyst converter settings. A slightly rich to stoichiometric air fuel ratio is required (Oxygen content in exhaust of 0.2% - 0.7%) oxygen sensor millivolts approximately 700 to 800, or lambda of 0.97 to 0.99)

Table I Engine Rich burn

JM
Johnson Matthey

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION

434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

Samson Investment Co.	**Date:** 09/10/2007
Samson Plaza	**Quote No.** N/A
Two West Second St.	**Email:** mbutler@samson.com
Tulsa, OK 74103-3103	**Phone:** 918-591-1619
Attn: Mr. Mike Butler	**Fax:**

ENGINE DATA	
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	600
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	3875
Exhaust Flow, scfh:	232528
Exhaust Flow, lb/hr:	17712
Exhaust MW:	28.9

TYPICAL (Rich Burn)	MW		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	PRE	POST	% Reduction
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	287.95	287.95	
NOx, ppmvd @ 15% O2:	154.31	154.31	
CO, g/Bhp-hr:	1.84	0.33	82.1%
CO, lb/hr:	5.86	1.05	
CO, tons/yr:	25.68	4.61	
CO, ppmv:	598.20	107.29	
CO, ppmvd @ 15% O2:	320.56	57.49	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	55.27	55.27	
NMHC as CH4, ppm @ 15% o2:	29.62	29.62	
CH2O as CH4, g/Bhp-hr:	0.22	0.07	69.1%
CH2O as CH4, lb/hr:	0.70	0.22	
CH2O as CH4, tons.yr.:	3.07	0.95	
CH2O as CH4, ppm:	71.52	22.11	
CH2O as CH4, ppm @ 15% o2:	38.33	11.85	

SCOPE OF SUPPLY	BXO70-14	*QXC70-14
Exhaust Line Size, (inches)	14	14
Attenuation type	None	Critical
Drawing reference:	10-OD4070-3	8200-1
Housing:		
Element(s)(Oxidation)		
Back Pressure: estimated (inches H2O)		
Net Price:		
Delivery: ARO		

***Integrated Converter/Silencer**
End in....End out
OXIDATION CATALYST

Jack Carroll Sr. Sales Engineer **ph: 484-320-2** **fax : 484-320-2152928-222-** **email: carrojj@jmusa.com**

Johnson Matthey

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION

434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

Samson Investment Co.	**Date:** 09/10/2007
Samson Plaza	**Quote No.** N/A
Two West Second St.	**Email:** mbutler@samson.com
Tulsa, OK 74103-3103	**Phone:** 918-591-1619
Attn: Mr. Mike Butler	**Fax:**

ENGINE DATA	
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	500
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	4279
Exhaust Flow, scfh:	256750
Exhaust Flow, lb/hr:	19557
Exhaust MW:	28.9

TYPICAL (Rich Burn)	MW		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	PRE	POST	% Reduction
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	260.79	260.79	
NOx, ppmvd @ 15% O2:	139.75	139.75	
CO, g/Bhp-hr:	1.84	0.40	78.3%
CO, lb/hr:	5.86	1.27	
CO, tons/yr:	25.68	5.58	
CO, ppmv:	541.76	117.77	
CO, ppmvd @ 15% O2:	290.32	63.11	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	50.05	50.05	
NMHC as CH4, ppm @ 15% o2:	26.82	26.82	
CH2O as CH4, g/Bhp-hr:	0.22	0.08	65.9%
CH2O as CH4, lb/hr:	0.70	0.24	
CH2O as CH4, tons.yr.:	3.07	1.05	
CH2O as CH4, ppm:	64.78	22.08	
CH2O as CH4, ppm @ 15% o2:	34.71	11.83	

SCOPE OF SUPPLY	BXO70-14	*QXC70-14
Exhaust Line Size, (inches)	14	14
Attenuation type	None	Critical
Drawing reference:	10-OD4070-3	8200-1
Housing:		
Element(s)(Oxidation)		
Back Pressure: estimated (inches H2O)		
Net Price:		
Delivery: ARO		

*Integrated Converter/Silencer
End in....End out
OXIDATION CATALYST

Jack Carroll Sr. Sales Engineer **ph: 484-320-2** **fax : 484-320-2152928-222-** **email: carrojj@jmusa.com**

Johnson Matthey

Emission Estimates
Emission Unit E5
South Ignacio Central Delivery Point

Unit E5 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	2.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.5	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 13.5\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.4\ tpy$$

Emission Estimates
Emission Unit E6
South Ignacio Central Delivery Point

Unit E6 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	2.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.5	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 13.5\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.4\ tpy$$

Emission Estimates
Emission Unit E7
South Ignacio Central Delivery Point

Unit E7 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	2.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.5	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 13.5\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.4\ tpy$$

Emission Estimates
Emission Unit E8
South Ignacio Central Delivery Point

Unit E8 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst. Potential to emit calculations are presented below.

Potential to Emit: Controlled Configuration
Lean-burn Engine with Oxidation Catalyst

Manufacturer Emission Factors/Testing Experience

NO_X	2.5	g/hp-hr
CO	1.0	g/hp-hr
VOC	0.5	g/hp-hr
Formaldehyde	0.1	g/hp-hr

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.0\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 13.5\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.1\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 1.4\ tpy$$

DEHYDRATION UNITS

Emission Unit Description
Dehydration Units
South Ignacio Central Delivery Point

There are two tri-ethylene glycol dehydration units installed at the South Ignacio Central Delivery Point. The dehydration units, Units D1 and D2, are equipped with flash gas separators that route the flash gas back into the sales line. Units D1 and D2 are each equipped with condensers and emissions from both units are routed to a PESCO BTEX combustor control unit which has a manufacturer guaranteed 98-percent control efficiency. Detailed emission calculations are attached for each unit. The PESCO BTEX unit manufacturer's specification sheet is also attached. Table 8 lists the serial number and installation/startup date for each of the dehydration units at the South Ignacio Central Delivery Point.

Table 8: Jaques Dehydration Unit Information

Unit ID	Description	Serial Number	Installation/Startup Date
D1	30 MMscfd PESCO Dehydration Unit with 1.25 MMBtu/hr reboiler burner	101727	2003
D2	40 MMscfd PESCO Dehydration Unit with 0.75 MMBtu/hr reboiler burner	Custom	2009

Benzene emissions from each dehydration unit are limited to 0.9 tons per consecutive twelve months. There is also a facility-wide HAP emission limit of 23 tons per consecutive twelve month period. To ensure compliance with these limits monthly gas analysis testing will be conducted to use for monthly dehydration unit emission calculations. This testing shall show the temperature and pressure of the inlet gas. Monthly determination of benzene and HAP emissions from the dehydrator will be calculated by using GRI GlyCalc using the current month's wet gas analysis, the temperature and pressure of the gas, the enclosed flare destruction efficiency of 98%, and the maximum gas throughput and glycol pump recirculation rate for each dehydrator. Unit D1 has a maximum throughput of 30 MMscfd and a glycol recirculation rate of 15 gallons per minute and D2 has a maximum throughput of 40 MMscfd and glycol recirculation rate of 17 gallons per minute.

Benzene emissions will be determined from each dehydrator each month. The benzene emissions for that month will be added to the preceding eleven months to record a new 12-month rolling total. HAP emissions will be determined from each dehydrator each month. The HAP emissions will be added to those from the engines and insignificant emissions units listed in the air permit to determine the monthly total. This monthly total will be added to the preceding eleven months to record a new 12-month rolling total.

Records will be kept of the gas analysis testing, GRI Glycalc modeling, and the rolling 12 month emissions totals for benzene and HAPs.

Emission Estimates
Emission Unit D1 - 30 MMscfd PESCO Dehydration Unit
Emission Unit D2 - 40 MMscfd PESCO Dehydration Unit
South Ignacio Central Delivery Point

VOC and HAP emissions may occur when triethylene glycol is regenerated. The emission model GRI-GLYCalc, a thermodynamic-based process simulator for dehydration units, was utilized to estimate emissions from this unit. A worse-case inlet gas analysis was developed based on highest sampled VOC content and maximum anticipated benzene concentration and input to the model. Following is a summary of other worse-case operating parameter model input values:

Parameter	Value	
Inlet Gas Temperature	70	°F
Inlet Gas Pressure	500	psig
Inlet Benzene Concentration	20	ppm
D1 Inlet Gas Throughput	30	MMscfd
D1 Glycol Circulation	15	gpm
D2 Inlet Gas Throughput	40	MMscfd
D2 Glycol Circulation	17	gpm
Flash Vessel Temperature	100	°F
Flash Vessel Pressure	30	psig
Condenser Temperature	120	°F
Condenser Pressure	23	psia (Atmospheric)

Units D1 and D2 will each be equipped with flash gas separators that route the flash gas back into the sales line. The dehydration units are also equipped with condensers and emissions from both units will be routed to a PESCO BTEX combustor unit which has a manufacturer guaranteed 98-percent control efficiency.

D1 - 30 MMscfd Model Results (Output Follows)

VOC Emissions	0.31 tpy (20.3 tpy Uncontrolled)
Benzene Emissions	0.18 tpy (Controlled)

D2 - 40 MMscfd Model Results (Output Follows)

VOC Emissions	0.36 tpy (24.5 tpy Uncontrolled)
Benzene Emissions	0.22 tpy (Controlled)

Emission Limits

Benzene Emissions	0.9 tpy (for each unit)
Facility-wide HAP	23.0 tpy

pesco
process equipment & service company inc

OPERATIONAL GUARANTEE - PESCO FLARE STACK
U.S. PATENT 6485292 (Other Patents Pending)

The PESCO Flare Stack (enclosed flare) is guaranteed to achieve total destruction of 98% or greater of all hydrocarbons present in the overhead stream from the still column of a glycol dehydrator. This assumes that the operating parameters do not exceed those to which the flare stack was initially designed. The PESCO Flare Stack is also guaranteed to meet the environmental requirements as set forth in 40 CFR 60.18.

James Rhodes
Engineering Manager
Process Equipment & Service Co., Inc.

6880 U.S. HIGHWAY 64 • 87401 / P.O. BOX 828 • 87499 • FARMINGTON, NEW MEXICO • PHONE: (505) 327-2222 • FAX: (505) 327-7550

EMISSION UNIT D1
TEG DEHYDRATION UNIT

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Samson South Ignacio
File Name: C:\Work\Projects\Samson\South Ignacio\Permit Work\Synthetic Minor December 2011\D1MaxCase.ddf
Date: December 15, 2011

DESCRIPTION:

Description: D1 PTE Model
30 MMSCFD PESCO Dehydration Unit

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0182	0.437	0.0798
Ethane	0.0015	0.037	0.0068
Propane	0.0008	0.018	0.0033
Isobutane	0.0004	0.008	0.0015
n-Butane	0.0006	0.015	0.0028
Isopentane	0.0005	0.013	0.0023
n-Pentane	0.0004	0.010	0.0017
n-Hexane	0.0007	0.016	0.0029
Cyclohexane	0.0016	0.039	0.0071
Other Hexanes	0.0007	0.018	0.0032
Heptanes	0.0017	0.042	0.0076
Methylcyclohexane	0.0027	0.065	0.0120
2,2,4-Trimethylpentane	0.0002	0.006	0.0010
Benzene	0.0417	1.000	0.1824
Toluene	0.0087	0.208	0.0379
Xylenes	0.0095	0.229	0.0418
C8+ Heavies	0.0003	0.006	0.0011
Total Emissions	0.0903	2.166	0.3953
Total Hydrocarbon Emissions	0.0903	2.166	0.3953
Total VOC Emissions	0.0705	1.692	0.3087
Total HAP Emissions	0.0607	1.458	0.2660
Total BTEX Emissions	0.0598	1.436	0.2621

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.9114	21.874	3.9920
Ethane	0.0773	1.856	0.3386
Propane	0.0378	0.908	0.1656
Isobutane	0.0177	0.425	0.0776
n-Butane	0.0320	0.768	0.1401
Isopentane	0.0268	0.643	0.1173
n-Pentane	0.0201	0.484	0.0882
n-Hexane	0.0345	0.828	0.1510
Cyclohexane	0.0855	2.053	0.3747
Other Hexanes	0.0378	0.907	0.1655

Heptanes	0.0968	2.324	0.4241
Methylcyclohexane	0.1527	3.666	0.6690
2,2,4-Trimethylpentane	0.0128	0.306	0.0559
Benzene	2.2599	54.238	9.8984
Toluene	0.5370	12.889	2.3522
Xylenes	0.8357	20.057	3.6603
C8+ Heavies	0.4498	10.795	1.9702
Total Emissions	5.6257	135.018	24.6408
Total Hydrocarbon Emissions	5.6257	135.018	24.6408
Total VOC Emissions	4.6370	111.289	20.3102
Total HAP Emissions	3.6799	88.317	16.1178
Total BTEX Emissions	3.6326	87.183	15.9109

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	13.5680	325.632	59.4279
Ethane	0.2840	6.816	1.2439
Propane	0.0620	1.488	0.2715
Isobutane	0.0176	0.421	0.0769
n-Butane	0.0234	0.561	0.1024
Isopentane	0.0160	0.383	0.0700
n-Pentane	0.0093	0.224	0.0408
n-Hexane	0.0080	0.192	0.0351
Cyclohexane	0.0048	0.114	0.0208
Other Hexanes	0.0119	0.286	0.0522
Heptanes	0.0099	0.237	0.0432
Methylcyclohexane	0.0062	0.148	0.0270
2,2,4-Trimethylpentane	0.0027	0.065	0.0119
Benzene	0.0159	0.381	0.0695
Toluene	0.0022	0.053	0.0096
Xylenes	0.0012	0.030	0.0054
C8+ Heavies	0.0039	0.095	0.0173
Total Emissions	14.0469	337.125	61.5254
Total Hydrocarbon Emissions	14.0469	337.125	61.5254
Total VOC Emissions	0.1949	4.677	0.8536
Total HAP Emissions	0.0300	0.720	0.1314
Total BTEX Emissions	0.0193	0.463	0.0845

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00	deg. F
Condenser Pressure:	23.00	psia
Condenser Duty:	2.18e-002	MM BTU/hr
Hydrocarbon Recovery:	0.09	bbls/day
Produced Water:	3.22	bbls/day
Ambient Temperature:	60.00	deg. F
Excess Oxygen:	2.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	2.18e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	1.99%	98.01%
n-Butane	1.99%	98.01%
Isopentane	1.97%	98.03%
n-Pentane	1.97%	98.03%
n-Hexane	1.92%	98.08%
Cyclohexane	1.89%	98.11%
Other Hexanes	1.94%	98.06%
Heptanes	1.80%	98.20%
Methylcyclohexane	1.79%	98.21%
2,2,4-Trimethylpentane	1.81%	98.19%
Benzene	1.84%	98.16%
Toluene	1.61%	98.39%
Xylenes	1.14%	98.86%
C8+ Heavies	0.06%	99.94%

ABSORBER

Specified Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	1.35	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	500.0	psig
Dry Gas Flow Rate:	30.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0369	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	39.42	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	18.91	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.42%	96.58%
Carbon Dioxide	99.49%	0.51%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.88%	0.12%
Propane	99.77%	0.23%
Isobutane	99.63%	0.37%
n-Butane	99.49%	0.51%
Isopentane	99.42%	0.58%
n-Pentane	99.23%	0.77%
n-Hexane	98.50%	1.50%
Cyclohexane	93.49%	6.51%
Other Hexanes	98.91%	1.09%
Heptanes	96.77%	3.23%
Methylcyclohexane	91.82%	8.18%
2,2,4-Trimethylpentane	98.63%	1.37%

Benzene	55.80%	44.20%
Toluene	40.82%	59.18%
Xylenes	20.28%	79.72%
C8+ Heavies	89.90%	10.10%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 100.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	49.63%	50.37%
Nitrogen	6.16%	93.84%
Methane	6.29%	93.71%
Ethane	21.40%	78.60%
Propane	37.89%	62.11%
Isobutane	50.22%	49.78%
n-Butane	57.77%	42.23%
Isopentane	62.81%	37.19%
n-Pentane	68.53%	31.47%
n-Hexane	81.24%	18.76%
Cyclohexane	94.90%	5.10%
Other Hexanes	76.26%	23.74%
Heptanes	90.80%	9.20%
Methylcyclohexane	96.28%	3.72%
2,2,4-Trimethylpentane	82.75%	17.25%
Benzene	99.34%	0.66%
Toluene	99.63%	0.37%
Xylenes	99.87%	0.13%
C8+ Heavies	99.24%	0.76%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	72.68%	27.32%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.80%	99.20%
n-Pentane	0.73%	99.27%
n-Hexane	0.62%	99.38%
Cyclohexane	3.37%	96.63%
Other Hexanes	1.31%	98.69%
Heptanes	0.55%	99.45%
Methylcyclohexane	4.15%	95.85%
2,2,4-Trimethylpentane	1.81%	98.19%

Benzene	5.03%	94.97%
Toluene	7.93%	92.07%
Xylenes	12.92%	87.08%
C8+ Heavies	12.11%	87.89%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.30e-002	4.93e+001
Carbon Dioxide	5.27e+000	7.65e+003
Nitrogen	1.62e-002	1.50e+001
Methane	9.43e+001	4.99e+004
Ethane	3.16e-001	3.14e+002
Propane	3.01e-002	4.38e+001
Isobutane	5.00e-003	9.58e+000
n-Butane	5.70e-003	1.09e+001
Isopentane	3.10e-003	7.37e+000
n-Pentane	1.60e-003	3.81e+000
n-Hexane	9.99e-004	2.84e+000
Cyclohexane	5.00e-004	1.39e+000
Other Hexanes	1.60e-003	4.54e+000
Heptanes	9.99e-004	3.30e+000
Methylcyclohexane	5.99e-004	1.94e+000
2,2,4-Trimethylpentane	3.00e-004	1.13e+000
Benzene	2.00e-003	5.15e+000
Toluene	3.00e-004	9.11e-001
Xylenes	3.00e-004	1.05e+000
C8+ Heavies	7.99e-004	4.49e+000
Total Components	100.00	5.80e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.84e-003	1.69e+000
Carbon Dioxide	5.25e+000	7.61e+003
Nitrogen	1.62e-002	1.50e+001
Methane	9.44e+001	4.99e+004
Ethane	3.16e-001	3.13e+002
Propane	3.00e-002	4.37e+001
Isobutane	4.98e-003	9.54e+000
n-Butane	5.67e-003	1.09e+001
Isopentane	3.08e-003	7.33e+000
n-Pentane	1.59e-003	3.78e+000

n-Hexane	9.86e-004	2.80e+000
Cyclohexane	4.68e-004	1.30e+000
Other Hexanes	1.58e-003	4.50e+000
Heptanes	9.68e-004	3.20e+000
Methylcyclohexane	5.51e-004	1.78e+000
2,2,4-Trimethylpentane	2.96e-004	1.11e+000
Benzene	1.12e-003	2.87e+000
Toluene	1.23e-004	3.72e-001
Xylenes	6.09e-005	2.13e-001
C8+ Heavies	7.20e-004	4.04e+000
Total Components	100.00	5.79e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.32e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	4.66e-011	3.94e-009
Nitrogen	5.46e-015	4.61e-013
Methane	5.76e-018	4.86e-016
Ethane	2.02e-009	1.71e-007
Propane	4.81e-011	4.06e-009
Isobutane	1.25e-011	1.06e-009
n-Butane	1.63e-011	1.37e-009
Isopentane	2.54e-006	2.15e-004
n-Pentane	1.75e-006	1.48e-004
n-Hexane	2.53e-006	2.14e-004
Cyclohexane	3.54e-005	2.99e-003
Other Hexanes	5.94e-006	5.02e-004
Heptanes	6.35e-006	5.36e-004
Methylcyclohexane	7.84e-005	6.62e-003
2,2,4-Trimethylpentane	2.79e-006	2.36e-004
Benzene	1.42e-003	1.20e-001
Toluene	5.48e-004	4.63e-002
Xylenes	1.47e-003	1.24e-001
C8+ Heavies	7.34e-004	6.20e-002
Total Components	100.00	8.45e+003

RICH GLYCOL STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.52e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.73e+001	8.32e+003
Water	2.04e+000	1.74e+002
Carbon Dioxide	4.60e-001	3.94e+001
Nitrogen	5.38e-005	4.60e-003
Methane	1.69e-001	1.45e+001

Ethane	4.23e-003	3.61e-001
Propane	1.17e-003	9.98e-002
Isobutane	4.13e-004	3.53e-002
n-Butane	6.47e-004	5.54e-002
Isopentane	5.02e-004	4.30e-002
n-Pentane	3.46e-004	2.96e-002
n-Hexane	4.99e-004	4.27e-002
Cyclohexane	1.09e-003	9.33e-002
Other Hexanes	5.87e-004	5.02e-002
Heptanes	1.25e-003	1.07e-001
Methylcyclohexane	1.94e-003	1.66e-001
2,2,4-Trimethylpentane	1.84e-004	1.57e-002
Benzene	2.80e-002	2.40e+000
Toluene	6.85e-003	5.85e-001
Xylenes	1.12e-002	9.61e-001
C8+ Heavies	6.03e-003	5.16e-001
Total Components	100.00	8.55e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 44.70 psia
Flow Rate: 4.97e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.71e-002	2.29e-002
Carbon Dioxide	3.44e+001	1.98e+001
Nitrogen	1.18e-002	4.32e-003
Methane	6.46e+001	1.36e+001
Ethane	7.21e-001	2.84e-001
Propane	1.07e-001	6.20e-002
Isobutane	2.31e-002	1.76e-002
n-Butane	3.07e-002	2.34e-002
Isopentane	1.69e-002	1.60e-002
n-Pentane	9.86e-003	9.32e-003
n-Hexane	7.10e-003	8.01e-003
Cyclohexane	4.31e-003	4.76e-003
Other Hexanes	1.06e-002	1.19e-002
Heptanes	7.51e-003	9.87e-003
Methylcyclohexane	4.79e-003	6.16e-003
2,2,4-Trimethylpentane	1.81e-003	2.71e-003
Benzene	1.55e-002	1.59e-002
Toluene	1.82e-003	2.19e-003
Xylenes	8.85e-004	1.23e-003
C8+ Heavies	1.77e-003	3.94e-003
Total Components	100.00	3.39e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.51e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.77e+001	8.32e+003
Water	2.05e+000	1.74e+002
Carbon Dioxide	2.29e-001	1.95e+001
Nitrogen	3.33e-006	2.84e-004
Methane	1.07e-002	9.11e-001
Ethane	9.08e-004	7.73e-002
Propane	4.44e-004	3.78e-002
Isobutane	2.08e-004	1.77e-002
n-Butane	3.75e-004	3.20e-002
Isopentane	3.17e-004	2.70e-002
n-Pentane	2.38e-004	2.03e-002
n-Hexane	4.07e-004	3.47e-002
Cyclohexane	1.04e-003	8.85e-002
Other Hexanes	4.49e-004	3.83e-002
Heptanes	1.14e-003	9.74e-002
Methylcyclohexane	1.87e-003	1.59e-001
2,2,4-Trimethylpentane	1.53e-004	1.30e-002
Benzene	2.79e-002	2.38e+000
Toluene	6.85e-003	5.83e-001
Xylenes	1.13e-002	9.60e-001
C8+ Heavies	6.01e-003	5.12e-001
Total Components	100.00	8.52e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.21e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.26e+001	4.76e+001
Carbon Dioxide	1.39e+001	1.95e+001
Nitrogen	3.17e-004	2.84e-004
Methane	1.78e+000	9.11e-001
Ethane	8.03e-002	7.73e-002
Propane	2.68e-002	3.78e-002
Isobutane	9.53e-003	1.77e-002
n-Butane	1.72e-002	3.20e-002
Isopentane	1.16e-002	2.68e-002
n-Pentane	8.73e-003	2.01e-002
n-Hexane	1.25e-002	3.45e-002
Cyclohexane	3.18e-002	8.55e-002
Other Hexanes	1.37e-002	3.78e-002
Heptanes	3.02e-002	9.68e-002
Methylcyclohexane	4.86e-002	1.53e-001
2,2,4-Trimethylpentane	3.49e-003	1.28e-002
Benzene	9.04e-001	2.26e+000
Toluene	1.82e-001	5.37e-001

Component	Conc. (wt%)	Loading (lb/hr)	
Xylenes	2.46e-001	8.36e-001	
C8+ Heavies	8.25e-002	4.50e-001	
Total Components	100.00	7.28e+001	

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 9.38e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.98e+001	4.68e+001	998328.
Carbon Dioxide	1.03e-001	4.82e-002	1027.
Nitrogen	3.91e-008	1.83e-008	0.
Methane	2.42e-004	1.14e-004	2.
Ethane	2.34e-005	1.10e-005	0.
Propane	1.18e-005	5.56e-006	0.
Isobutane	3.02e-006	1.42e-006	0.
n-Butane	7.22e-006	3.39e-006	0.
Isopentane	4.22e-006	1.98e-006	0.
n-Pentane	3.41e-006	1.60e-006	0.
n-Hexane	4.72e-006	2.21e-006	0.
Cyclohexane	6.48e-005	3.04e-005	1.
Other Hexanes	4.21e-006	1.97e-006	0.
Heptanes	6.89e-006	3.23e-006	0.
Methylcyclohexane	5.22e-005	2.45e-005	1.
2,2,4-Trimethylpentane	6.05e-007	2.84e-007	0.
Benzene	4.69e-002	2.20e-002	469.
Toluene	8.02e-003	3.76e-003	80.
Xylenes	9.21e-003	4.32e-003	92.
C8+ Heavies	6.36e-007	2.98e-007	0.
Total Components	100.00	4.69e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.56e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.35e-002	4.73e-004
Carbon Dioxide	3.92e-001	4.27e-003
Nitrogen	2.26e-006	2.46e-008
Methane	6.85e-003	7.45e-005
Ethane	3.02e-003	3.28e-005
Propane	7.53e-003	8.19e-005
Isobutane	6.90e-003	7.50e-005
n-Butane	1.69e-002	1.84e-004
Isopentane	3.27e-002	3.55e-004
n-Pentane	2.93e-002	3.19e-004
n-Hexane	1.25e-001	1.36e-003
Cyclohexane	4.38e-001	4.76e-003
Other Hexanes	1.03e-001	1.12e-003
Heptanes	8.87e-001	9.64e-003
Methylcyclohexane	1.50e+000	1.63e-002
2,2,4-Trimethylpentane	1.14e-001	1.24e-003

Benzene	1.43e+001	1.55e-001
Toluene	9.26e+000	1.01e-001
Xylenes	3.26e+001	3.54e-001
C8+ Heavies	4.02e+001	4.37e-001
Total Components	100.00	1.09e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 23.00 psia
Flow Rate: 2.23e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.46e+000	7.91e-001
Carbon Dioxide	7.52e+001	1.95e+001
Nitrogen	1.72e-003	2.84e-004
Methane	9.66e+000	9.11e-001
Ethane	4.37e-001	7.73e-002
Propane	1.45e-001	3.77e-002
Isobutane	5.16e-002	1.76e-002
n-Butane	9.30e-002	3.18e-002
Isopentane	6.22e-002	2.64e-002
n-Pentane	4.67e-002	1.98e-002
n-Hexane	6.53e-002	3.31e-002
Cyclohexane	1.63e-001	8.08e-002
Other Hexanes	7.23e-002	3.67e-002
Heptanes	1.48e-001	8.72e-002
Methylcyclohexane	2.36e-001	1.36e-001
2,2,4-Trimethylpentane	1.72e-002	1.15e-002
Benzene	4.53e+000	2.08e+000
Toluene	7.98e-001	4.33e-001
Xylenes	7.64e-001	4.77e-001
C8+ Heavies	1.28e-002	1.28e-002
Total Components	100.00	2.48e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 7.72e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	5.58e+001	1.82e-002
Ethane	2.52e+000	1.55e-003
Propane	8.41e-001	7.55e-004
Isobutane	2.98e-001	3.53e-004
n-Butane	5.37e-001	6.36e-004
Isopentane	3.60e-001	5.28e-004
n-Pentane	2.70e-001	3.97e-004
n-Hexane	3.78e-001	6.62e-004
Cyclohexane	9.43e-001	1.62e-003
Other Hexanes	4.18e-001	7.33e-004
Heptanes	8.55e-001	1.74e-003
Methylcyclohexane	1.37e+000	2.73e-003
2,2,4-Trimethylpentane	9.92e-002	2.31e-004

Benzene	2.62e+001	4.17e-002
Toluene	4.61e+000	8.65e-003
Xylenes	4.42e+000	9.54e-003
C8+ Heavies	7.39e-002	2.56e-004
Total Components	100.00	9.03e-002

EMISSION UNIT D2
TEG DEHYDRATION UNIT

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Samson South Ignacio
File Name: C:\Work\Projects\Samson\South Ignacio\Permit Work\Synthetic Minor December 2011\D2MaxCase.ddf
Date: December 15, 2011

DESCRIPTION:

Description: D2 PTE Model
40 MMSCFD PESCO Dehydration Unit

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0206	0.494	0.0902
Ethane	0.0017	0.042	0.0076
Propane	0.0009	0.021	0.0037
Isobutane	0.0004	0.010	0.0017
n-Butane	0.0007	0.017	0.0032
Isopentane	0.0006	0.014	0.0026
n-Pentane	0.0004	0.011	0.0020
n-Hexane	0.0007	0.018	0.0033
Cyclohexane	0.0018	0.044	0.0080
Other Hexanes	0.0008	0.020	0.0036
Heptanes	0.0019	0.047	0.0085
Methylcyclohexane	0.0031	0.073	0.0134
2,2,4-Trimethylpentane	0.0003	0.006	0.0011
Benzene	0.0494	1.186	0.2164
Toluene	0.0103	0.248	0.0453
Xylenes	0.0114	0.274	0.0500
C8+ Heavies	0.0003	0.006	0.0011
Total Emissions	0.1054	2.530	0.4618
Total Hydrocarbon Emissions	0.1054	2.530	0.4618
Total VOC Emissions	0.0831	1.994	0.3640
Total HAP Emissions	0.0722	1.732	0.3161
Total BTEX Emissions	0.0712	1.708	0.3117

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.0302	24.724	4.5122
Ethane	0.0872	2.092	0.3818
Propane	0.0428	1.028	0.1876
Isobutane	0.0201	0.481	0.0879
n-Butane	0.0362	0.869	0.1586
Isopentane	0.0303	0.727	0.1327
n-Pentane	0.0228	0.547	0.0999
n-Hexane	0.0390	0.937	0.1710
Cyclohexane	0.0972	2.332	0.4256
Other Hexanes	0.0427	1.026	0.1872

Heptanes	0.1097	2.633	0.4805
Methylcyclohexane	0.1738	4.172	0.7614
2,2,4-Trimethylpentane	0.0144	0.346	0.0632
Benzene	2.7143	65.143	11.8887
Toluene	0.6615	15.877	2.8975
Xylenes	1.0695	25.668	4.6844
C8+ Heavies	0.5132	12.316	2.2476
Total Emissions	6.7050	160.919	29.3677
Total Hydrocarbon Emissions	6.7050	160.919	29.3677
Total VOC Emissions	5.5876	134.103	24.4738
Total HAP Emissions	4.4988	107.971	19.7047
Total BTEX Emissions	4.4453	106.688	19.4705

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	15.3516	368.438	67.2399
Ethane	0.3213	7.712	1.4074
Propane	0.0702	1.685	0.3075
Isobutane	0.0199	0.477	0.0871
n-Butane	0.0265	0.636	0.1160
Isopentane	0.0181	0.434	0.0793
n-Pentane	0.0106	0.253	0.0463
n-Hexane	0.0091	0.218	0.0398
Cyclohexane	0.0054	0.130	0.0238
Other Hexanes	0.0135	0.324	0.0592
Heptanes	0.0112	0.269	0.0491
Methylcyclohexane	0.0071	0.169	0.0309
2,2,4-Trimethylpentane	0.0031	0.074	0.0135
Benzene	0.0191	0.458	0.0836
Toluene	0.0027	0.065	0.0119
Xylenes	0.0016	0.038	0.0069
C8+ Heavies	0.0045	0.109	0.0198
Total Emissions	15.8954	381.490	69.6219
Total Hydrocarbon Emissions	15.8954	381.490	69.6219
Total VOC Emissions	0.2225	5.340	0.9746
Total HAP Emissions	0.0355	0.853	0.1556
Total BTEX Emissions	0.0234	0.561	0.1023

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00	deg. F
Condenser Pressure:	23.00	psia
Condenser Duty:	2.53e-002	MM BTU/hr
Hydrocarbon Recovery:	0.11	bbls/day
Produced Water:	4.29	bbls/day
Ambient Temperature:	60.00	deg. F
Excess Oxygen:	2.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	2.53e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	1.99%	98.01%
Isobutane	1.99%	98.01%
n-Butane	1.99%	98.01%
Isopentane	1.97%	98.03%
n-Pentane	1.96%	98.04%
n-Hexane	1.91%	98.09%
Cyclohexane	1.87%	98.13%
Other Hexanes	1.93%	98.07%
Heptanes	1.78%	98.22%
Methylcyclohexane	1.76%	98.24%
2,2,4-Trimethylpentane	1.78%	98.22%
Benzene	1.82%	98.18%
Toluene	1.56%	98.44%
Xylenes	1.07%	98.93%
C8+ Heavies	0.05%	99.95%

ABSORBER

Specified Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	1.38	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	500.0	psig
Dry Gas Flow Rate:	40.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0492	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	39.42	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	16.09	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.50%	96.50%
Carbon Dioxide	99.56%	0.44%
Nitrogen	99.97%	0.03%
Methane	99.98%	0.02%
Ethane	99.90%	0.10%
Propane	99.81%	0.19%
Isobutane	99.69%	0.31%
n-Butane	99.57%	0.43%
Isopentane	99.51%	0.49%
n-Pentane	99.34%	0.66%
n-Hexane	98.73%	1.27%
Cyclohexane	94.45%	5.55%
Other Hexanes	99.07%	0.93%
Heptanes	97.25%	2.75%
Methylcyclohexane	93.01%	6.99%
2,2,4-Trimethylpentane	98.84%	1.16%

Benzene	60.18%	39.82%
Toluene	45.32%	54.68%
Xylenes	23.48%	76.52%
C8+ Heavies	91.35%	8.65%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 100.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	49.62%	50.38%
Nitrogen	6.15%	93.85%
Methane	6.29%	93.71%
Ethane	21.34%	78.66%
Propane	37.90%	62.10%
Isobutane	50.21%	49.79%
n-Butane	57.76%	42.24%
Isopentane	62.79%	37.21%
n-Pentane	68.51%	31.49%
n-Hexane	81.21%	18.79%
Cyclohexane	94.88%	5.12%
Other Hexanes	76.22%	23.78%
Heptanes	90.77%	9.23%
Methylcyclohexane	96.26%	3.74%
2,2,4-Trimethylpentane	82.70%	17.30%
Benzene	99.34%	0.66%
Toluene	99.62%	0.38%
Xylenes	99.87%	0.13%
C8+ Heavies	99.23%	0.77%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	69.35%	30.65%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.80%	99.20%
n-Pentane	0.73%	99.27%
n-Hexane	0.62%	99.38%
Cyclohexane	3.37%	96.63%
Other Hexanes	1.31%	98.69%
Heptanes	0.55%	99.45%
Methylcyclohexane	4.16%	95.84%
2,2,4-Trimethylpentane	1.81%	98.19%

Benzene	5.03%	94.97%
Toluene	7.93%	92.07%
Xylenes	12.92%	87.08%
C8+ Heavies	12.12%	87.88%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.30e-002	6.58e+001
Carbon Dioxide	5.27e+000	1.02e+004
Nitrogen	1.62e-002	1.99e+001
Methane	9.43e+001	6.65e+004
Ethane	3.16e-001	4.18e+002
Propane	3.01e-002	5.83e+001
Isobutane	5.00e-003	1.28e+001
n-Butane	5.70e-003	1.46e+001
Isopentane	3.10e-003	9.83e+000
n-Pentane	1.60e-003	5.07e+000
n-Hexane	9.99e-004	3.79e+000
Cyclohexane	5.00e-004	1.85e+000
Other Hexanes	1.60e-003	6.06e+000
Heptanes	9.99e-004	4.40e+000
Methylcyclohexane	5.99e-004	2.59e+000
2,2,4-Trimethylpentane	3.00e-004	1.51e+000
Benzene	2.00e-003	6.87e+000
Toluene	3.00e-004	1.21e+000
Xylenes	3.00e-004	1.40e+000
C8+ Heavies	7.99e-004	5.99e+000
Total Components	100.00	7.73e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.91e-003	2.30e+000
Carbon Dioxide	5.26e+000	1.02e+004
Nitrogen	1.62e-002	1.99e+001
Methane	9.44e+001	6.65e+004
Ethane	3.16e-001	4.18e+002
Propane	3.01e-002	5.82e+001
Isobutane	4.99e-003	1.27e+001
n-Butane	5.68e-003	1.45e+001
Isopentane	3.09e-003	9.78e+000
n-Pentane	1.59e-003	5.04e+000

n-Hexane	9.88e-004	3.74e+000
Cyclohexane	4.72e-004	1.75e+000
Other Hexanes	1.59e-003	6.00e+000
Heptanes	9.73e-004	4.28e+000
Methylcyclohexane	5.58e-004	2.41e+000
2,2,4-Trimethylpentane	2.97e-004	1.49e+000
Benzene	1.20e-003	4.13e+000
Toluene	1.36e-004	5.50e-001
Xylenes	7.05e-005	3.29e-001
C8+ Heavies	7.31e-004	5.47e+000
Total Components	100.00	7.72e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.70e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	9.43e+003
Water	1.50e+000	1.44e+002
Carbon Dioxide	4.66e-011	4.46e-009
Nitrogen	5.45e-015	5.21e-013
Methane	5.75e-018	5.50e-016
Ethane	2.01e-009	1.93e-007
Propane	4.81e-011	4.60e-009
Isobutane	1.25e-011	1.20e-009
n-Butane	1.62e-011	1.55e-009
Isopentane	2.54e-006	2.43e-004
n-Pentane	1.75e-006	1.68e-004
n-Hexane	2.53e-006	2.42e-004
Cyclohexane	3.54e-005	3.39e-003
Other Hexanes	5.94e-006	5.68e-004
Heptanes	6.35e-006	6.08e-004
Methylcyclohexane	7.88e-005	7.54e-003
2,2,4-Trimethylpentane	2.79e-006	2.67e-004
Benzene	1.50e-003	1.44e-001
Toluene	5.95e-004	5.70e-002
Xylenes	1.66e-003	1.59e-001
C8+ Heavies	7.39e-004	7.07e-002
Total Components	100.00	9.57e+003

RICH GLYCOL STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.73e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.72e+001	9.43e+003
Water	2.13e+000	2.07e+002
Carbon Dioxide	4.60e-001	4.46e+001
Nitrogen	5.37e-005	5.21e-003
Methane	1.69e-001	1.64e+001

Ethane	4.21e-003	4.08e-001
Propane	1.17e-003	1.13e-001
Isobutane	4.12e-004	3.99e-002
n-Butane	6.46e-004	6.27e-002
Isopentane	5.01e-004	4.86e-002
n-Pentane	3.46e-004	3.35e-002
n-Hexane	4.99e-004	4.84e-002
Cyclohexane	1.09e-003	1.06e-001
Other Hexanes	5.86e-004	5.68e-002
Heptanes	1.25e-003	1.22e-001
Methylcyclohexane	1.94e-003	1.88e-001
2,2,4-Trimethylpentane	1.83e-004	1.78e-002
Benzene	2.97e-002	2.88e+000
Toluene	7.44e-003	7.21e-001
Xylenes	1.27e-002	1.23e+000
C8+ Heavies	6.07e-003	5.88e-001
Total Components	100.00	9.70e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 44.70 psia
Flow Rate: 5.63e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.02e-001	2.72e-002
Carbon Dioxide	3.44e+001	2.25e+001
Nitrogen	1.18e-002	4.89e-003
Methane	6.45e+001	1.54e+001
Ethane	7.20e-001	3.21e-001
Propane	1.07e-001	7.02e-002
Isobutane	2.31e-002	1.99e-002
n-Butane	3.07e-002	2.65e-002
Isopentane	1.69e-002	1.81e-002
n-Pentane	9.87e-003	1.06e-002
n-Hexane	7.11e-003	9.09e-003
Cyclohexane	4.35e-003	5.43e-003
Other Hexanes	1.06e-002	1.35e-002
Heptanes	7.55e-003	1.12e-002
Methylcyclohexane	4.84e-003	7.05e-003
2,2,4-Trimethylpentane	1.81e-003	3.07e-003
Benzene	1.65e-002	1.91e-002
Toluene	1.98e-003	2.71e-003
Xylenes	1.00e-003	1.58e-003
C8+ Heavies	1.79e-003	4.53e-003
Total Components	100.00	3.84e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.72e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.76e+001	9.43e+003
Water	2.14e+000	2.07e+002
Carbon Dioxide	2.29e-001	2.21e+001
Nitrogen	3.31e-006	3.20e-004
Methane	1.07e-002	1.03e+000
Ethane	9.02e-004	8.72e-002
Propane	4.43e-004	4.28e-002
Isobutane	2.08e-004	2.01e-002
n-Butane	3.75e-004	3.62e-002
Isopentane	3.16e-004	3.05e-002
n-Pentane	2.38e-004	2.30e-002
n-Hexane	4.06e-004	3.93e-002
Cyclohexane	1.04e-003	1.01e-001
Other Hexanes	4.48e-004	4.33e-002
Heptanes	1.14e-003	1.10e-001
Methylcyclohexane	1.88e-003	1.81e-001
2,2,4-Trimethylpentane	1.52e-004	1.47e-002
Benzene	2.96e-002	2.86e+000
Toluene	7.44e-003	7.19e-001
Xylenes	1.27e-002	1.23e+000
C8+ Heavies	6.04e-003	5.84e-001
Total Components	100.00	9.66e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.58e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.48e+001	6.34e+001
Carbon Dioxide	1.21e+001	2.21e+001
Nitrogen	2.75e-004	3.20e-004
Methane	1.55e+000	1.03e+000
Ethane	6.98e-002	8.72e-002
Propane	2.34e-002	4.28e-002
Isobutane	8.31e-003	2.01e-002
n-Butane	1.50e-002	3.62e-002
Isopentane	1.01e-002	3.03e-002
n-Pentane	7.61e-003	2.28e-002
n-Hexane	1.09e-002	3.90e-002
Cyclohexane	2.78e-002	9.72e-002
Other Hexanes	1.19e-002	4.27e-002
Heptanes	2.63e-002	1.10e-001
Methylcyclohexane	4.26e-002	1.74e-001
2,2,4-Trimethylpentane	3.04e-003	1.44e-002
Benzene	8.36e-001	2.71e+000
Toluene	1.73e-001	6.62e-001

Xylenes	2.42e-001	1.07e+000
C8+ Heavies	7.25e-002	5.13e-001
Total Components	100.00	9.23e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 1.25e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.98e+001	6.25e+001	998301.
Carbon Dioxide	1.02e-001	6.42e-002	1024.
Nitrogen	3.89e-008	2.44e-008	0.
Methane	2.41e-004	1.51e-004	2.
Ethane	2.32e-005	1.45e-005	0.
Propane	1.18e-005	7.40e-006	0.
Isobutane	3.01e-006	1.88e-006	0.
n-Butane	7.20e-006	4.51e-006	0.
Isopentane	4.20e-006	2.63e-006	0.
n-Pentane	3.39e-006	2.12e-006	0.
n-Hexane	4.68e-006	2.93e-006	0.
Cyclohexane	6.43e-005	4.03e-005	1.
Other Hexanes	4.18e-006	2.62e-006	0.
Heptanes	6.78e-006	4.25e-006	0.
Methylcyclohexane	5.16e-005	3.23e-005	1.
2,2,4-Trimethylpentane	5.95e-007	3.73e-007	0.
Benzene	4.90e-002	3.07e-002	490.
Toluene	8.45e-003	5.29e-003	84.
Xylenes	9.70e-003	6.08e-003	97.
C8+ Heavies	5.57e-007	3.49e-007	0.
Total Components	100.00	6.27e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 3.28e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.53e-002	6.33e-004
Carbon Dioxide	3.95e-001	5.52e-003
Nitrogen	2.55e-006	3.56e-008
Methane	6.77e-003	9.45e-005
Ethane	2.95e-003	4.12e-005
Propane	7.46e-003	1.04e-004
Isobutane	6.83e-003	9.55e-005
n-Butane	1.67e-002	2.33e-004
Isopentane	3.25e-002	4.54e-004
n-Pentane	2.94e-002	4.11e-004
n-Hexane	1.24e-001	1.74e-003
Cyclohexane	4.35e-001	6.08e-003
Other Hexanes	1.02e-001	1.43e-003
Heptanes	8.76e-001	1.22e-002
Methylcyclohexane	1.49e+000	2.08e-002
2,2,4-Trimethylpentane	1.12e-001	1.56e-003

Benzene	1.53e+001	2.14e-001
Toluene	9.94e+000	1.39e-001
Xylenes	3.53e+001	4.93e-001
C8+ Heavies	3.58e+001	5.00e-001
Total Components	100.00	1.40e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 23.00 psia
Flow Rate: 2.53e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.46e+000	8.98e-001
Carbon Dioxide	7.50e+001	2.21e+001
Nitrogen	1.71e-003	3.20e-004
Methane	9.61e+000	1.03e+000
Ethane	4.34e-001	8.71e-002
Propane	1.45e-001	4.27e-002
Isobutane	5.14e-002	2.00e-002
n-Butane	9.27e-002	3.60e-002
Isopentane	6.19e-002	2.98e-002
n-Pentane	4.65e-002	2.24e-002
n-Hexane	6.48e-002	3.73e-002
Cyclohexane	1.62e-001	9.11e-002
Other Hexanes	7.18e-002	4.13e-002
Heptanes	1.46e-001	9.75e-002
Methylcyclohexane	2.33e-001	1.53e-001
2,2,4-Trimethylpentane	1.69e-002	1.29e-002
Benzene	4.73e+000	2.47e+000
Toluene	8.41e-001	5.17e-001
Xylenes	8.05e-001	5.71e-001
C8+ Heavies	1.12e-002	1.27e-002
Total Components	100.00	2.82e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.89e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	5.48e+001	2.06e-002
Ethane	2.47e+000	1.74e-003
Propane	8.28e-001	8.55e-004
Isobutane	2.93e-001	3.99e-004
n-Butane	5.29e-001	7.19e-004
Isopentane	3.53e-001	5.97e-004
n-Pentane	2.65e-001	4.48e-004
n-Hexane	3.70e-001	7.46e-004
Cyclohexane	9.24e-001	1.82e-003
Other Hexanes	4.09e-001	8.26e-004
Heptanes	8.31e-001	1.95e-003
Methylcyclohexane	1.33e+000	3.06e-003
2,2,4-Trimethylpentane	9.62e-002	2.57e-004

Benzene	2.70e+001	4.94e-002
Toluene	4.80e+000	1.03e-002
Xylenes	4.59e+000	1.14e-002
C8+ Heavies	6.39e-002	2.55e-004
Total Components	100.00	1.05e-001

Gas Analysis

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	South Ignacio Suct Header
Analysis Date/Time:	5/6/2011	1:56 PM	Field:	La Plata
Analyst Initials:	AST		ML#:	Samson
Instrument ID:	Instrument 1		GC Method:	Quesbtex
Data File:	QPC66.D			
Date Sampled:	5/1/2011			

Component	Mol%	Wt%	LV%
Methane	94.3395	86.0641	94.1004
Ethane	0.3166	0.5413	0.4996
Propane	0.0301	0.0754	0.0488
Isobutane	0.0050	0.0167	0.0097
n-Butane	0.0057	0.0189	0.0106
Neopentane	0.0005	0.0019	0.0011
Isopentane	0.0026	0.0107	0.0056
n-Pentane	0.0016	0.0064	0.0033
2,2-Dimethylbutane	0.0000	0.0000	0.0000
2,3-Dimethylbutane	0.0003	0.0015	0.0007
2-Methylpentane	0.0007	0.0035	0.0017
3-Methylpentane	0.0006	0.0028	0.0014
n-Hexane	0.0010	0.0051	0.0025
Heptanes	0.0027	0.0146	0.0063
Octanes	0.0004	0.0027	0.0013
Nonanes	0.0004	0.0031	0.0013
Decanes plus	0.0003	0.0021	0.0009
Nitrogen	0.0162	0.0258	0.0104
Carbon Dioxide	5.2758	13.2034	5.2944
Oxygen	0.0000	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

Global Properties		Units
Gross BTU/Real CF	964.4	BTU/SCF at 60°F and14.73 psia
Sat.Gross BTU/Real CF	948.8	BTU/SCF at 60°F and14.73 psia
Gas Compressibility (Z)	0.9979	
Specific Gravity	0.6086	air=1
Avg Molecular Weight	17.586	gm/mole
Propane GPM	0.008249	gal/MCF
Butane GPM	0.003424	gal/MCF
Gasoline GPM	0.003867	gal/MCF
26# Gasoline GPM	0.005715	gal/MCF
Total GPM	0.015596	gal/MCF
Base Mol%	99.482	%v/v

Sample Temperature:	48	°F
Sample Pressure:	46	psig
H2SLength of Stain Tube	N/A	ppm

Component	Mol%	Wt%	LV%
Benzene	0.0000	0.0000	0.0000
Toluene	0.0003	0.0017	0.0006
Ethylbenzene	0.0000	0.0000	0.0000
M&P Xylene	0.0003	0.0021	0.0008
O-Xylene	0.0000	0.0000	0.0000
2,2,4-Trimethylpentane	0.0003	0.0020	0.0009
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0005	0.0025	0.0010
Methylcyclohexane	0.0006	0.0035	0.0015
Description:	South Ignacio Suct Header		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	5.2758	13.2034	5.2944
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	0.0162	0.0258	0.0104
Methane	94.3395	86.0641	94.1004
Ethane	0.3166	0.5413	0.4996
Propane	0.0301	0.0754	0.0488
Isobutane	0.0050	0.0167	0.0097
n-Butane	0.0057	0.0189	0.0106
Isopentane	0.0031	0.0126	0.0067
n-Pentane	0.0016	0.0064	0.0033
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0010	0.0051	0.0025
Cyclohexane	0.0005	0.0025	0.0010
Other Hexanes	0.0016	0.0078	0.0038
Heptanes	0.0010	0.0049	0.0023
Methylcyclohexane	0.0006	0.0035	0.0015
2,2,4 Trimethylpentane	0.0003	0.0020	0.0009
Benzene	0.0000	0.0000	0.0000
Toluene	0.0003	0.0017	0.0006
Ethylbenzene	0.0000	0.0000	0.0000
Xylenes	0.0003	0.0021	0.0008
C8+ Heavies	0.0008	0.0058	0.0027
Subtotal	100.0000	100.0000	100.0000
Oxygen	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

EMISSION UNIT FUG
FUGITIVE EMISSIONS

Emission Estimates
Emission Unit FUG
South Ignacio Central Delivery Point

Service	Component	Count	Emission factor (lb/component/hr)	VOC	
				(lb/hr)	(tpy)
		VOC Wt. % = 0.163			
Gas	Valves	258	0.00992	0.00	0.02
	Connectors	86	0.00044	0.00	0.00
	Flanges	40	0.00086	0.00	0.00
	Other	116	0.01940	0.00	0.02
	Open End	0	0.00441	0.00	0.00
	Pump Seals	0	0.00529	0.00	0.00
		VOC Wt. % = 100.00			
Slop/Oil	Valves	76	0.00551	0.42	1.83
	Connectors	14	0.00046	0.01	0.03
	Flanges	2	0.00024	0.00	0.00
	Other	2	0.01653	0.03	0.14
	Open End	0	0.00309	0.00	0.00
	Pump Seals	0	0.02866	0.00	0.00
		VOC Wt. % = 100.00			
Glycol	Valves	32	0.00551	0.18	0.77
	Connectors	10	0.00046	0.00	0.02
	Flanges	0	0.00024	0.00	0.00
	Other	2	0.01653	0.00	0.00
	Open End	0	0.00309	0.00	0.00
	Pump Seals	2	0.02866	0.06	0.25
		VOC Wt. % = 50.00			
Water	Valves	65	0.000216	0.01	0.03
	Connectors	40	0.000243	0.00	0.02
	Flanges	2	0.000006	0.00	0.00
	Other	19	0.000053	0.00	0.00
	Open End	0	0.030865	0.00	0.00
	Pump Seals	1	0.000551	0.00	0.00
		767		**0.72**	**3.14**

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
South Ignacio Central Delivery Point

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L7044GSI	6700.59	57.93	0.01
E2	Waukesha L7042GL	4491.21	57.90	0.01
E3	Waukesha L7042GL	4491.21	57.90	0.01
E4	Waukesha L7042GL	4735.31	57.90	0.01
E5	Waukesha L5794LT	5137.33	57.91	0.01
E6	Waukesha L5794LT	5137.33	57.91	0.01
E7	Waukesha L5794LT	5137.33	57.91	0.01
E8	Waukesha L5794LT	5137.33	57.91	0.01
D1	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	85.41	3.99	0.00
D2	0.75 MMBtu/hr Reboiler	383.18	0.01	0.00
	Glycol Process Vents	96.80	4.51	0.00
FUG	Fugitive Leaks	2.83	18.38	0.00
IEUs	Insignificant Units	306.54	0.01	0.00
Total		42481.04	490.17	0.08
CO_2e		42481.04	10293.49	24.67

Total GHG PTE **42,971 tpy**
Total CO_2e **52,799 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E1	
	Waukesha L7044GSI Compressor Engine	
Combustion	4 Stroke Rich Burn	
Rating	1680	hp
Operating Hours	8760	hours/year
Fuel Consuption	7780	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions		Emissions		Emissions		Emissions			
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,528	6,692	1.45	6.34	246.77	2.47	3.32	0.09	6,700.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.026	0.114	9.41	41.21	1604.59	16.05	21.56	0.56	57.93	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.003	0.013	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E2, E3	
	Waukesha L7042GL Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1267	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,023	4,482	1.45	6.34	246.77	2.47	3.32	0.09	4,491.21	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.077	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.008	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E4	
	Waukesha L7042GL Compressor Engine	
Combustion	4 Stroke Lean Burn	
Rating	1336	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,079	4,726	1.45	6.34	246.77	2.47	3.32	0.09	4,735.31	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.081	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.009	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E5, E6, E7, E8	
	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents		Blowdowns		Starter		Totals	Emission Factor Source
	Emission Factor	Emissions		Emissions		Emissions		Emissions			
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.45	6.34	246.77	2.47	3.32	0.09	5,137.33	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.020	0.088	9.41	41.21	1604.59	16.05	21.56	0.56	57.91	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Dehydration Unit Reboilers
Hours of Operation	8760 hrs
D1 Rating	1.25 MMBtu/hr
D2 Rating	0.75 MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	87.48	383.18	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.002	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	30	MMscfd
D2 Annual Throughput	40	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	19.5	85.41	19.5	85.41
Methane	0.911	3.99	0.911	3.99
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	22.1	96.80	22.1	96.80
Methane	1.03	4.51	1.03	4.51
N_2O	0.0	0	0.0	0.0

Fugitive GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Fugitive Emissions
CO_2	13.232 wt%
CH_4	86.038 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.34	1.48	2.20	9.64
Connectors	86	2.00E-04	0.01	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.30	1.30	1.93	8.47
Total			**0.65**	**2.83**	**4.20**	**18.38**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size	CO_2		Methane		N_2O	
		(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
Heater/Burner Total				**306.54**		**0.01**		**0.00**

From: Eric Wortman/R8/USEPA/US
To: srose@samson.com
Cc: Katie Romero/R8/USEPA/US@EPA, Kathleen Paser/R8/USEPA/US@EPA, bjarrell@southern-ute.nsn.us
Bcc: Claudia Smith/R8/USEPA/US@EPA

Date: Tuesday, September 13, 2011 08:27AM
Subject: S. Ignacio CDP Syn. Minor Limit Request

Scott,

EPA received your application requesting synthetic minor limits under 40 CFR part 49 for the S. Ignacio CDP facility on September 1, 2011. I have reviewed the application and determined that it is administratively incomplete. Your application for synthetic minor limits under the Federal Minor NSR rule should include all the documentation necessary to process the permit action. Since this is a new permit action, an entirely new application must be submitted. References to other applications or permits does not provide a complete application or docket for issuing the permit. As we do with our part 71 program, the application must be a wholly, self contained, independent package. EPA has developed application checklist and instructions for submitting information to our office, which can be found at http://epa.gov/region8/air/permitting/tmnsr.html. Please note that although the use of these checklist is not mandatory, providing all of the information identified on the checklist is recommended for a complete application and will help expedite the permitting process.

Specifically, Samson Resources only provided the information suggested on the Form "SYNMIN" in the September 1st submittal. All of the items listed on Form "NEW" are also necessary to process the request. Additionally, it appeared that some other information may have been omitted from your request. For example, the engines at the facility currently have part 71 emission limits for CO (engine E1 also has a limit for NOx) and your request did not include establishing synthetic minor limits for these pollutants, although I suspect you still require these enforceable emission limits.

Please resubmit your request to establish synthetic minor limits under the Federal Minor NSR rule at this facility with the omitted information necessary to process the application. I can be reached at the contact information below if you have any questions.

I have not reviewed the Jaques submittal, but the same information will be required to process that application. Katie Romero is the permit engineer assigned to that action.

Thank you,

-Eric

Eric Wortman
Environmental Scientist
Air Permitting, Monitoring and Modeling Unit
Office of Partnerships & Regulatory Assistance
EPA Region 8
1595 Wynkoop Street (8P-AR)
Denver, CO 80202-1129

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

August 29, 2011

Ms. Kathleen Paser
Air and Radiation Program, 8P-AR
U.S. Environmental Protection Agency
Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Like-Kind Engine Replacement
South Ignacio Central Delivery Point (V-SU-0031-08.00)
Samson Resources Company

Dear Ms. Paser:

The Samson Resources Company is herein submitting notification of a like-kind engine replacement for Unit E6 at the South Ignacio Central Delivery Point. The facility is located in the SE/4 of Section 32, Township 33 North, Range 7 West, in La Plata County, Colorado.

Unit E6, a 1400 hp Waukesha 5794LT lean burn reciprocating engine equipped with an oxidation catalyst with Serial Number C-16160/1 was taken out of service on August 17, 2011. The replacement engine is labeled with Serial Number C-15964/1 was originally manufactured in March 2006. The replacement engine was installed and put into service on August 18, 2011.

The facility is not a major source of HAP and will therefore be subject to the area source rules under 40 CFR part 63 subpart ZZZZ (RICE MACT). The engine is not subject to 40 CFR Part 60 subpart JJJJ because the engine was manufactured prior to July 1, 2007.

If you have any questions regarding this replacement please feel free to contact me at (918) 591-1370 or via email at srose@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Environmental Specialist

Cc: South Ignacio File

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

October 14, 2011

Ms. Kathleen Paser
Air and Radiation Program, 8P-AR
U.S. Environmental Protection Agency
Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Like-Kind Engine Replacement
South Ignacio Central Delivery Point (V-SU-0031-08.00)
Samson Resources Company

Dear Ms. Paser:

The Samson Resources Company is herein submitting notification of a like-kind engine replacement for Unit E4 at the South Ignacio Central Delivery Point. The facility is located in the SE/4 of Section 32, Township 33 North, Range 7 West, in La Plata County, Colorado.

Unit E4, a 1267 hp Waukesha 7042 GL lean burn reciprocating engine (serial number C-109901/1) equipped with an oxidation catalyst was taken out of service on September 27, 2011. The engine was replaced with a like-kind replacement, another 1267 hp Waukesha 7042 GL lean burn reciprocating engine (serial number C-12554/4) equipped with an oxidation catalyst on September 30, 2011. The replacement engine was originally manufactured on February 1998. The replacement engine will be tested for an initial performance test in the fourth quarter of 2011 as part of the regularly scheduled testing at this facility.

If you have any questions regarding this change please contact me at 918-591-1370 or at srose@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Air Quality Specialist

Cc: South Ignacio Facility File

Syn. Minor NSR Permit # SM NSR-SU-000031-2011.00

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

August 29, 2011

Ms. Kathleen Paser
Federal Minor NSR Permit Coordinator
1595 Wynkoop Street (8P-AR)
Denver, CO 80202-1129

Re: Synthetic Minor Limit Request
South Ignacio Central Delivery Point
Samson Resources

Dear Ms. Paser:

Samson Resources Company (Samson) is herein submitting a synthetic minor limit request for its South Ignacio Central Delivery Point facility. This facility is currently permitted under permit V-SU-0031-08.00 under Title V Part 71. This permit has several emissions limitations that Samson would like to operate under and will therefore need to establish under the Minor NSR program.

Enclosed you will find the attachments documenting the limits requested as well as the methods for demonstrating compliance with those limits. Since Samson currently operates with these limits there will be no pre and post emission changes and Samson has enclosed a copy of the 2010 Emission Inventory for the facility. This facility is an existing facility operated by Samson since January 2005.

Please feel free to contact me at (918) 591-1370 or srose@samson.com if you have any questions regarding this application.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Air Quality Specialist

Cc: File
Brenda Jarrell
Kyle Hunderman

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 8 Air Program
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Checklist - Synthetic Minor Limit Request

(Form SYNMIN)

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Avenue, 8P-AR
Denver, CO 80202-1129

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact the EPA Region 8 Tribal Air Coordinator:

Alexis North, EPA Region 8 Tribal Air Coordinator
303-312-7005
north.alexis@epa.gov

A. GENERAL INFORMATION

Company Name Samson Resources	**Facility Name** South Ignacio Central Delivery Point
Company Contact or Owner Name Scott Rose	Title Air Quality Specialist
Mailing Address 2 W. Second Street, Tulsa, OK 74103-3103	
Email Address srose@samson.com	
Telephone Number 918-591-1370	Facsimile Number 918 591-7370

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

Item 1 - The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.

Item 2 - The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.

Item 3 - The type and quantity of fuels and/or raw materials used.

Item 4 - A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.

Item 5 - Estimates of the Current Actual Emissions, Current Allowable Emissions including all calculations for the estimates, where applicable.

Item 6 - Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.

Item 7 – Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants:

Attachments to the Synthetic Minor Limit Request for Indian Country

Item 1: This site has three proposed emissions limitations that Samson proposes to carry over from its Title V Part 71 Program Operating Permit V-SU-0031-08.00. Those limitations are:

1. II.D.2 a Facility-wide formaldehyde (CH2O) emissions shall not exceed 9.5 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12 month basis.
2. III.A.1 Benzene emissions from each of the glycol dehydration units, D1 and D2 shall be limited to 0.9 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12 month basis.
3. III.A.2 Facility-wide HAP emissions shall not exceed 23 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12 month basis.

Limitations 1 and 3 would allow the facility to be considered an area source of HAP emissions and be subject to the area source MACT standards of NESHAP ZZZZ.

Limitation 2 would minimize emissions from the dehydration units and the units would be exempt from NESHAP HH. This limitation is requested due to the varying levels of benzene seen in the inlet gas stream at the facility.

Item 2: Compliance with the limitations will be demonstrated by the following testing methods as outlined in the current Title V permit.

- Limitation 1:
    - Reference method performance tests will be conducted for all replacement engines to measure CH2O emissions from the replacement engines to demonstrate compliance with the facility-wide CH2O emission limit. The performance tests will be conducted within 90 calendar days of the startup of the replacement engine.
    - Upon change out of the catalyst for any engine, a performance test will be conducted for measuring CH2O emissions to demonstrate continued compliance with the emissions limits. The performance test will be conducted within 90 calendar days of the catalyst change out.
    - The performance test for measuring CH2O shall be conducted in accordance with EPA Reference Method 320 or 323 of 40 CFR part 63, Appendix A or Method CARB 430.
    - The performance test will meet the following requirements:
        - All tests shall be performed at a maximum operating rate (90% to 110% of engine design capacity).

        - Each source test shall consist of at least three 1-hour or longer valid test runs. Emission results will be reported as the arithmetic average of all valid test runs and shall be in terms of the emissions limits (lbs/hr and g/bhp-hr)
        - During each test run data shall be collected on all parameters necessary to document how CH2O emissions were measured or calculated.
    - The performance tests on the engines shall be conducted semi-annually to demonstrate compliance with the emission limit. For each engine if the monitoring results for the semi-annual test is less than a 60% emission reduction the testing frequency will revert to quarterly. If after two consecutive quarterly tests show that the 60% CH2O reduction is being achieved the testing rate may return to semi-annually.
    - Facility-wide emissions of CH2O will be calculated at the end of each calendar month from the results of the most recent performance test. The emissions will include CH2O emissions from all other units including insignificant emissions units listed in the Title V permit for the facility.
    - The facility emissions for the month as described above will be added to the preceding 11 months to record a new 12 month total.
    - The facility-wide emissions will be calculated by
        - Taking the emission factor in lbs/hr for each engine and multiplying by the number of operating hours for that month. If no hours are recorded the unit will be calculated as if it ran continuously during that month.
        - Emissions from insignificant emissions units will be recorded as one-twelfth of the annual emission amount listed for IEU's on the most recent Form PTE submitted to either EPA or Tribal Agency delegated authority over air quality.
    - Records of all testing will be kept for a period of 5 years.
- Limitations 2 and 3:
    - Monthly gas analysis testing will be conducted. This testing shall show the temperature and pressure of the inlet gas.
    - Monthly determination of benzene and HAP emissions from the dehydrator will be calculated by using GRI GlyCalc using the following inputs:
        - The current months wet gas analysis
        - The temperature and pressure of the gas.
        - The enclosed flare destruction efficiency
        - Maximum gas throughput and glycol pump recirculation rate for each dehydrator as follows:
            - D1 30 MMSCFD 15 gallons per minute
            - D2 40 MMSCFD 17 gallons per minute
    - Benzene emissions will be determined from each dehydrator each month. The benzene emissions for that month will be added to the preceding 11 months to record a new 12 month total.
    - HAP emissions will be determined from each dehydrator each month. The HAP emissions will be added to those from the engines and insignificant emissions units

listed in the air permit to determine the monthly total. This monthly total will be added to the preceding 11 months to record a new 12 month total.

- Records will be kept of the following:
  - Gas analysis testing.
  - GRI Glycalc modeling.
  - Rolling 12 month emissions totals for Benzene and HAPs.
  - Documentation of the conducted maintenance.

Item 3: All emission units at this facility will be fired only with natural gas. The natural gas will be pipeline quality in all respects except that CO2 concentrations in the gas may not be within pipeline-quality specifications.

Item 4: All lean burn engines at the facility will use and air fuel ratio controller and oxidation catalyst to reduce CO and formaldehyde emissions below the proposed plant wide limit of 9.5 tons per year. The efficiency of each catalyst will vary dependent on site specific conditions such as age of the catalyst and run time of the engine. The effectiveness of the controls and documentation of compliance will be demonstrated by the conditions listed in Item 2 above.

The destruction efficiency of the PESCO flare stack controlling the dehydrators is 98%. This will be maintained by following the manufacturer's recommended preventative maintenance schedules.

Item 5: Current actual emissions are estimated to be at similar levels to the calendar year 2010 emission inventory which is attached.

Current Allowable Emissions – Facility Emissions limits are listed in the current EPA permit V-SU-0031-08.00 in section II.D. The permit is attached.

Item 6: Samson is currently meeting the requested emissions limits under the existing permit therefore there would be no significant emissions changes.

Item 7: This is an existing facility that is not making any physical changes to the manner in which it operates according to its existing permit. There are no emissions increases associated with this application.

pesco
process equipment & service company inc

OPERATIONAL GUARANTEE - PESCO FLARE STACK
U.S. PATENT 6485292 (Other Patents Pending)

The PESCO Flare Stack (enclosed flare) is guaranteed to achieve total destruction of 98% or greater of all hydrocarbons present in the overhead stream from the still column of a glycol dehydrator. This assumes that the operating parameters do not exceed those to which the flare stack was initially designed. The PESCO Flare Stack is also guaranteed to meet the environmental requirements as set forth in 40 CFR 60.18.

James Rhodes
Engineering Manager
Process Equipment & Service Co., Inc.

5680 U.S. HIGHWAY 64 • 87401 / P.O. BOX 828 • 87499 • FARMINGTON, NEW MEXICO • PHONE: (505) 327-2222 • FAX: (505) 327-7550

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

FEE FILING FORM (FF)

Complete this form each time you prepare form FEE and send this form to the appropriate lockbox bank address, along with full payment. This form required at time of initial fee payment, and thereafter, when paying annual fees.

Source or Facility Name **South Ignacio Central Delivery Point**

Mailing Address:

Street/P.O. Box **Two West Second Street** City **Tulsa**

State **OK** ZIP **74103 - 3103**

Contact Person: **Scott Rose** Title **Environmental Specialist**

Telephone (**918**) **591** - **1370** Ext. _____

Total Fee Payment Remitted: $ **11,684.00**

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS (CTAC)

This form must be completed, signed by the "Responsible Official" designated for the facility or emission unit, and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by a part 71 permit).

A. Responsible Official

Name: (Last) **Dalton** (First) **Mark** (MI) ____

Title **Attorney-in-Fact**

Street or P.O. Box **Two West Second Street**

City **Tulsa** State **OK** ZIP **74103 - 3103**

Telephone **(918) 591 – 1369** Ext. _____ Facsimile **(918) 591 - 7369**

B. Certification of Truth, Accuracy and Completeness (to be signed by the responsible official)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed) Mark S. Dalton

Name (typed) **Mark Dalton** Date: 3 / 21 / 11

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

FEE CALCULATION WORKSHEET (FEE)

Use this form initially, or thereafter on an annual basis, to calculate part 71 fees.

A. General Information

Type of fee (Check one): ___Initial __X__Annual

Deadline for submitting fee calculation worksheet **04 / 01 / 2011**

For initial fees, emissions are based on (Check one):

___ Actual emissions for the preceding calendar year. (Required in most circumstances.)

___ Estimates of actual emissions for the current calendar year. (Required when operations commenced during the preceding calendar year.)

Date commenced operations ____/____/_____

___ Estimates of actual emissions for the preceding calendar year. (Optional after a part 71 permit was issued to replace a part 70 permit, but only if initial fee payment is due between January 1 and March 31; otherwise use actual emissions for the preceding calendar year.)

For annual fee payment, you are required to use actual emissions for the preceding calendar year.

B. Source Information: Complete this section only if you are paying fees but not applying for a permit.

Source or facility name **South Ignacio Central Delivery Point**

Mailing address: Street or P.O. Box **Two West Second Street**

City **Tulsa** State **OK** ZIP **74103 - 3103**

Contact person **Scott Rose** Title **Environmental Specialist**

Telephone (**918**) **591** - **1370** Ext_____ Part 71 permit no. **V-SU-0031-08.00**

C. Certification of Truth, Accuracy and Completeness: Only needed if not submitting a separate form CTAC.

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in this submittal (form and attachments) are true, accurate and complete.

Name (signed) _____

Name (typed) _____ Date:____/____/_____

D. Annual Emissions Report for Fee Calculation Purposes -- Non-HAP

You may use this to report actual emissions (tons per year) of regulated pollutants (for fee calculation) on a calendar-year basis for both initial and annual fee calculation purposes. Section E is designed to report HAP emissions. Quantify all actual emissions, including fugitives, but do not include insignificant emissions and certain regulated air pollutants that are not counted for fee purposes, such as CO (see instructions). You may round to the nearest tenth of a ton on this form. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000 for that column.

This data is for **2010** (year)

Emission Unit ID	NOx	VOC	SO2	PM10	Lead	Other
E1	**21.9**	**7.8**				
E2	**18.1**	**6.0**				
E3	**11.1**	**0.2**				
E4	**19.1**	**6.4**				
E5	**33.1**	**6.6**				
E6	**33.5**	**6.7**				
E7	**33.2**	**6.6**				
E8	**33.6**	**6.7**				
D1	**0.5**	**0.1**				
D2	**0.3**	**0.1**				
SUBTOTALS	**204.4**	**47.2**				

E. Annual Emissions Report for Fee Calculation Purposes -- HAP

HAP Identification. Identify individual HAP emitted at the facility, identify the CAS number, and assign a unique identifier for use in the second table in this section. Whenever assigning identifier codes, use "HAP1" for the first, "HAP2" for the second, and so on.

Name of HAP	CAS No	Identifier
Formaldehyde	**50-00-0**	**HAP 1**

HAP Emissions. Report the actual emissions of individual HAP identified above. Use the identifiers assigned in the table above. Include all emissions, including fugitives, and do not include insignificant emissions. You may round to the nearest tenth of a ton. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000.

This data is for **2010** (year)

Emissions Unit ID	Actual Emissions (Tons/Year)							
	HAP 1	HAP___	HAP___	HAP___	HAP___	HAP___	HAP___	HAP___
E1	**0.4**							
E2	**0.4**							
E3	**0.3**							
E4	**0.3**							
E5	**0.3**							
E6	**0.4**							
E7	**0.3**							
E8	**0.3**							
D1	**0.0**							
D2	**0.0**							
SUBTOTALS	**2.8**							

F. Fee Calculation Worksheet

This section is used to calculate the total fee owed for both initial and annual fee payment purposes. Reconciliation is only for cases where you are paying the annual fee and you used any type of estimate of actual emissions when you calculated the initial fee. If you do not need to reconcile fees, only complete line 1-5 and then skip down to lines 21 – 26. See instructions for more detailed explanation.

1. Sum the emissions from section D of this form (non-HAP) and enter the total (tons).	**251.6**
2. Sum the emissions from section E of this form (HAP) and enter the total (tons).	**2.8**
3. Sum lines 1 and 2.	**254.4**
4. Enter the emissions that were counted twice. If none, enter "0."	**0**
5. Subtract line 4 from line 3, round to the nearest ton, and enter the result here.	**254**

RECONCILIATION
(WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "CURRENT" CALENDAR YEAR)

Only complete lines 6-10 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year in which you paid initial fees; otherwise skip to line 11 or to line 21.

6. Enter the total estimated actual emissions for the year the initial fee was paid (previously reported on line 5 of the initial fee form).	
7. If line 5 is greater than line 6, subtract line 6 from line 5, and enter the result. Otherwise enter "0."	
8. If line 6 is greater than line 5, subtract line 5 from line 6, and enter the result. Otherwise enter "0."	
9. If line 7 is greater than 0, multiply line 7 by last year's fee rate ($/ton) and enter the result here. This is the underpayment. Go to line 21.	
10. If line 8 is greater than 0, multiply line 8 by last year's fee rate ($/ton) and enter the result here. This is the overpayment. Go to line 21.	

RECONCILIATION
(WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "PRECEDING" CALENDAR YEAR)

Only complete lines 11-20 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year preceding initial fee payment; otherwise skip to line 21. If completing this section, you will also need to complete sections D and E to report actual emissions for the calendar year preceding initial fee payment.

11. Sum the actual emissions from section D (non-HAP) for the calendar year preceding initial fee payment and enter the result here.	
12. Sum the actual emissions from section E (HAP) for the calendar year preceding initial fee payment and enter the result here.	
13. Add lines 11 and 12 and enter the total here. These are total actual emissions for the calendar year preceding initial fee payment.	
14. Enter double counted emission from line 13 here. If none, enter "0."	
15. Subtract line 14 from line 13, round to the nearest ton, and enter the result here.	

16. Enter the total estimated actual emissions previously reported on line 5 of the initial fee form. These are estimated actual emissions for the calendar year preceding initial fee payment.	
17. If line 15 is greater than line 16, subtract line 16 from line 15, and enter the result here. Otherwise enter "0."	
18. If line 16 is greater than line 15, subtract line 15 from line 16, and enter the result here. Otherwise enter "0."	
19. If line 17 is greater than 0, multiply line 17 by last year's fee rate ($/ton) and enter the result here. This is the underpayment.	
20. If line 18 is greater than 0, multiply line 18 by last year's fee rate ($/ton) and enter the result on this line. This is the overpayment.	
FEE CALCULATION	
21. Multiply line 5 (tons) by the current fee rate ($46/ton) and enter the result here.	**$11,684.00**
22. Enter any underpayment from line 9 or 19 here. Otherwise enter "0."	**0**
23. Enter any overpayment from line 10 or 20 here. Otherwise enter "0."	**0**
24. If line 22 is greater than "0," add it to line 21 and enter the result here. If line 23 is greater than "0," subtract this from line 21 and enter the result here. Otherwise enter the amount on line 21 here. This is the fee adjusted for reconciliation.	**$11,684.00**
25. If your account was credited for fee assessment error since the last time you paid fees, enter the amount of the credit here. Otherwise enter "0."	**0**
26. Subtract line 25 from line 24 and enter the result here. Stop here. This is the total fee amount that you must remit to EPA.	**$11,684.00**

Samson

South Ignacio Central Delivery Point
V-SU-0031-08.00
2010 Engine Emissions

Using Manufacturer's Emission Factors

Unit	Make	Model	hp	2010 Operating Hours	NOx			VOC		
					g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy
E1	Waukesha	L7044GSI	1680	8457	used test results below		21.9	0.5	1.9	7.8
E2	Waukesha	L7042GL	1267	8637	1.5	4.2	18.1	0.5	1.4	6.0
E3	Waukesha	L7042GL	1267	8358	used test results below		11.1	used test results below		0.2
E4	Waukesha	L7042GL	1336	8634	1.5	4.4	19.1	0.5	1.5	6.4
E5	Waukesha	L5794LT	1400	8595	2.5	7.7	33.1	0.5	1.5	6.6
E6	Waukesha	L5794LT	1400	8696	2.5	7.7	33.5	0.5	1.5	6.7
E7	Waukesha	L5794LT	1400	8615	2.5	7.7	33.2	0.5	1.5	6.6
E8	Waukesha	L5794LT	1400	8711	2.5	7.7	33.6	0.5	1.5	6.7
Total							203.6			47.0

Using Test Results

Month	EF (lb/hr)	E1 NO_x Operating Hours	Emissions (lb/month)
January	3.99	700	2793.0
February	3.99	672	2681.3
March	3.99	639	2549.6
April	6.94	703	4878.8
May	6.94	736	5107.8
June	6.94	720	4996.8
July	6.94	664	4608.2
August	6.94	705	4892.7
September	3.87	716	2770.9
October	3.87	744	2879.3
November	3.87	714	2763.2
December	3.87	744	2879.3
Total lb/yr			43800.9
Total tpy			21.9

EF (lb/hr)	E3 NO_x Operating Hours	Emissions (lb/month)	EF (lb/hr)	E3 VOC Operating Hours	Emissions (lb/month)
2.97	605	1796.9	0.03	605	18.2
2.97	672	1995.8	0.03	672	20.2
2.97	655	1945.4	0.03	655	19.7
2.97	714	2120.6	0.03	714	21.4
2.97	672	1995.8	0.03	672	20.2
2.97	639	1897.8	0.03	639	19.2
2.97	740	2197.8	0.03	740	22.2
2.97	740	2197.8	0.03	740	22.2
2.1	720	1512.0	0.05	720	36.0
2.1	740	1554.0	0.05	740	37.0
2.1	717	1505.7	0.05	717	35.9
2.1	744	1562.4	0.05	744	37.2
		22282.0			309.4
		11.1			0.2

Samson

South Ignacio Central Delivery Point
V-SU-0031-08.00
2010 Facility Formaldehyde Emissions

Unit	January-10			February-10			March-10			April-10			May-10			June-10		
	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)
E1	0.002	700	1.4	0.002	672	1.3	0.002	639	1.3	0.096	703	67.5	0.096	736	70.7	0.064	720	46.1
E2	0.116	744	86.3	0.116	672	78.0	0.116	667	77.4	0.064	714	45.7	0.064	744	47.6	0.073	693	50.6
E3	0.096	605	58.1	0.096	672	64.5	0.096	655	62.9	0.068	714	48.6	0.068	672	45.7	0.030	639	19.2
E4	0.073	744	54.3	0.073	670	48.9	0.073	672	49.1	0.073	714	52.1	0.073	741	54.1	0.053	716	37.9
E5	0.105	744	78.1	0.105	669	70.2	0.105	649	68.1	0.126	712	89.7	0.126	741	93.4	0.046	694	31.9
E6	0.071	744	52.8	0.071	670	47.6	0.071	744	52.8	0.087	678	59.0	0.087	742	64.6	0.073	720	52.6
E7	0.071	729	51.8	0.071	672	47.7	0.071	672	47.7	0.066	706	46.6	0.066	744	49.1	0.053	696	36.9
E8	0.062	744	46.1	0.062	671	41.6	0.062	720	44.6	0.057	714	40.7	0.057	744	42.4	0.082	712	58.4
Total			428.9			399.8			403.9			449.9			467.6			333.6

Unit	July-10			August-10			September-10			October-10			November-10			December-10		
	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)	EF (lb/hr)	Operating Hours	Emissions (lb/month)
E1	0.064	664	42.5	0.064	705	45.1	0.171	716	122.4	0.171	744	127.2	0.187	714	133.5	0.187	744	139.1
E2	0.073	744	54.3	0.073	739	53.9	0.084	718	60.3	0.084	740	62.2	0.116	718	83.3	0.116	744	86.3
E3	0.030	740	22.2	0.030	740	22.2	0.053	720	38.2	0.053	740	39.2	0.068	717	48.8	0.068	744	50.6
E4	0.053	740	39.2	0.053	736	39.0	0.062	720	44.6	0.062	742	46.0	0.075	718	53.9	0.075	721	54.1
E5	0.046	742	34.1	0.046	742	34.1	0.089	711	63.3	0.089	744	66.2	0.082	713	58.5	0.082	734	60.2
E6	0.073	742	54.2	0.073	741	54.1	0.094	720	67.7	0.094	739	69.5	0.096	718	68.9	0.096	738	70.8
E7	0.053	741	39.3	0.053	744	39.4	0.050	717	35.9	0.050	740	37.0	0.053	718	38.1	0.053	736	39.0
E8	0.082	744	61.0	0.082	744	61.0	0.043	717	30.8	0.043	744	32.0	0.043	715	30.7	0.043	742	31.9
Total			346.8			348.8			463.2			479.3			515.7			532.0

Unit	Hours	CH2O Emissions	
		lb/yr	tpy
E1	8457	798.1	0.4
E2	8637	785.9	0.4
E3	8358	520.2	0.3
E4	8634	573.2	0.3
E5	8595	747.8	0.4
E6	8696	714.6	0.4
E7	8615	508.5	0.3
E8	8711	521.2	0.3
Total		5169.5	2.8

Emission Estimates
Emission Unit E1
Waukesha 7044GSI
South Ignacio Central Delivery Point

Manufacturer Emission Factors

VOC 0.5 g/hp-hr

Site-Rated Horsepower: 1,680 hp

2010 Actual Emissions

$$\text{VOC} = \frac{(0.5\ \text{g/hp-hr})(1{,}680\ \text{hp})(8457\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 7.8\ \text{tpy}$$

NO_X emissions are calculated using the most recent test results and the engine operating hours for the month. Annual NO_X emissions are calculated by summing the monthly emissions. The attached 2010 Engine Emissions spreadsheet gives the monthly and annual NO_X emissions of the unit.

$$\text{Monthly } NO_X = \textit{Tested EF}\ \frac{lb}{hr} \cdot \frac{\textit{Operational Hours}}{month} = \frac{lb\ NO_X}{month}$$

$$\text{Annual } NO_X = \sum_{January}^{December} \textit{Monthly } NO_X$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = \textit{Tested EF}\ \frac{lb}{hr} \cdot \frac{\textit{Operational Hours}}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} \textit{Monthly } CH_2O$$

Emission Estimates
Emission Unit E2
Waukesha 7042GL
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	1.5	g/hp-hr
VOC	0.5	g/hp-hr

Site-Rated Horsepower: 1,267 hp

2010 Actual Emissions

$$NO_X = \frac{(1.5\ g/hp\text{-}hr)(1{,}267\ hp)(8637\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 18.1\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}267\ hp)(8637\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.0\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Emission Estimates
Emission Unit E3
Waukesha 7042GL
South Ignacio Central Delivery Point

NO_X emissions are calculated using the most recent test results and the engine operating hours for the month. Annual NO_X emissions are calculated by summing the monthly emissions. The attached 2010 Engine Emissions spreadsheet gives the monthly and annual NO_X emissions of the unit.

$$\text{Monthly } NO_X = \textit{Tested EF} \frac{lb}{hr} \cdot \frac{\textit{Operational Hours}}{month} = \frac{lb\ NO_X}{month}$$

$$\text{Annual } NO_X = \sum_{January}^{December} \textit{Monthly } NO_X$$

VOC emissions are calculated using the most recent test results and the engine operating hours for the month. Annual VOC emissions are calculated by summing the monthly emissions. The attached 2010 Engine Emissions spreadsheet gives the monthly and annual VOC emissions of the unit.

$$\text{Monthly VOC} = \textit{Tested EF} \frac{lb}{hr} \cdot \frac{\textit{Operational Hours}}{month} = \frac{lb\ VOC}{month}$$

$$\text{Annual VOC} = \sum_{January}^{December} \textit{Monthly VOC}$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = \textit{Tested EF} \frac{lb}{hr} \cdot \frac{\textit{Operational Hours}}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} \textit{Monthly } CH_2O$$

Emission Estimates
Emission Unit E4
Waukesha 7042GL
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	1.5	g/hp-hr
VOC	0.5	g/hp-hr

Site-Rated Horsepower: 1,336 hp

2010 Actual Emissions

$$NO_X = \frac{(1.5\ g/hp\text{-}hr)(1{,}336\ hp)(8634\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 19.1\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}336\ hp)(8634\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.4\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Emission Estimates
Emission Unit E5
Waukesha L5794LT
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	2.5	g/hp-hr
VOC	0.5	g/hp-hr

Site-Rated Horsepower: 1,400 hp

2010 Actual Emissions

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8595\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.1\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8595\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.6\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Emission Estimates
Emission Unit E6
Waukesha L5794LT
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	2.5 g/hp-hr
VOC	0.5 g/hp-hr

Site-Rated Horsepower: 1,400 hp

2010 Actual Emissions

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8696\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.5\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8696\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.7\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Emission Estimates
Emission Unit E7
Waukesha L5794LT
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	2.5	g/hp-hr
VOC	0.5	g/hp-hr

Site-Rated Horsepower: 1,400 hp

2010 Actual Emissions

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8615\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.2\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8615\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.6\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Emission Estimates
Emission Unit E8
Waukesha L5794LT
South Ignacio Central Delivery Point

Manufacturer Emission Factors

NO_X	2.5	g/hp-hr
VOC	0.5	g/hp-hr

Site-Rated Horsepower: 1,400 hp

2010 Actual Emissions

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8711\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.6\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8711\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.7\ tpy$$

Formaldehyde emissions are calculated on a monthly basis using the preceding quarterly test results and the engine operating hours for the month. Annual formaldehyde emissions are calculated by summing the monthly emissions. The attached 2010 Facility Formaldehyde Emissions spreadsheet gives the monthly and annual formaldehyde emissions of the unit.

$$\text{Monthly } CH_2O = Tested\ EF \frac{lb}{hr} \cdot \frac{Operational\ Hours}{month} = \frac{lb\ CH_2O}{month}$$

$$\text{Annual } CH_2O = \sum_{January}^{December} Monthly\ CH_2O$$

Samson

South Ignacio Central Delivery Point
V-SU-0031-08.00
2010 Dehydration Unit Emissions

Month	Benzene Emissions				Toluene Emissions			
	D1		D2		D1		D2	
	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month
January-10	0.97	30.10	1.19	36.95	0.00	0.00	0.00	0.00
February-10	0.57	15.93	0.64	17.84	0.03	0.90	0.04	1.04
March-10	0.02	0.74	0.03	0.84	0.07	2.17	0.08	2.51
April-10	0.12	3.66	0.14	4.11	0.13	3.96	0.15	4.44
May-10	0.07	2.26	0.08	2.45	0.11	3.26	0.12	3.57
June-10	0.11	3.21	0.12	3.57	0.11	3.24	0.12	3.72
July-10	0.08	2.33	0.08	2.51	0.13	3.91	0.14	4.28
August-10	0.08	2.33	0.08	2.51	0.13	3.91	0.14	4.28
September-10	0.09	2.58	0.10	2.85	0.13	3.78	0.14	4.20
October-10	0.02	0.59	0.02	0.65	0.07	2.08	0.08	2.39
November-10	0.02	0.57	0.02	0.63	0.07	2.01	0.08	2.31
December-10	0.04	1.33	0.05	1.49	0.09	2.85	0.10	3.22
Total	2.18	65.63	2.54	76.40	1.05	32.07	1.18	35.96

Month	Ethylbenzene Emissions				Xylene Emissions			
	D1		D2		D1		D2	
	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month
January-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
February-10	0.05	1.26	0.05	1.48	0.02	0.50	0.02	0.62
March-10	0.00	0.00	0.00	0.00	0.12	3.84	0.15	4.59
April-10	0.00	0.00	0.00	0.00	0.19	5.76	0.22	6.51
May-10	0.00	0.00	0.00	0.00	0.20	6.29	0.23	7.19
June-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
July-10	0.00	0.00	0.00	0.00	0.18	5.70	0.21	6.48
August-10	0.00	0.00	0.00	0.00	0.18	5.70	0.21	6.45
September-10	0.00	0.00	0.00	0.00	0.15	4.53	0.17	5.19
October-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
November-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December-10	0.00	0.00	0.00	0.00	0.20	6.14	0.23	7.04
Total	0.05	1.26	0.05	1.48	1.25	38.46	1.44	44.07

Month	Total HAP Emissions				VOC Emissions			
	D1		D2		D1		D2	
	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month	lb/day	lb/month
January-10	0.97	30.10	1.19	36.95	1.05	32.64	1.29	39.90
February-10	0.67	18.62	0.75	20.97	0.72	20.27	0.81	22.79
March-10	0.22	6.94	0.26	8.15	0.32	9.98	0.37	11.53
April-10	0.45	13.38	0.50	15.06	0.63	18.84	0.71	21.18
May-10	0.38	11.81	0.43	13.21	0.51	15.75	0.57	17.58
June-10	0.22	6.45	0.24	7.29	0.41	12.42	0.47	14.01
July-10	0.38	11.90	0.43	13.27	0.51	15.84	0.57	17.67
August-10	0.38	11.90	0.43	13.27	0.51	15.84	0.57	17.67
September-10	0.36	10.86	0.41	12.24	0.54	16.17	0.61	18.18
October-10	0.09	2.67	0.10	3.07	0.14	4.31	0.16	4.90
November-10	0.09	2.58	0.10	2.97	0.14	4.17	0.16	4.74
December-10	0.34	10.45	0.38	11.90	0.42	13.02	0.48	14.76
Total	4.54	137.66	5.22	158.35	5.91	179.25	6.75	204.91

Total Emissions Per Unit

HAP	D1 (lb/year)	D1 (tpy)	D2 (lb/year)	D2 (tpy)
Benzene	65.63	0.03	76.40	0.04
Toluene	32.07	0.02	35.96	0.02
Ethylbenzene	1.26	0.00	1.48	0.00
Xylene	38.46	0.02	44.07	0.02
Total HAP	137.66	0.07	158.35	0.08
VOC	179.25	0.09	204.91	0.10

Samson

South Ignacio Central Delivery Point
V-SU-0031-08.00
2010 Dehydration Unit Reboiler Emissions

Dehydration Unit Reboilers

Type	<100 MMBtu/hr

Unit	D1 Reboiler	
Heater Size	1.25	MMBtu/hr
Hours of Operation	8760	hr
Heat Content	1000	Btu/scf

Emissions

Pollutant	Emission Factor*	Emissions	
	lb/MMscf	lb/hr	tpy
NO_X	100	0.12	0.53
CO	84	0.10	0.44
VOC	5.5	0.01	0.03
Formaldehyde	0.075	0.00	0.00
SO2	0.6	0.00	0.00
PM	7.6	0.01	0.04

*Emission factors obtained from AP-42 Tables 1.4-1, 1.4-2 and 1.5-2.

Unit	D2 Reboiler	
Heater Size	0.75	MMBtu/hr
Hours of Operation	8760	hr
Heat Content	1000	Btu/scf

Emissions

Pollutant	Emission Factor*	Emissions	
	lb/MMscf	lb/hr	tpy
NO_X	100	0.07	0.32
CO	84	0.06	0.27
VOC	5.5	0.00	0.02
Formaldehyde	0.075	0.00	0.00
SO2	0.6	0.00	0.00
PM	7.6	0.01	0.02

*Emission factors obtained from AP-42 Tables 1.4-1, 1.4-2 and 1.5-2.

Emission Estimates
Emission Unit D1
30 MMscfd PESCO Dehydration Unit
South Ignacio Central Delivery Point

The emission model GRI-GLYCalc Version 4.0, a thermodynamic-based process simulator for dehydration units, was utilized to estimate emissions from this unit. Monthly runs were performed in accordance with Operating Permit V-SU-0031-08.00 using the maximum gas throughput of the unit and maximum glycol recirculation rate. The gas composition, temperature, and pressure were obtained from the monthly gas sample. A summary of other average operating parameter values follows:

Parameter	Value
Inlet Gas Throughput	30.0 MMscfd
Glycol Circulation	15.0 gpm
Flash Vessel Temperature	100.0 °F
Flash Vessel Pressure	30.0 psig
Flash Gas Destruction Efficiency	98.0 %

VOC and HAP emissions from the dehydration unit were calculated on a monthly basis using the monthly GRI-GLYCalc output. Annual VOC and HAP emissions were calculated by summing the monthly emissions. The attached 2010 Dehydration Unit Emissions spreadsheet gives the monthly and annual benzene, toluene, ethylbenzene, xylene, total HAP, and VOC emissions of the unit.

$$\text{Annual VOC} = \sum_{January}^{December} Monthly\ VOC = 0.09 \text{ tpy}$$

$$\text{Annual HAP} = \sum_{January}^{December} Monthly\ HAP = 0.07 \text{ tpy}$$

Emission Estimates
Emission Unit D2
40 MMscfd NATCO Dehydration Unit
South Ignacio Central Delivery Point

The emission model GRI-GLYCalc Version 4.0, a thermodynamic-based process simulator for dehydration units, was utilized to estimate emissions from this unit. Monthly runs were performed in accordance with Operating Permit V-SU-0031-08.00 using the maximum gas throughput of the unit and maximum glycol recirculation rate. The gas composition, temperature, and pressure were obtained from the monthly gas sample. A summary of other average operating parameter values follows:

Parameter	Value
Inlet Gas Throughput	40.0 MMscfd
Glycol Circulation	17.0 gpm
Flash Vessel Temperature	100.0 °F
Flash Vessel Pressure	30.0 psig
Flash Gas Destruction Efficiency	98.0 %

VOC and HAP emissions from the dehydration unit were calculated on a monthly basis using the monthly GRI-GLYCalc output. Annual VOC and HAP emissions were calculated by summing the monthly emissions. The attached 2010 Dehydration Unit Emissions spreadsheet gives the monthly and annual benzene, toluene, ethylbenzene, xylene, total HAP, and VOC emissions of the unit.

$$\text{Annual VOC} = \sum_{January}^{December} Monthly\ VOC = 0.08 \text{ tpy}$$

$$\text{Annual HAP} = \sum_{January}^{December} Monthly\ HAP = 0.10 \text{ tpy}$$

United States Environmental Protection Agency
Region 8
Air Program
1595 Wynkoop Street
Denver, Colorado 80202

AIR POLLUTION CONTROL
TITLE V PERMIT TO OPERATE

In accordance with the provisions of title V of the Clean Air Act and 40 CFR part 71 and applicable rules and regulations,

Samson Resources
South Ignacio Central Delivery Point

is authorized to operate air emission units and to conduct other air pollutant emitting activities in accordance with the permit conditions listed in this permit.

This source is authorized to operate at the following location:

Southern Ute Indian Reservation
SE ¼ of Section 32, Township 33N, Range 7W
La Plata County, Colorado

Terms not otherwise defined in this permit have the meaning assigned to them in the referenced regulations. All terms and conditions of the permit are enforceable by EPA and citizens under the Clean Air Act.

Callie A. Videtich

8/10/09

Callie A. Videtich, Director
Air Program
US EPA Region 8

Date

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AIR POLLUTION CONTROL
TITLE V PERMIT TO OPERATE
Samson Resources
South Ignacio Central Delivery Point

Permit Number: V-SU-0031-08.00
Replaces Permit No.: V-SU-0031-01.04

Issue Date: August 10, 2009
Effective Date: August 20, 2009
Expiration Date: August 20, 2014

The permit number cited above should be referenced in future correspondence regarding this facility.

Permit Revision History

DATE OF REVISION	TYPE OF REVISION	SECTION NUMBER AND TITLE	DESCRIPTION OF REVISION
April 2004	Initial Permit Issuance		**Permit #V-SU-0031-01.00 with 4 modifications:** #V-SU-0031-01.01 – Significant Modification – Incorporated Synthetic Minor Limits #V-SU-0031-01.02 – Administrative - Change Responsible Official #V-SU-0031-01.03 – Administrative Amendment - Streamlined Permit #V-SU-0031-01.04 - Significant Modification – Incorporated Synthetic Minor Limits
2009	Renewal Permit Issuance		**Permit #V-SU-0031-08.00**

TABLE OF CONTENTS

Abbreviations and Acronyms

AR	Acid Rain
ARP	Acid Rain Program
bbls	Barrels
BACT	Best Available Control Technology
CAA	Clean Air Act [42 U.S.C. Section 7401 et seq.]
CAM	Compliance Assurance Monitoring
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CMS	Continuous Monitoring System (includes COMS, CEMS and diluent monitoring)
COMS	Continuous Opacity Monitoring System
CO	Carbon monoxide
CO_2	Carbon dioxide
DAHS	Data Acquisition and Handling System
dscf	Dry standard cubic foot
dscm	Dry standard cubic meter
EIP	Economic Incentives Programs
EPA	Environmental Protection Agency
FGD	Flue gas desulfurization
gal	Gallon
gpm	Gallons per minute
H_2S	Hydrogen sulfide
gal	gallon
HAP	Hazardous Air Pollutant
hr	Hour
ICE	Internal Combustion Engine
Id. No.	Identification Number
kg	Kilogram
lb	Pound
MACT	Maximum Achievable Control Technology
MVAC	Motor Vehicle Air Conditioner
Mg	Megagram
MMBtu	Million British Thermal Units
MMscfd	Million Standard Cubic Feet per Day
mo	Month
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMHC	Non-methane hydrocarbons
NOx	Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
pH	Negative logarithm of effective hydrogen ion concentration (acidity)
PM	Particulate Matter
PM_{10}	Particulate matter less than 10 microns in diameter
ppm	Parts per million
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
psi	Pounds per square inch
psia	Pounds per square inch absolute
RICE	Reciprocating internal combustion engine
RMP	Risk Management Plan
scfm	Standard cubic feet per minute
SI	Spark Ignition
SNAP	Significant New Alternatives Program
SO_2	Sulfur Dioxide
tpy	Ton Per Year
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

List of Tables

I. Source Information and Emission Unit Identification

I.A. Source Information

Parent Company Name: Samson Resources

Plant Name: South Ignacio Central Delivery Point

Plant Location: SE ¼ of Section 32, T33N R7W
Lat. 37° 3' 14.1" N Long. -107° 37' 30.8" W

Region: 8

State: Colorado

County: La Plata

Reservation: Southern Ute Indian Reservation

Tribe: Southern Ute Indian Tribe

Responsible Official: Attorney-in-Fact

SIC Code: 1311 – Natural Gas Production

AFS Plant Identification Number: 0806700287

Other Clean Air Act Permits: There are no other Federal Clean Air Act (CAA) permits, such as minor NSR or PSD.

Description of Operations: The South Ignacio Central Delivery Point facility compresses inlet coal-bed methane gas to transmission pipeline pressures. Gas entering the facility from the field is first fed to an inlet separator that removes water gravimetrically that may have condensed during transportation from the gas wells. Separator overhead is fed to one of eight compressor engines from a common suction header. The compressors discharge gas to a common discharge header that feeds to scrubbers. Scrubbers separate and collect liquids that may have formed during compression. The compressed gas is then fed to two dehydration units operating in parallel. Tri-ethylene glycol is circulated counter-currently and absorbs water. Rich glycol is circulated to a reboiler, where moisture is driven to the atmosphere by heating the glycol. Dry gas exits the contactors and is directed to one of two sales lines, where it is metered and exits the facility. The current gas processing capacity of the facility is 70 MMscfd.

I.B. Source Emission Points

Table 1 - Emission Units
Samson Resources South Ignacio Central Delivery Point

Emission Unit Id.	Description	Control Equipment
E1	1680 hp, Waukesha 7044 GSI Rich Burn Compressor Engine, natural gas fired: Serial No. C-13225/1 Manufactured 5/2005 Installed 1/6/2006	Non-Selective Catalyst
E2	1267 hp, Waukesha 7042 GL Lean Burn Compressor Engine, natural gas fired: Serial No. C-60768/1 Manufactured 11/1997 Installed 1/29/2007	Oxidation Catalyst
E3	Serial No. C-12097/2 Manufactured 2/2008 (NSPS JJJJ - engine) Installed 3/14/2008	
E4	1336 hp, Waukesha 7042 GL Lean Burn Compressor Engine, natural gas fired: Serial No. C-10990/1 Manufactured March 2007 Installed May 7, 2007	Oxidation Catalyst
E5	1400 hp, Waukesha 5794 LT Lean Burn Compressor Engine, natural gas fired: Serial No. C-15962/1 Manufactured 2/2006 Installed 8/24/2007	Oxidation Catalyst
E6	Serial No. C-16160/1 Manufactured 11/2005 Installed 4/8/2006	
E7	Serial No. C-15838/1 Manufactured 9/2005 Installed 3/29/2006	
E8	Serial No. C-15836/1 Manufactured 8/2005 Installed 4/5/2006	
D1	30 MMscfd Dehydration Unit glycol regenerator & 1.25 MMBtu/hr natural gas-fired reboiler burner: Serial No. 101727 Installed 2003	PESCO Control Unit: Condenser & Enclosed Flare Stack
D2	40 MMscfd Dehydration Unit Glycol Regenerator & 0.75 MMBtu/hr natural gas-fired reboiler burner: Serial No. Custom Installed 2/2009	PESCO Control Unit: Condenser & Enclosed Flare Stack

Table 2 - Insignificant Emission Units
Samson Resources South Ignacio Central Delivery Point

Unit ID	Description
IEU1	16 - 500 gal. lubricating oil storage tanks (low vapor pressure)
IEU2	11 - 500 gal. used oil storage tanks (low vapor pressure)
IEU3	2 - 500 gal. ethylene glycol storage tanks (low vapor pressure)
IEU4	4 - 1000 gal. produced water storage tanks (low VOC content)
IEU5	1 - 400 bbl. slop tank (mostly water w/some lubricating oil - low vapor pressure)
IEU6	1 - 500 gal. methanol storage tank (low throughput)
IEU7	1 – 0.75 MMBtu/hr natural gas fired reboiler burner
IEU8	1 – 1.25 MMBtu/hr natural gas fired reboiler burner
IEU9	5 - 0.12 MMBtu/hr natural gas fired tank heaters

II. Specific Requirements for Engines

Certain requirements in Section II of this permit (subsections of Sections II.D., II.E., II.F., II.G., II.H., and II.I.) have been created, at the permittee's request, specifically to recognize the catalysts for limiting the PTE of nitrogen oxides, carbon monoxide, and formaldehyde emissions.

[CAA 304(f)(4), 40 CFR 71.6(b) and 71.7(e)(1)(i)(A)(4)(i)]

II.A. 40 CFR Part 60 and 40 CFR Part 63 General Provisions

1. 40 CFR Part 60, Subpart A – Standards of Performance for New Stationary Sources, General Provisions: This facility is subject to the requirements of 40 CFR part 60, subpart A as outlined in Table 3 of 40 CFR 60, subpart JJJJ. Notwithstanding conditions in this permit, the permittee shall comply with all applicable requirements of 40 CFR part 60.

   [40 CFR 60.4246]

2. 40 CFR Part 63, Subpart A – National Emission Standards for Hazardous Air Pollutants for Source Categories, General Provisions: This facility is not subject to any of the requirements of 40 CFR part 63, subpart A.

   [40 CFR 63.6590(c)]

II.B. 40 CFR 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines [40 CFR 63.6580-63.6675]

1. This facility is subject to the requirements of 40 CFR part 63, subpart ZZZZ. Notwithstanding conditions in this permit, the permittee shall comply with all applicable requirements of 40 CFR part 63, subpart ZZZZ.

2. The permittee must meet the requirements of 40 CFR part 63, subpart ZZZZ by meeting the requirements of 40 CFR part 60, subpart JJJJ, for spark ignition engines. No further requirements apply to engine unit E3 under 40 CFR part 63.

   [40 CFR 63.6590(c)]

II.C. 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines [40 CFR 60.4230 – 60.4248]

1. This facility is subject to the requirements of 40 CFR part 60, subpart JJJJ. Notwithstanding conditions in this permit, the permittee shall comply with all applicable requirements of 40 CFR part 60, subpart JJJJ.

2. 40 CFR part 60, subpart JJJJ applies to the following engine:

   E3: 1267 hp Waukesha, natural gas-fired, lean-burn engine;
   Reconstructed post-June 12, 2006; Manufactured February 2008.

   [40 CFR 60.4230(a)(5)]

3. The permittee shall demonstrate compliance with 40 CFR 60, subpart JJJJ according to one of the following methods:

(a) Certified Engine:

(i) Operate an engine certified according to procedures specified in 40 CFR 60, subpart JJJJ for the same model year; and

(ii) Demonstrate compliance according to one of the methods specified in §60.4231(a); or

(b) Non-Certified Engine:

(i) Operate a non-certified engine and demonstrate compliance with the emission standards specified in the emissions table in Section II.D. of this permit and according to the testing requirements specified in §60.4244, as applicable; and

(ii) Keep a maintenance plan and records of conducted maintenance and, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions; and

(iii) Conduct an initial performance test and subsequent performance testing according to 40 CFR 60.4244, every 8,760 hours of operation or 3 years, whichever comes first, thereafter to demonstrate compliance.

[Explanatory Note: The performance testing requirements, as required for in 40 CFR 60, subpart JJJJ, can be found in the Appendix to this permit, Section VI.]

[40 CFR 60.4243]

4. Requirements pursuant to 40 CFR 60, subpart JJJJ are taken from the Federal Register as published on January 18, 2008 (73 FR 3568).

II.D. Emission Limits

1. Emissions from engine units E1, E2, E3, E4, E5, E6, E7, and E8 shall not exceed the following limits:

Unit	Source of Emission Limit	CO		NOx		VOC	
		g/hp-hr	lbs/hr	g/hp-hr	lbs/hr	g/hp-hr	lbs/hr
E1	Part 71 Permit/Consent Agreement	3.5	12.9	2.5	9.2	-	-
E2	Part 71 Permit/Applicant Requested	1.0	2.79	-	-	-	-
E3	Part 71 Permit/Applicant Requested	1.0	2.79	-	-	-	-
	NSPS JJJJ–Manuf. on or after 1/1/08	4.0*	-	2.0*	-	1.0*	-
	NSPS JJJJ – Manuf. on or after 7/1/10 [40 CFR 60.4233(f)(4) and (e)]	2.0*	-	1.0*	-	0.7*	-
E4	Part 71 Permit/Applicant Requested	1.0	2.94	-	-	-	-
E5	Part 71 Permit/Applicant Requested	1.0	3.08	-	-	-	-
E6	Part 71 Permit/Applicant Requested	1.0	3.08	-	-	-	-
E7	Part 71 Permit/Applicant Requested	1.0	3.08	-	-	-	-
E8	Part 71 Permit/Applicant Requested	1.0	3.08	-	-	-	-

* Emission limit is for non-certified engines.

2. Facility-wide formaldehyde (CH_2O) emissions shall not exceed 9.5 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12-month total.

II.E. Work Practice and Operational Requirements

1. Unit E1, a Waukesha 7044 GSI reciprocating natural gas compressor engine with 1,680 brake horsepower (bhp) shall be equipped with a Johnson Matthey non-selective catalytic reduction unit for the control of NOx, CO, and CH_2O.

2. Units E2 and E3, which are Waukesha 7042 GL lean burn reciprocating natural gas compressor engines each rated at 1,267 brake horsepower (bhp), shall each be equipped with an oxidation catalyst for the control of CO and CH_2O.

3. Unit E4, a Waukesha 7042 GL lean burn reciprocating natural gas compressor engine with 1,336 bhp shall be equipped with an oxidation catalyst for the control of CO and CH_2O.

4. Units E5, E6, E7, and E8, which are Waukesha L5794LT reciprocating natural gas compressor engines each rated at 1,400 bhp, shall each be equipped with an oxidation catalyst for the control of CO and CH_2O.

5. The permittee shall follow, for each engine and any respective non-selective catalyst and oxidation catalyst, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance of each engine and catalyst.

6. The permittee shall install temperature sensing devices before the catalyst for each engine in order to continuously monitor the inlet temperature of the catalyst for each engine. Each temperature-sensing device shall be accurate to within plus or minus 3 °F.

7. The engine exhaust temperature for unit E1 at the inlet to the non-selective catalyst, shall be maintained at all times the engine operates at no less than 750 °F and no more than 1,250 °F. The engine exhaust temperature for units E2, E3, E4, E5, E6, E7, and E8 at the inlet to each oxidation catalyst, shall be maintained at all times the engine operates at no less than 500 °F and no more than 1,250 °F.

8. If the catalyst inlet temperature on an engine deviates from the acceptable range listed for each engine in Section II.E.7 above, then the following actions shall be taken:

   (a) Immediately upon determining a deviation of the catalyst inlet temperature, corrective action shall be taken on that engine to assess performance problems and/or tuning issues and the catalyst shall be inspected for possible damage and problems affecting catalyst effectiveness (including, but not limited to, plugging, fouling, destruction, or poisoning of the catalyst).

   (b) If the problem can be corrected by following the engine and/or the catalyst manufacturer's recommended procedures, then the permittee shall correct the problem within 24 hours of inspecting the engine and catalyst.

(c) If the problem can not be corrected using the manufacturer's recommended procedures, then the affected engine shall cease operating immediately and shall not be returned to routine service until the catalyst inlet temperature is measured and found to be within the acceptable temperature range for that engine. The permittee shall also notify EPA in writing of the problem within 15 working days of observing the problem and include in the notification the cause of the problem and a corrective action plan that outlines the steps and timeframe for bringing the inlet temperature range into compliance. (The corrective action may include removal and cleaning of the catalyst according to the manufacturer's methods or replacement of the catalyst.)

9. The permittee shall install gauges before and after the catalyst for each engine in order to monitor pressure drop across the catalyst. The pressure sensing devices shall be accurate to within plus or minus five-tenths (0.5) inches of water.

10. The pressure drop across the catalyst for units E3, E4, E5, and E6 shall not change by more than 2 inches of water at maximum operating rate (90% to 110% of engine capacity at site elevation) from the baseline pressure drop across the catalyst measured during the latest performance test as required by Section II.F.6(d).

11. A pressure drop which exceeds the pressure drop range for an engine or replacement engine as indicated above shall be considered indicative of catalyst fouling or break through and the catalyst shall be inspected and cleaned or replaced, if necessary.

12. The permittee's completion of any or all of the actions prescribed by Sections II.E.8(a) through (c) and II.E.11 of this permit shall not constitute, nor qualify as, an exemption from any CO, NOx, or CH_2O emission limits in this permit.

13. All emission units at the South Ignacio Central Delivery Point shall be fired only with natural gas. The natural gas shall be pipeline-quality in all respects except that CO_2 concentrations in the gas shall not be required to be within pipeline-quality.

[Explanatory Note: The purpose of permit Section 13, above, is to ensure that there are no contaminants in the fuel that might foul the catalyst. In general, pipeline-quality natural gas is (1) within ± 5% of the heating value of pure methane, or 1,010 Btu/per cubic foot under standard atmospheric conditions, and (2) free of water and toxic or corrosive contaminants. However, CO_2 is not a potential foulant of the catalyst and has therefore been excluded from the requirement.]

II.F. Testing Requirements [40 CFR 71.6(a)(3)(i)(A) through (C)]

1. Performance Tests:

(a) Reference method performance tests shall be conducted for all replacement engines to measure CH_2O emissions from the replacement engines to demonstrate compliance with the facility-wide CH_2O emission limit in Section II.D. The performance test for CH_2O shall be conducted within 90 calendar days of startup of a replacement engine.

[Explanatory Note: An initial reference method performance test was conducted for units E2, E3, E6, E7, and E8 for measuring CH_2O emissions from the engines to demonstrate compliance with the facility-wide CH_2O emission cap in Section II.D. when the emission limits were originally permitted on 11/30/2005. The initial performance test for CH_2O was conducted within 60 calendar days of 11/30/2005]

(b) Reference method performance tests shall be conducted for replacement engines for unit E1 to measure NOx and CO emissions to demonstrate compliance with the emission limits in Section II.D. The performance tests for NOx and CO shall be conducted within 90 calendar days of startup of a replacement engine.

(c) Reference Method performance tests shall be conducted, according to 40 CFR 60.4244, upon startup and for all new and replaced engines subject to NSPS JJJJ that are non-certified to measure NOx, CO, and VOC emissions to demonstrate compliance with the emission limits in Section II.D. In addition, the permittee must conduct subsequent performance tests on non-certified engines every 8,760 hours of operation or 3 years, which ever comes first.

[40 CFR 60.4243(b)(2)(ii)]

2. Upon change out of the catalyst for any engine, a performance test shall be conducted for measuring NOx (E1 only) and CO and CH_2O emissions to demonstrate continued compliance with the emission limits in Section II.D. and to re-establish temperature and pressure baselines. The performance test shall be conducted within 90 calendar days of the catalyst change out.

3. The performance tests for NOx and CO shall be conducted in accordance with the test methods specified in 40 CFR part 60, Appendix A. EPA Reference Method 7E or ASTM D-6438-03 shall be used to measure NOx emissions. EPA Reference Method 10 shall be used to measure CO emissions.

4. The performance test for measuring CH_2O emissions shall be conducted in accordance with EPA Reference Method 320 or 323 of 40 CFR part 63, Appendix A or Method CARB 430.

5. The performance test for measuring VOC emissions shall be conducted in accordance with EPA Reference Method 25A and 18 of 40 CFR part 63, Appendix A.

[40 CFR 4244, Table 2]

6. All tests for NOx, CO, VOC, and CH_2O emissions must meet the following requirements:

(a) All tests shall be performed at a maximum operating rate (90% to 110% of engine design capacity);

(b) Each source test shall consist of at least three 1-hour or longer valid test runs. Emission results shall be reported as the arithmetic average of all valid test runs and shall be in terms of the emission limits (lbs/hr and g/hp-hr);

(c) During each test run, data shall be collected on all parameters necessary to document how NOx, CO, VOC, and CH_2O emissions were measured or calculated (such as test run length, minimum sample volume, volumetric flow rate, moisture and oxygen corrections, etc.);

(d) During each test run, the pressure drop across each oxidation catalyst and the inlet temperature to the oxidation catalyst for each engine shall be measured. The baseline pressure drop shall be the arithmetic average of all valid test runs; and

(e) The source testing plans for NOx, CO, and CH_2O emissions approved by EPA on May 19, 2004 and June 3, 2004 shall be followed. The source testing plans for VOC emissions pursuant to 40 CFR 60.4244 shall be followed. The source testing plan shall include and addresses the following elements:

(i) Purpose of the test;
(ii) Engines and catalysts to be tested;
(iii) Expected engine operating rate(s) during test;
(iv) Schedule/dates for test;
(v) Sampling and analysis procedures (sampling locations, test methods, laboratory identification);
(vi) Quality assurance plan (calibration procedures and frequency, sample recovery and field documentation, chain of custody procedures); and
(vii) Data processing and reporting (description of data handling and quality control procedures, report content).

II.G. Monitoring Requirements [40 CFR 71.6(a)(3)(i)(A) through (C)]

1. The permittee shall measure NOx (E1 only) and CO emissions from all engines at least quarterly to demonstrate compliance with the emission limits in Section II.D, above. To meet this requirement, the permittee shall measure NOx (E1 only) and CO emissions from each engine using a portable analyzer and the monitoring protocol approved by EPA on June 3, 2004. If the monitoring results for two (2) consecutive quarters are less than eighty percent (80%) of both the NOx and CO emission limits in Section II.D., then the required monitoring frequency shall change from quarterly to semi-annual. If monitoring results for any one engine ever exceed more than 80% of either the NOx (E1 only) or CO emission limits, then the required monitoring frequency shall revert back to quarterly for that engine only. Semi-annual monitoring may be resumed after two (2) consecutive quarters of monitoring results that demonstrate less than 80% of the NOx (E1 only) and CO emission limits.

2. The permittee shall measure CH_2O emissions from all engines at least quarterly to demonstrate compliance with the facility-wide CH_2O emission limit in Section II.D, above. To meet this requirement, the permittee shall measure CH_2O emissions from each engine and replacement engine using the performance test methods and requirements listed in Section II.F, above and the test plan approved by EPA on June 3, 2004.

   For each engine, if the monitoring results for two (2) consecutive quarters show that the CH_2O emission reduction meets or exceeds 60%, then the required monitoring frequency shall change from quarterly to semi-annually. If monitoring results ever show that the CH_2O emission

reduction is less than 60%, then the required monitoring frequency shall revert back to quarterly. Semi-annual monitoring may be resumed after two (2) consecutive quarters of monitoring results that demonstrate CH_2O emission reductions meet or exceed 60%.

3. Measurements of the engine exhaust temperature at the inlet to each catalyst shall be taken at least daily.

4. Measurements of the pressure drop across each catalyst shall be taken at least weekly.

II.H. Recordkeeping Requirements [40 CFR 71.6(a)(3)(ii), 40 CFR 60.4245]

1. Facility-wide emissions of CH_2O shall be calculated at the end of each calendar month from the results of the most recent performance test required in Section II.G.2 for units E1, E2, E3, E4, E5, E6, E7, and E8. The monthly emissions shall include CH_2O emissions from all other units, including insignificant emitting units, listed in Tables 1 and 2 of this permit. These emissions shall be recorded.

2. The permittee shall, at the end of each month, add the CH_2O emissions for that month to the calculated emissions for the preceding 11 months and record a new 12-month total. CH_2O emissions from all controlled, uncontrolled, and insignificant emitting units (Tables 1 and 2 of this permit) shall be included in the calculation.

3. The facility-wide emissions of CH_2O shall be calculated as follows:

   (a) For the eight engines (E1, E2, E3, E4, E5, E6, E7, and E8), emissions for the month shall be calculated by multiplying the most recent CH_2O test result for that engine, in pounds per hour, by the number of operating hours for that engine for that month. If data on operating hours are not available for that unit for that month, full-time operation of the unit for that month shall be assumed.

   (b) For the remaining emitting units at the facility, except insignificant emitting units, emissions for the month for each unit shall be calculated by multiplying the CH_2O emission factor for that unit, in pounds per hour by the number of operating hours for that unit for that month. If data on operating hours are not available for that unit for that month, full-time operation of the unit shall be assumed.

   (c) Emissions for insignificant emission units for each month shall be recorded as one-twelfth of the annual emission amount listed for IEUs on the most recent Form PTE of the part 71 documents submitted to EPA, unless the IEUs have changed, in which case the permittee shall provide the basis for the new IEU emission calculations with the next required report.

4. The permittee shall comply with the following recordkeeping requirements:

   (a) Records shall be kept of all temperature measurements required by Section II.G.3 of this permit, as well as a description of any corrective actions taken pursuant to Section II.E.9 of this permit.

(b) Records shall be kept of vendor specifications to demonstrate that the accuracy of the temperature-sensing thermocouples at each catalyst is at least as accurate as that specified in Section II.E.6 of this permit.

(c) Records shall be kept of all pressure drop measurements required by Sections II.G.4 and II.E.9 of this permit, as well as a description of any corrective actions taken pursuant to Section II.E.11 of this permit.

(d) Records shall be kept that are sufficient to demonstrate, pursuant to Section II.E.13 of this permit, that the fuel for the engines is pipeline-quality natural gas in all respects, with the exception of CO_2 concentration in the natural gas.

5. The permittee shall keep records of all required testing (Section II.F.) and monitoring (Section II.G) in this permit. The records shall include the following:

(a) The date, place, and time of sampling or measurements;

(b) The date(s) analyses were performed;

(c) The company or entity that performed the analyses;

(d) The analytical techniques or methods used;

(e) The results of such analyses or measurements; and

(f) The operating conditions as existing at the time of sampling or measurement.

6. The permittee must keep records of the following for engine E3:

(a) All notifications submitted to comply with this subpart and all documentation supporting any notification;

(b) Maintenance conducted on the engine;

(c) If E3 is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90 and 1048; and

(d) If E3 engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

[40 CFR 60.4245(a)]

II.I. <u>Notifications and Reporting Requirements</u>
[40 CFR 71.6(a)(3)(iii), 40 CFR 60.4245 & 60.19]

1. The permittee shall submit to EPA a written report of the results of any performance tests and temperature and pressure drop measurements required in Section II.F. of this permit. This report shall be submitted within 90 calendar days of the date of testing completion.

2. The permittee shall submit to EPA, as part of the semi-annual monitoring reports required in Section IV of this permit, a report of any instances where:

   (a) The temperature at the inlet to the catalyst is outside the limits established in Section II.E.8, and a description of any corrective actions taken;

   (b) The pressure drop across the catalyst is outside the limits established in Section II.E.11., and a description of any corrective actions taken;

   (c) An exceedance of the NOx or CO emission limits in Section II.D.1 has occurred, and a description of any corrective actions taken; or

   (d) An exceedance of the facility-wide CH_2O emission limit in Section II.D.2 has occurred, and a description of any corrective actions taken.

3. If no such instances of deviations, outlined in Section II.I.2(a) through (d) above, have been detected, then the permittee shall submit to EPA, as part of the semi-annual monitoring reports required in Section IV of this permit a statement that says so.

4. The permittee must, for engines that have not been certified by an engine manufacturer to meet the emission standards in §60.4231(c), submit an initial notification as required in §60.7(a)(1). The notification must include the following information:

   (a) Name and address of the owner or operator;

   (b) The address of the affected source;

   (c) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;

   (d) Emission control equipment; and

   (e) Fuel used.

   [40 CFR 60.4245(c)]

5. The permittee must submit a copy of each performance test as required by §60.4244 and Section II.F.1 within 60 days after the test has been completed.

   [40 CFR 60.4245(d)]

III. Specific Requirements for Glycol Dehydrators

Certain requirements in Section III of this permit have been created, at the permittee's request, to limit the PTE of benzene from the glycol dehydrators (D1 and D2) and facility-wide hazardous air pollutants; specifically, Sections III.A, III.B, III.C, III.D, III.E.

[CAA 304(f)(4), 40 CFR 71.6(b) and 71.7(e)(1)(i)(A)(4)(i)]

III.A. Emission Limits

1 Benzene emissions from each of the glycol dehydration units, D1 and D2, shall be limited to 0.9 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12-month total.

2. Facility-wide HAP emissions shall not exceed 23 tons during any consecutive 12 months. Compliance with the annual limits shall be determined on a rolling 12-month total.

III.B. Work Practice and Operational Requirements

1. The permittee shall install and operate a PESCO Control Unit capable of reducing uncontrolled benzene emissions from both dehydrators (D1 and D2) by no less than 98%, and:

   (a) Emissions from the both dehydration unit process vents (D1 and D2) shall be routed to the enclosed flare;

   (b) A flame must be present on the enclosed flare at all times during which either one or both of the dehydration units (D1 and/or D2) are operating. The dehydration units (D1 and D2) shall not be operated if a flame is not present in the enclosed flare;

   (c) The permittee shall utilize the emergency shutdown (ESD) valve for safety considerations only; and

   (d) The permittee shall minimize visible emissions from the enclosed flare stack.

2. The permittee shall follow, for each dehydration unit and the PESCO Control Unit, the manufacturer's recommended maintenance schedule and procedures to ensure optimum performance.

III.C. Monitoring Requirements [40 CFR 71.6(a)(3)(i)(A) through (C)]

1. The permittee shall perform monthly testing of the inlet wet gas stream to the dehydrators (extended wet gas analysis). The analysis shall include the inlet gas temperature and pressure at which the sample was taken.

2. The permittee shall determine the monthly benzene and total HAP emissions from each dehydrator using GRI GlyCalc Version 4.0. The input parameter to the model shall include:

(a) The current months inlet wet gas analysis;

(b) The temperature and pressure of the gas provided in the inlet wet gas analysis;

(c) The enclosed flare control efficiency; and

(d) The maximum gas throughput and glycol pump recirculation rate for each dehydrator as follows:

Dehydration Unit ID	Maximum Gas Throughput	Maximum Glycol Pump Recirculation Rate
D1	30 MMscfd	15 gallons per minute
D2	40 MMscfd	17 gallons per minute

3. Benzene emissions from each dehydrator shall be recorded at the end of each month. The permittee shall, at the end of each month, add the benzene emissions for that month to the calculated emissions for the preceding eleven months and record a new twelve-month total.

4. Facility-wide HAP emissions shall be determined as follows:

(a) HAP emissions from each dehydrator and all other units operating at the facility, including insignificant units, listed in Tables 1 and 2 of this permit, shall be recorded at the end of each month;

(i) HAP emissions from the dehydrators shall be determined using the GRI GlyCalc model required in Section III.C.2;
(ii) HAP emissions from the engines shall be determined using the methods outlined in Section II.H of this permit;
(iii) Emissions for insignificant emission units for each month shall be recorded as one-twelfth of the annual emission amount listed for IEUs on the most recent Form PTE of the part 71 documents submitted to EPA, unless the IEUs have changed, in which case the permittee shall provide the basis for the new IEU emission calculations with the next required report.

(b) The permittee shall sum the HAP emissions from each dehydrator, and all other units operating at the facility, including insignificant units, listed in Tables 1 and 2 of this permit each month;

(c) The permittee shall, at the end of each month, add the HAP emissions for that month to the calculated HAP emissions for the preceding eleven months and record a new twelve month total.

III.D. Recordkeeping Requirements [40 CFR 71.6(a)(3)(ii) and 40 CFR 63.774(d)(1)]

1. The permittee shall comply with the following recordkeeping requirements:

   (a) Records shall be kept of the dehydrator and control equipment specifications;

   (b) Records shall be kept of the equipment manufacturer's recommended maintenance schedule and procedures;

   (c) Records shall be kept of the monthly GRI GlyCalc modeling analysis; and

   (d) Records shall be kept of the rolling 12 month emission totals for benzene emissions from the dehydrator and the facility-wide HAP emissions.

2. The permittee shall keep records of all required gas analysis testing. The records shall include the following:

   (a) The date, place, and time of sampling or measurements;

   (b) The date(s) analyses were performed;

   (c) The company or entity that performed the analyses;

   (d) The analytical techniques or methods used;

   (e) The results of such analyses or measurements; and

   (f) The operating conditions as existing at the time of sampling or measurement (gas flow rate, gas temperature, and gas pressure).

3. The permittee shall retain records of all required monitoring data and support information for a period of at least 5 years from the date of the monitoring sample, measurement, report, or application. These records shall be made available upon request by EPA. Support information includes all calibration and maintenance records, all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit.

III.E. Reporting Requirements [40 CFR 71.6(a)(3)(iii)]

The permittee shall submit to EPA, as part of the semi-annual monitoring reports required in Section IV.B.1. of this permit, where an excursion of the benzene emission limit or facility-wide HAP emission limit has occurred, as well as a description of any corrective actions taken. If no such instances have been detected, then a statement shall be provided to say so.

IV. Facility-Wide Requirements

Conditions in this section of the permit apply to all emissions units located at the facility, including any units not specifically listed in Table 1 and Table 2 of Section I.B.

[40 CFR 71.6(a)(1)]

IV.A. General Recordkeeping Requirements [40 CFR 71.6(a)(3)(ii)]

The permittee shall comply with the following generally applicable recordkeeping requirements:

1. If the permittee determines that his or her stationary source that emits (or has the potential to emit, without federally recognized controls) one or more hazardous air pollutants is not subject to a relevant standard or other requirement established under 40 CFR part 63, the permittee shall keep a record of the applicability determination on site at the source for a period of five years after the determination, or until the source changes its operations to become an affected source, whichever comes first. The record of the applicability determination shall include an analysis (or other information) that demonstrates why the permittee believes the source is unaffected (e.g., because the source is an area source).

   [40 CFR 63.10(b)(3)]

2. Records shall be kept, as required by the Off Permit Changes condition of this permit which are made in accordance with the approved Alternative Operating Scenario condition of this permit.

IV.B. General Reporting Requirements

1. The permittee shall submit to EPA reports of any monitoring and recordkeeping required under this permit semi-annually by April 1st and October 1st of each year. The report due on April 1st shall cover the prior six-month period from July 1st through December 31st. The report due on October 1st shall cover the prior six-month period from January 1st through June 30th. All instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by a responsible official consistent with Section V.E. of this permit.

2. The permittee shall promptly report to the EPA Regional Office deviations from permit requirements, including those attributable to upset conditions as defined in this permit, the probable cause of such deviations and any corrective actions or preventive measures taken. "Prompt" is defined as follows:

   (a) Any definition of "prompt" or a specific timeframe for reporting deviations provided in an underlying applicable requirement as identified in this permit;

   (b) Where the underlying applicable requirement fails to address the time frame for reporting deviations, reports of deviations will be submitted based on the following schedule:

      (i) For emissions of a hazardous air pollutant or a toxic air pollutant (as identified in the applicable regulation) that continue for more than an hour in excess of permit requirements, the report must be made within 24 hours of the occurrence;

(ii) For emissions of any regulated air pollutant, excluding a hazardous air pollutant or a toxic air pollutant that continues for more than two hours in excess of permit requirements, the report must be made within 48 hours; and

(iii) For all other deviations from permit requirements, the report shall be submitted with the semi-annual monitoring report.

3. If any of the conditions in IV.B.2(b)(i) or (ii), are met, the source must notify EPA by telephone (1-800-227-8917) or facsimile (303-312-6064) based on the timetables listed above. *[Notification by telephone or fax must specify that this notification is a deviation report for a part 71 permit].* A written notice, certified consistent with Section V.E. of this permit must be submitted within 10 working days of the occurrence. All deviations reported under this Section must also be identified in the 6-month report required under permit Section IV.B.1.

[Explanatory note: To help part 71 permittees meet reporting responsibilities, EPA has developed a form "PDR" for prompt deviation reporting. The form may be found on EPA website at: http://www.epa.gov/air/oaqps/permits/p71forms.html]

4. "Deviation" means any situation in which an emissions unit fails to meet a permit term or condition. A deviation is not always a violation. A deviation can be determined by observation or through review of data obtained from any testing, monitoring, or recordkeeping established in accordance with §71.6(a)(3)(i) and (a)(3)(ii). For a situation lasting more than 24 hours which constitutes a deviation, each 24 hour period is considered a separate deviation. Included in the meaning of deviation are any of the following:

(a) A situation where emissions exceed an emission limitation or standard;

(b) A situation where process or emissions control device parameter values indicate that an emission limitation or standard has not been met;

(c) A situation in which observations or data collected demonstrate noncompliance with an emission limitation or standard or any work practice or operating condition required by the permit; or

(d) A situation in which an exceedance or an excursion, as defined in 40 CFR part 64 occurs.

IV.C. Permit Shield [40 CFR 71.6(f)(3)]

Nothing in this permit shall alter or affect the following:

1. The liability of a permittee for any violation of applicable requirements prior to or at the time of permit issuance;

2. The ability of the EPA to obtain information under section 114 of the CAA; or

3. The provisions of section 303 of the CAA (emergency orders), including the authority of the Administrator under that section.

IV.D. Alternative Operating Scenarios [40 CFR 71.6(a)(9) and 40 CFR 71.6(a)(3)(ii)]

Engine Replacement/Overhaul

1. Replacement of an existing permitted compressor engine with an engine of the same make, model, horsepower rating, and configured to operate in the same manner as the engine being replaced, and which satisfies all of the provisions for Off Permit Changes in this permit, including the provisions specific to engine replacement, shall be considered an allowed alternative operating scenario under this permit.

2. Any emission limits, requirements, control technologies, testing, or provisions that apply to engines that are replaced under this Alternative Operating Scenarios section shall also apply to the replacement engines, including initial performance testing requirements.

3. A replacement engine for unit E3 shall be considered a new unit and thus subject to the performance tests required by Section II.F, and all other conditions applicable to unit E3 in this permit.

4. Replacement of a permitted compressor engine with an engine subject to 40 CFR part 60, subpart JJJJ is not allowed under this alternative operating scenario.

5. Replacement of a permitted compressor engine with an engine subject to 40 CFR part 63, subpart ZZZZ is not allowed under this alternative operating scenario.

[Explanatory note: This section was included to allow for Off Permit replacement of engines that may have existing federally enforceable limits created in this permit. Replacement engines which trigger new applicable requirements (i.e., NSPS, NESHAP, etc.) must be processed through a minor permit modification. (See Section V.I. of this permit).]

V. Part 71 Administrative Requirements

V.A. Annual Fee Payment [40 CFR 71.6(a)(7) and 40 CFR 71.9]

1. The permittee shall pay an annual permit fee in accordance with the procedures outlined below.

[40 CFR 71.9(a)]

2. The permittee shall pay the annual permit fee each year no later than April 1st. The fee shall cover the previous calendar year.

[40 CFR 71.9(h)]

3. The fee payment shall be in United States currency and shall be paid by money order, bank draft, certified check, corporate check, or electronic funds transfer payable to the order of the U.S. Environmental Protection Agency.

[40 CFR 71.9(k)(1)]

4. The permittee shall send fee payment and a completed fee filing form to:

For regular U.S. Postal Service mail	For non-U.S. Postal Service Express mail (FedEx, Airborne, DHL, and UPS)
U.S. Environmental Protection Agency FOIA and Miscellaneous Payments Cincinnati Finance Center P.O. Box 979078 St. Louis, MO 63197-9000	U.S. Bank Government Lockbox 979078 U.S. EPA FOIA & Misc. Payments 1005 Convention Plaza SL-MO-C2-GL St. Louis, MO 63101

[40 CFR 71.9(k)(2)]

5. The permittee shall send an updated fee calculation worksheet form and a photocopy of each fee payment check (or other confirmation of actual fee paid) submitted annually by the same deadline as required for fee payment to the address listed in Section V.E. of this permit.

[40 CFR 71.9(h)(1)]

[Explanatory note: The fee filing form "FF" and the fee calculation worksheet form "FEE" may be found on EPA website at: http://www.epa.gov/air/oaqps/permits/p71forms.html]

6. Basis for calculating annual fee:

   (a) The annual emissions fee shall be calculated by multiplying the total tons of actual emissions of all "regulated pollutants (for fee calculation)" emitted from the source by the presumptive emissions fee (in dollars/ton) in effect at the time of calculation.

[40 CFR 71.9(c)(1)]

(i) "Actual emissions" means the actual rate of emissions in tpy of any regulated pollutant (for fee calculation) emitted from a part 71 source over the preceding calendar year. Actual emissions shall be calculated using each emissions units actual operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year.

[40 CFR 71.9(c)(6)]

(ii) Actual emissions shall be computed using methods required by the permit for determining compliance, such as monitoring or source testing data.

[40 CFR 71.9(h)(3)]

(iii) If actual emissions cannot be determined using the compliance methods in the permit, the permittee shall use other federally recognized procedures.

[40 CFR 71.9(e)(2)]

[Explanatory note: The presumptive fee amount is revised each calendar year to account for inflation, and it is available from EPA prior to the start of each calendar year.]

(b) The permittee shall exclude the following emissions from the calculation of fees:

(i) The amount of actual emissions of each regulated pollutant (for fee calculation) that the source emits in excess of 4,000 tpy;

[40 CFR 71.9(c)(5)(i)]

(ii) Actual emissions of any regulated pollutant (for fee calculation) already included in the fee calculation; and

[40 CFR 71.9(c)(5)(ii)]

(iii) The quantity of actual emissions (for fee calculation) of insignificant activities [defined in §71.5(c)(11)(i)] or of insignificant emissions levels from emissions units identified in the permittee's application pursuant to §71.5(c)(11)(ii).

[40 CFR 71.9(c)(5)(iii)]

7. Fee calculation worksheets shall be certified as to truth, accuracy, and completeness by a responsible official.

[40 CFR 71.9(h)(2)]

[Explanatory note: The fee calculation worksheet form already incorporates a section to help you meet this responsibility.]

8. The permittee shall retain fee calculation worksheets and other emissions-related data used to determine fee payment for 5 years following submittal of fee payment. [Emission-related data include, for example, emissions-related forms provided by EPA and used by the permittee for fee calculation purposes, emissions-related spreadsheets, and emissions-related data, such as

records of emissions monitoring data and related support information required to be kept in accordance with §71.6(a)(3)(ii).]

[40 CFR 71.9(i)]

9. Failure of the permittee to pay fees in a timely manner shall subject the permittee to assessment of penalties and interest in accordance with §71.9(l).

[40 CFR 71.9(l)]

10. When notified by EPA of underpayment of fees, the permittee shall remit full payment within 30 days of receipt of notification.

[40 CFR 71.9(j)(2)]

11. A permittee who thinks an EPA assessed fee is in error and who wishes to challenge such fee, shall provide a written explanation of the alleged error to EPA along with full payment of the EPA assessed fee.

[40 CFR 71.9(j)(3)]

V.B. Annual Emissions Inventory [40 CFR 71.9(h)(1)and (2)]

The permittee shall submit an annual emissions report of its actual emissions for both criteria pollutants and regulated HAPS for this facility for the preceding calendar year for fee assessment purposes. The annual emissions report shall be certified by a responsible official and shall be submitted each year to EPA by April 1st.

The annual emissions report shall be submitted to EPA at the address listed in Section V.E. of this permit.

[Explanatory note: An annual emissions report, required at the same time as the fee calculation worksheet by §71.9(h), has been incorporated into the fee calculation worksheet form as a convenience.]

V.C. Compliance Requirements

1. Compliance with the Permit

   (a) The permittee must comply with all conditions of this part 71 permit. Any permit noncompliance constitutes a violation of the CAA and is grounds for enforcement action; for permit termination, revocation and re-issuance, or modification; or for denial of a permit renewal application.

   [40 CFR 71.6(a)(6)(i)]

   (b) It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

   [40 CFR 71.6(a)(6)(ii)]

   (c) For the purpose of submitting compliance certifications in accordance with Section V.C.2 of this permit, or establishing whether or not a person has violated or is in

violation of any requirement of this permit, nothing shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[Section 113(a) and 113(e)(1) of the Act, 40 CFR 51.212, 52.12, 52.33, 60.11(g), and 61.12]

2. Compliance Schedule

(a) For applicable requirements with which the source is in compliance, the source will continue to comply with such requirements.

[40 CFR 71.5(c)(8)(iii)(A)]

(b) For applicable requirements that will become effective during the permit term, the source shall meet such requirements on a timely basis.

[40 CFR 71.5(c)(8)(iii)(B)]

3. Compliance Certifications

The permittee shall submit to EPA a certification of compliance with permit terms and conditions, including emission limitations, standards, or work practices annually each year no later than April 1st. The compliance certification shall cover the same 12-month period as the two consecutive semi-annual monitoring reports.

[Explanatory note: To help part 71 permittees meet reporting responsibilities, EPA has developed a reporting form for annual compliance certifications. The form may be found on EPA website at: http://www.epa.gov/air/oaqps/permits/p71forms.html]

The compliance certification shall be certified as to truth, accuracy, and completeness by a responsible official consistent with §71.5(d). The certification shall include the following:

(a) Identification of each permit term or condition that is the basis of the certification;

(b) The identification of the method(s) or other means used for determining the compliance status of each term and condition during the certification period, and whether such methods or other means provide continuous or intermittent data. Such methods and other means shall include, at a minimum, the methods and means required in this permit. If necessary, the permittee also shall identify any other material information that must be included in the certification to comply with section 113(c)(2) of the CAA, which prohibits knowingly making a false certification or omitting material information;

(c) The status of compliance with each term and condition of the permit for the period covered by the certification based on the method or means designated in (ii) above; and

(d) The certification shall identify each deviation and take it into account in the compliance certification;

(i) Such other facts as the EPA may require to determine the compliance status of the source; and

(ii) Whether compliance with each permit term was continuous or intermittent.

[40 CFR 71.6(c)(5)]

V.D. Duty to Provide and Supplement Information
[40 CFR 71.6(a)(6)(v), 71.5(a)(3), and 71.5(b)]

1. The permittee shall furnish to EPA, within a reasonable time, any information that EPA may request in writing to determine whether cause exists for modifying, revoking, and reissuing, or terminating the permit, or to determine compliance with the permit. Upon request, the permittee shall also furnish to the EPA copies of records that are required to be kept pursuant to the terms of the permit, including information claimed to be confidential. Information claimed to be confidential must be accompanied by a claim of confidentiality according to the provisions of 40 CFR part 2, subpart B.

[40 CFR 71.6(a)(6)(v) and 40 CFR 71.5(a)(3)]

2. The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information. In addition, a permittee shall provide additional information as necessary to address any requirements that become applicable after the date a complete application is filed, but prior to release of a draft permit.

[40 CFR 71.5(b)]

V.E. Submissions [40 CFR 71.5(d), 71.6(c)(1) and 71.9(h)(2)]

1. Any document (application form, report, compliance certification, etc.) required to be submitted under this permit shall be certified by a responsible official as to truth, accuracy, and completeness. Such certifications shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

[Explanatory note: EPA has developed a reporting form "CTAC" for certifying truth, accuracy and completeness of part 71 submissions. The form may be found on EPA website at: http://www.epa.gov/air/oaqps/permits/p71forms.html]

2. Any documents required to be submitted under this permit, including reports, test data, monitoring data, notifications, compliance certifications, fee calculation worksheets, and applications for renewals and permit modifications shall be submitted to:

Part 71 Permit Contact
Air Program, 8P-AR
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, Colorado 80202

V.F. Severability Clause [40 CFR 71.6(a)(5)]

The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.

V.G. Permit Actions [40 CFR 71.6(a)(6)(iii)]

This permit may be modified, revoked, reopened, and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition.

V.H. Administrative Permit Amendments [40 CFR 71.7(d)]

The permittee may request the use of administrative permit amendment procedures for a permit revision that:

1. Corrects typographical errors;

2. Identifies a change in the name, address, or phone number of any person identified in the permit, or provides a similar minor administrative change at the source;

3. Requires more frequent monitoring or reporting by the permittee;

4. Allows for a change in ownership or operational control of a source where the EPA determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittee has been submitted to the EPA;

5. Incorporates into the part 71 permit the requirements from preconstruction review permits authorized under an EPA-approved program, provided that such a program meets procedural requirements substantially equivalent to the requirements of §§71.7 and 71.8 that would be applicable to the change if it were subject to review as a permit modification, and compliance requirements substantially equivalent to those contained in §71.6; or

6. Incorporates any other type of change which EPA has determined to be similar to those listed above in subparagraphs 1 through 5 above.

[Explanatory Note: If subparagraphs 1 through 5 above do not apply, please contact EPA for a determination of similarity prior to submitting your request for an administrative permit amendment under this provision.]

V.I. Minor Permit Modifications [40 CFR 71.7(e)(1)]

1. The permittee may request the use of minor permit modification procedures only for those modifications that:

(a) Do not violate any applicable requirement;

(b) Do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;

(c) Do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient impacts, or a visibility or increment analysis;

(d) Do not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement and that the source has assumed to avoid an applicable requirement to which the source would otherwise be subject. Such terms and conditions include:

(i) A federally enforceable emissions cap assumed to avoid classification as a modification under any provision of title I; and
(ii) An alternative emissions limit approved pursuant to regulations promulgated under section 112(i)(5) of the CAA;

(e) Are not modifications under any provision of title I of the CAA; and

(f) Are not required to be processed as a significant modification.

[40 CFR 71.7(e)(1)(i)(A)]

2. Notwithstanding the list of changes ineligible for minor permit modification procedures in paragraph 1 above, minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in an applicable implementation plan or in applicable requirements promulgated by EPA.

[40 CFR 71.7(e)(1)(i)(B)]

3. An application requesting the use of minor permit modification procedures shall meet the requirements of §71.5(c) and shall include the following:

(a) A description of the change, the emissions resulting from the change, and any new applicable requirements that will apply if the change occurs;

(b) The source's suggested draft permit;

(c) Certification by a responsible official, consistent with §71.5(d), that the proposed modification meets the criteria for use of minor permit modification procedures and a request that such procedures be used; and

(d) Completed forms for the permitting authority to use to notify affected States as required under §71.8.

[40 CFR 71.7(e)(1)(ii)]

4. The source may make the change proposed in its minor permit modification application immediately after it files such application. After the source makes the change allowed by the preceding sentence, and until the permitting authority takes any of the actions authorized by §71.7(e)(1)(iv)(A) through (C), the source must comply with both the applicable requirements governing the change and the proposed permit terms and conditions. During this time period, the source need not comply with the existing permit terms and conditions it seeks to modify. However, if the source fails to comply with its proposed permit terms and conditions during this time period, the existing permit terms and conditions it seeks to modify may be enforced against it.

[40 CFR 71.7(e)(1)(v)]

5. The permit shield under §71.6(f) may not extend to minor permit modifications.

[40 CFR 71.7(e)(1)(vi)]

V.J. <u>Group Processing of Minor Permit Modifications</u> [40 CFR 71.7(e)(2)]

1. Group processing of modifications by EPA may be used only for those permit modifications:

   (a) That meet the criteria for minor permit modification procedures under Section V.I.1. of this permit; and

   (b) That collectively are below the threshold level of 10 percent of the emissions allowed by the permit for the emissions unit for which the change is requested, 20 percent of the applicable definition of major source in §71.2, or 5 tpy, whichever is least.

[40 CFR 71.7(e)(2)(i)]

2. An application requesting the use of group processing procedures shall be submitted to EPA, shall meet the requirements of §71.5(c), and shall include the following:

   (a) A description of the change, the emissions resulting from the change, and any new applicable requirements that will apply if the change occurs;

   (b) The source's suggested draft permit;

   (c) Certification by a responsible official, consistent with §71.5(d), that the proposed modification meets the criteria for use of group processing procedures and a request that such procedures be used;

   (d) A list of the source's other pending applications awaiting group processing, and a determination of whether the requested modification, aggregated with these other applications, equals or exceeds the threshold set under subparagraph (a)(ii) above; and

   (e) Completed forms for the permitting authority to use to notify affected States as required under §71.8.

[40 CFR 71.7(e)(2)(ii)]

3. The source may make the change proposed in its minor permit modification application immediately after it files such application. After the source makes the change allowed by the preceding sentence, and until the permitting authority takes any of the actions authorized by §71.7(e)(1)(iv)(A) through (C), the source must comply with both the applicable requirements governing the change and the proposed permit terms and conditions. During this time period, the source need not comply with the existing permit terms and conditions it seeks to modify. However, if the source fails to comply with its proposed permit terms and conditions during this time period, the existing permit terms and conditions it seeks to modify may be enforced against it.

[40 CFR 71.7(e)(2)(v)]

4. The permit shield under §71.6(f) may not extend to group processing of minor permit modifications.

[40 CFR 71.7(e)(2)(vi)]

V.K. Significant Permit Modifications [40 CFR 71.7(e)(3)]

1. The permittee must request the use of significant permit modification procedures for those modifications that:

   (a) Do not qualify as minor permit modifications or as administrative amendments;

   (b) Are significant changes in existing monitoring permit terms or conditions; or

   (c) Are relaxations of reporting or recordkeeping permit terms or conditions.

[40 CFR 71.7(e)(3)(i)]

2. Nothing herein shall be construed to preclude the permittee from making changes consistent with part 71 that would render existing permit compliance terms and conditions irrelevant.

[40 CFR 71.7(e)(3)(i)]

3. Permittees must meet all requirements of part 71 for applications, public participation, and review by affected states and tribes for significant permit modifications. For the application to be determined complete, the permittee must supply all information that is required by §71.5(c) for permit issuance and renewal, but only that information that is related to the proposed change.

[40 CFR 71.7(e)(3)(ii), 71.8(d), and 71.5(a)(2)]

V.L. Reopening for Cause [40 CFR 71.7(f)]

1. The permit may be reopened and revised prior to expiration under any of the following circumstances:

   (a) Additional applicable requirements under the Act become applicable to a major part 71 source with a remaining permit term of 3 or more years. Such a reopening shall be

completed not later than 18 months after promulgation of the applicable requirement. No such reopening is required if the effective date of the requirement is later than the date on which the permit is due to expire, unless the original permit or any of its terms and conditions have been extended pursuant to §71.7 (c)(3);

(b) Additional requirements (including excess emissions requirements) become applicable to an affected source under the acid rain program. Upon approval by the Administrator, excess emissions offset plans shall be deemed to be incorporated into the permit;

(c) EPA determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit; or

(d) EPA determines that the permit must be revised or revoked to assure compliance with the applicable requirements.

V.M. Property Rights [40 CFR 71.6(a)(6)(iv)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

V.N. Inspection and Entry [40 CFR 71.6(c)(2)]

Upon presentation of credentials and other documents as may be required by law, the permittee shall allow EPA or an authorized representative to perform the following:

1. Enter upon the permittee's premises where a part 71 source is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and

4. As authorized by the CAA, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.

V.O. Emergency Provisions [40 CFR 71.6(g)]

1. In addition to any emergency or upset provision contained in any applicable requirement, the permittee may seek to establish that noncompliance with a technology-based emission limitation under this permit was due to an emergency. To do so, the permittee shall demonstrate the affirmative defense of emergency through properly signed, contemporaneous operating logs, or other relevant evidence that:

   (a) An emergency occurred and that the permittee can identify the cause(s) of the emergency;

(b) The permitted facility was at the time being properly operated;

(c) During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards, or other requirements in this permit; and

(d) The permittee submitted notice of the emergency to EPA within 2 working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken. This notice fulfills the requirements for prompt notification of deviations.

2. In any enforcement proceeding, the permittee attempting to establish the occurrence of an emergency has the burden of proof.

3. An "emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error.

V.P. Transfer of Ownership or Operation [40 CFR 71.7(d)(1)(iv)]

A change in ownership or operational control of this facility may be treated as an administrative permit amendment if the EPA determines no other change in this permit is necessary and provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittee has been submitted to EPA.

V.Q. Off Permit Changes [40 CFR 71.6(a)(12) and 40 CFR 71.6(a)(3)(ii)]

The permittee is allowed to make certain changes without a permit revision, provided that the following requirements are met, and that all records required by this section are kept on site at the source for a period of five (5) years:

1. Each change is not addressed or prohibited by this permit;

2. Each change shall meet all applicable requirements and shall not violate any existing permit term or condition;

3. Changes under this provision may not include changes subject to any requirement of 40 CFR parts 72 through 78 or modifications under any provision of title I of the CAA;

4. The permittee must provide contemporaneous written notice to EPA of each change, except for changes that qualify as insignificant activities under §71.5(c)(11). The written notice must describe each change, the date of the change, any change in emissions, pollutants emitted, and any applicable requirements that would apply as a result of the change;

5. The permit shield does not apply to changes made under this provision;

6. The permittee must keep a record describing all changes that result in emissions of any regulated air pollutant subject to any applicable requirement not otherwise regulated under this permit, and the emissions resulting from those changes; and

7. For replacement of a permitted engine with an engine of the same make, model, horsepower rating, and configured to operate in the same manner as the engine being replaced, in addition to satisfying all other provisions for off permit changes, the permittee satisfies the following provisions:

   (a) The replacement engine employs air emissions control devices, monitoring, record keeping and reporting that are equivalent to those employed by the engine being replaced;

   (b) The replacement of the existing engine does not constitute a major modification or major new source as defined in Federal PSD regulations (40 CFR 52.21);

   (c) No new applicable requirements, as defined in 40 CFR 71.2, are triggered by the replacement; and

   (d) The following information is provided in a written notice to EPA, prior to installation of the replacement engine, in addition to the standard information listed above for contemporaneous written notices for off permit changes:

      (i) Make, model number, serial number, horsepower rating and configuration of the existing engine and the replacement engine;
      (ii) Manufacture date, commence construction date (per the definitions in 40 CFR 60.4230(a) and 63.2), and installation date of the replacement engine at the facility;
      (iii) If applicable, documentation of the cost to rebuild a replacement engine versus the cost to purchase a new engine in order to support claims that an engine is not "reconstructed", as defined in 40 CFR 60.15 and 40 CFR 63.2;
      (iv) 40 CFR part 60, subpart IIII (CI Engine NSPS) non-applicability documentation as appropriate;
      (v) 40 CFR part 60, subpart JJJJ (SI Engine NSPS) non-applicability documentation as appropriate;
      (vi) 40 CFR part 63, subpart ZZZZ (RICE MACT) non-applicability documentation for major sources, as appropriate;
      (vii) 40 CFR part 63, subpart ZZZZ (RICE MACT) non-applicability documentation for area sources, as appropriate; and
      (viii) Documentation to demonstrate that the replacement does not constitute a major new source or major modification, as defined in Federal PSD rules (40 CFR 52.21), as follows:

(A) If the replacement will not constitute a "physical change or change in the method of operation" as described in §52.21(b)(2)(i), an explanation of how that conclusion was reached shall be provided.

(B) If the replacement will constitute a "physical change or change in the method of operation" as described §52.21(b)(2)(i), the following information shall be provided:

(1) If the existing source is a "major stationary source" as defined in §52.21(b)(1): For each "regulated NSR pollutant" as defined in §52.21(b)(50), a demonstration (including all calculations) that the replacement will not be a "major modification" as defined in §52.21(b)(2). A modification is major only if it causes a "significant emissions increase" as defined in §52.21(b)(40), and also causes a "significant net emissions increase" as defined in §§52.21(b)(3) and (b)(23).

The procedures of §52.21(a)(2)(iv) shall be used to calculate whether or not there will be a significant emissions increase. If there will be a significant emissions increase, then calculations shall be provided to demonstrate there will not be a significant net emissions increase. These latter calculations shall include all source-wide contemporaneous and creditable emission increases and decreases, as defined in §52.21(b)(3), summed with the PTE of the replacement unit(s).

If netting is used to demonstrate that the replacement will not constitute a "major modification," verification shall be provided that the replacement engine(s) or turbine(s) employ emission controls at least equivalent in control effectiveness to those employed by the engine(s) or turbine(s) being replaced.

PTE of replacement unit(s) shall be determined based on the definition of PTE in §52.21(b)(4). For each "regulated NSR pollutant" for which the PTE is not "significant," calculations used to reach that conclusion shall be provided.

(2) If the existing source is not a "major stationary source" as defined in §52.21(b)(1): For each "regulated NSR pollutant," a demonstration (including all calculations) that the replacement engine(s) or turbine(s), by itself, will not constitute a "major stationary source" as defined in §52.21(b)(1)(i).

8. The notice shall be kept on site and made available to EPA on request, in accordance with the general recordkeeping provision of this permit.

9. Submittal of the written notice required above shall not constitute a waiver, exemption, or shield from applicability of any applicable standard or PSD permitting requirements under

40 CFR 52.21 that would be triggered by the replacement of any one engine, or by replacement of multiple engines.

V.R. Permit Expiration and Renewal [40 CFR 71.5(a)(1)(iii), 71.5(a)(2), 71.5(c)(5), 71.6(a)(11), 71.7(b), 71.7(c)(1), and 71.7(c)(3)]

1. This permit shall expire upon the earlier occurrence of the following events:

   (a) Five (5) years elapse from the date of issuance; or

   (b) The source is issued a part 70 or part 71 permit under an EPA approved or delegated permit program.

   [40 CFR 71.6(a)(11)]

2. Expiration of this permit terminates the permittee's right to operate unless a timely and complete permit renewal application has been submitted at least 6 months but not more than 18 months prior to the date of expiration of this permit.

   [40 CFR 71.5(a)(1)(iii)]

3. If the permittee submits a timely and complete permit application for renewal, consistent with §71.5(a)(2), but EPA has failed to issue or deny the renewal permit, then all the terms and conditions of the permit, including any permit shield granted pursuant to §71.6(f) shall remain in effect until the renewal permit has been issued or denied.

   [40 CFR 71.7(c)(3)]

4. The permittee's failure to have a part 71 permit is not a violation of this part until EPA takes final action on the permit renewal application. This protection shall cease to apply if, subsequent to the completeness determination, the permittee fails to submit any additional information identified as being needed to process the application by the deadline specified in writing by EPA.

   [40 CFR 71.7(b)]

5. Renewal of this permit is subject to the same procedural requirements that apply to initial permit issuance, including those for public participation, affected State, and tribal review.

   [40 CFR 71.7(c)(1)]

6. The application for renewal shall include the current permit number, description of permit revisions and off permit changes that occurred during the permit term, any applicable requirements that were promulgated and not incorporated into the permit during the permit term, and other information required by the application form.

   [40 CFR 71.5(a)(2) and 71.5(c)(5)]

VI. Appendix

VI.A. Inspection Information

1. Directions to Facility:

From the intersection of U.S. Highway 550 and County Road 318 in La Plata County, Colorado, go east on County Road 318 to the tee in the road. Turn right at the tee and drive to between mile markers 5 and 6 to a guardrail. Turn at the next right and drive to the South Ignacio facility.

2. Latitude and Longitude coordinates:

Lat. 37° 3' 14.1" N Long. -107° 37' 30.8" W

3. Safety Considerations:

Persons entering the site are required to wear a hard hat, safety glasses, safety toe footwear, hearing protection, and fire retardant clothing.

VI.B. 40 CFR 60, Subpart JJJJ Performance Testing

Testing Requirements for Owners and Operators

Sec. 60.4244 What test methods and other procedures must I use if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.

(a) Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in Sec. 60.8 and under the specific conditions that are specified by Table 2 to this subpart.

(b) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in Sec. 60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine.

(c) You must conduct three separate test runs for each performance test required in this section, as specified in Sec. 60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.

(d) To determine compliance with the NO_X mass per unit output emission limitation, convert the concentration of NO_X in the engine exhaust using Equation 1 of this section:

$$ER = \frac{C_d \times 1.912 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 1)}$$

Where:

ER = Emission rate of NO_X in g/HP-hr.
C_d = Measured NO_X concentration in parts per million by volume (ppmv). 1.912x10-\3\ = Conversion constant for ppm NO_X to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

(e) To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = \frac{C_d \times 1.164 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 2)}$$

Where:

ER = Emission rate of CO in g/HP-hr.
C_d = Measured CO concentration in ppmv. 1.164x10-\3\ = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, in HP-hr.

(f) For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = \frac{C_d \times 1.833 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 3)}$$

Where:

ER = Emission rate of VOC in g/HP-hr.
C_d = VOC concentration measured as propane in ppmv. 1.833x10-\3\ = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.
Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.
T = Time of test run, in hours.
HP-hr = Brake work of the engine, in HP-hr.

(g) If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, Appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = \frac{C_{Mi}}{C_{Ai}} \quad \text{(Eq. 4)}$$

Where:

RF_i = Response factor of compound i when measured with EPA Method 25A.
C_{Mi} = Measured concentration of compound i in ppmv as carbon.
C_{Ai} = True concentration of compound i in ppmv as carbon.

$$C_{icorr} = RF_i x C_{imeas} \quad \text{(Eq. 5)}$$

Where:

$C_{i\ corr}$ = Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.
$C_{i\ meas}$ = Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6098 x C_{icorr} \quad \text{(Eq. 6)}$$

Where:

C_{Peq} = Concentration of compound i in mg of propane equivalent per DSCM.