Chevron Appalachia, LLC

G70-A General Air Permit Modification
Francis Pad A Natural Gas Production Site

Moundsville, West Virginia

Prepared By:

ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia

June 2015

Chevron Appalachia, LLC
1550 Corapolis Heights Road, 2nd Floor
Moon Township, PA 15108

June XX, 2015

Mr. William F. Durham, Director
WV Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, West Virginia 25304

HAND DELIVERED

Re: Chevron Appalachia, LLC, Moundsville, West Virginia
Francis Pad A Natural Gas Production Facility G70-A Permit Application

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) CD-ROMs of a G70-A General Air Permit Application for the construction of the Francis Pad A Natural Gas Production Well Site. A check for $4,000 is enclosed for the application fee.

If you have any questions concerning this permit application, please contact Ms. Amy McGreevy, Air Specialist, of my staff at (412) 604-6739.

Sincerely,

Blake Loke
Appalachia Area Manager for Chevron Appalachia, LLC

Enclosures:

INTRODUCTION

Chevron Appalachia, LLC is submitting this G70-A Class II General Permit application to the WVDEP's Department of Air Quality for the Francis Pad A natural gas production site located in Marshall County, West Virginia. This application addresses the operational activities associated with the production of natural gas and condensates at the Francis pad.

FACILITY DESCRIPTION

The Francis Pad A natural gas production site will operate in Marshall County, WV and consists of eleven (11) natural gas wells. Natural gas and liquids (including water and condensates) are extracted from underground deposits. The natural gas and condensates will be transported from the wells to sales pipelines for compression or pumping and additional processing, as necessary. The produced water and fluids realized from blowdown activities are stored in storage vessels.

The applicant seeks to authorize the operation of:

- Eleven (11) natural gas wells;
- Eleven (11) GPU line heaters each rated at 1.25 MMBtu/hr heat input;
- One (1) Condensate line heater rated at 1.25 MMBtu/hr heat input;
- One (1) 400 bbl test tank for storage of produced water;
- One (1) natural gas-fired RICE engine used for the compression;
- One (1) VRU (electric drive);
- One (1) test vent stack;
- Five (5) 400 barrel (bbl) tanks for the storage of produced water; and
- One (1) Tank Truck Loading Operation.

A process flow diagram is included in this application in Attachment D.

REGULATORY DISCUSSION

This section outlines the State and Federal air quality regulations that could be reasonably expected to apply to the Francis pad and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the WVDEP G70-A permit application forms.

The West Virginia State Regulations address federal regulations, including Prevention of Significant Deterioration permitting, Title V permitting, New

Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to Francis are described in detail in the below section.

WEST VIRGINIA STATE AIR REGULATIONS

45 CSR 02 – To Prevent and Control Particulate Air Pollution From Combustion of Fuel in Indirect Heat Exchangers

The line heaters are indirect heat exchangers that combust natural gas with heat input ratings less than 10 MMBtu/hr. Such units are subject to 10% opacity as a six-minute block average limitation, but are exempt from most other requirements in the rule aside from discretionary testing requirements.

45 CSR 04 – To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

Operations conducted at the Francis wellpad are subject to this requirement. Based on the nature of the process at the wellpad, the presence of objectionable odors is unlikely.

45 CSR 06 – Control of Air Pollution from the Combustion of Refuse

There will be no combustion of refuse at the Francis wellpad. The external fuel combustion heaters do not meet the definition of incinerators under this Rule.

45 CSR 10 – To Prevent and Control Air Pollution From the Emission of Sulfur Oxides

The line heaters are indirect heat exchangers that combust natural gas with heat input ratings less than 10 MMBTU/hr. Such units are subject to the 2,000 ppm_v sulfur dioxide concentration limitation but are exempt from most other requirements in the rule aside from discretionary testing requirements. Compliance with the allowable sulfur dioxide concentration limitations is based on a block (3) hour averaging time.

45 CSR 13 – Permits for Construction, Modification, Relocation, And Operation of Stationary Sources of Air Pollutants

This G70-A permit application is being submitted for the operational activities associated with Chevron Appalachia, LLC's production of natural gas.

45 CSR 14 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD). The

G70A-applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the Francis pad will not exceed emission thresholds established by this permitting program. Chevron Appalachia, LLC will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with the PSD thresholds to ensure these activities will not trigger this program.

45 CSR 16 - Standards of Performance for New Stationary Sources (NSPS)

45CSR 16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section. Applicable requirements of NSPS, Subpart JJJJ and OOOO are included in the G70-A general permit.

This facility is expected to contain gas well affected facilities under Subpart OOOO. No additional NSPS are applicable for this facility. Additional discussion is provided in the Federal Regulation Discussion of this permit application

45 CS R19 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contributed to Non-attainment

Federal construction permitting programs regulate new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). The G70A-applicability criterion excludes facilities that meet the definition of a major source as defined in 45 CSR 19 for being eligible for the general permit.

Operation of equipment at the Francis pad will not exceed emission thresholds established by either of these permitting programs. Chevron Appalachia, LLC will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with the NSR thresholds to ensure these activities will not trigger this program.

45 CSR 25 – Control of Air Pollution from Hazardous Waste Treatment, Storage, and Disposal Facilities

No hazardous waste will be burnt at this well site; therefore, it is not subject to this hazardous waste rule.

45 CSR 30 – Requirements for Operating Permits

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds with respect to the West

Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the wellpad is not a major source for Title V purposes.

45 CSR 34 – National Emission Standards for Hazardous Air Pollutants (NESHAP)

45 CSR 34 applies to all registrants that are subject to any of the NESHAP requirements. Excluded from G70-A general permit eligibility are any sources that are subject to NESHAP Subpart HHH.

The Francis wellpad will operate a reciprocating internal combustion engine subject to 40 CFR 63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines), as discussed in the Federal Regulation Applicability of this application.

The following NESHAP included in the G70-A permit are not subject to the Francis facility:

- 40 CFR 63 Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities).

FEDERAL REGULATIONS

40 CFR 60, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

Subpart JJJJ established standards and compliance schedules for the control of volatile organic compounds (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO) emissions from affected facilities that commence construction, modification, or reconstruction after June 12, 2006. The applicable provisions and requirements of Subpart JJJJ are included under the G70-A permit.

The natural gas-fired flash gas compressor that will be installed at the Francis natural gas production facility is not subject to the requirements of this Rule. The engine is a non-emergency spark ignition internal combustion engine with less than 500 bhp that will be installed at the site in 2015 but was constructed prior to June 12, 2006 (§60.4230(a)(4)(iii)). Please note that the engine has not been reconstructed or modified after June 12, 2006.

40 CFR 60, Subpart OOOO (Standards of Performance for Crude oil and Natural Gas Production, Transmission and Distribution)

EPA published the NSPS for the oil and gas sector on August 16, 2012. EPA published final amendments to the subpart on September 23, 2013.

Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The applicable provisions and requirements of Subpart OOOO are included under the G70-A permit.

This facility includes gas well affected facilities under Subpart OOOO.

This facility qualifies as a storage tank affected facility with post control VOC emissions greater than 6 tons per year.

"There is equipment that will be installed at the Francis wellpad that does not meet the affected facility definitions as specified by EPA. Such equipment includes pneumatic controllers.

> Pneumatic Controllers: There will not be any high bleed pneumatic controllers installed at the Francis wellpad. All pneumatic controllers installed at this facility will be intermittent bleed or low continuous bleed devices. Based upon the pneumatic controllers installed at the Site, the Francis wellpad does not qualify as a pneumatic controller affected facility.

No additional NSPS Rules are expected to be applicable to this facility.

40 CFR 63, Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

The CAT G379TA Compressor Engine is subject to the requirements of 40 CFR 63 Subpart ZZZZ. The engine was manufactured prior to June 12, 2006 and has not been reconstructed or modified. The engine qualifies as a 4 stroke rich burn Spark Ignition (SI) Internal Combustion Engine (ICE). The engine is not classified as a black start or emergency engine. With a brake horsepower rating of 415, this engine is subject to the requirements of 63.6603(a), as outlined in Table 2d.10. The requirements for non-emergency, non-black start 4SRB stationary RICE with less than 500 hp are as follows:

- Change oil and filter every 1,440 hours of operation or annually, whichever comes first;
- Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first, and replace as necessary; and

- Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

The following NESHAP Rules included in the G70-A permit are not applicable to the Francis facility:

40 CFR 63 Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities)

The Francis wellpad will not operate any affected equipment, as defined under this Rule, and therefore is not subject to the standards of this Rule.

Analysis Regarding Applicability of Source Aggregation

This analysis addresses how well-site equipment owned and operated by Chevron Appalachia, LLC (Chevron) should be treated in relation to equipment owned and operated by Williams Ohio Valley Midstream (Williams OVM), specifically asking whether or not it would be appropriate to treat them as two stationary sources or as a single source under the Prevention of Significant Deterioration (PSD) and Title V permitting programs. Treating them as a single source would be improper and inconsistent with the intent of the Clean Air Act.

As explained in detail below, the two companies' equipment at or near the West Virginia natural gas well sites are not under common control—even where that equipment might be located near one another. Therefore, these are separate sources under the Clean Air Act and the regulations of the West Virginia Department of Environmental Protection, Division of Air Quality (DAQ). This means that these separate source emissions should not be aggregated in determining applicability of permitting programs.

For these reasons, and for those more fully explained below, aggregation would be inappropriate here.

Background

Chevron is a natural gas producer that acquired several natural gas wells from Chief Oil and Gas LLC (Chief) and AB Resources LLC (AB Resources) in mid-2011. In 2009, Chief and AB Resources entered into a "gathering agreement" with Caiman Eastern Midstream (Caiman) to compress and process the gas produced. Subsequently, Williams OVM purchased Caiman and now owns the gathering system. The natural gas well-sites that Chevron acquired are being produced with equipment typically found at natural gas well-sites, which may include heaters, separators, tanks (produced water, condensate, blowdown), and in some cases, vapor destruction and/or vapor recovery units. The equipment associated with the gathering system includes compressors and dehydration units, all of which are separately owned and operated by Williams OVM. Ultimately, the gas is routed to processing plants, owned by either Williams or MarkWest.

The sites produce and sell condensate, which also must be gathered and processed. Depending on which of the sites is involved, the condensate may be stored in a condensate tank and trucked offsite for processing or may be pumped offsite by pipeline. The condensate is gathered and processed by either Williams OVM or another company, Ergon, which currently contracts with sites that are not pipeline-equipped. Ergon could also truck condensate at sites where the condensate is currently pumped offsite and may be called upon to do so if there is a disruption or Chevron chooses to

enter into a contract for that purpose. Both Ergon and Williams would process the condensate at their plants, depending on which of them Chevron contracts with for that service at that site. As a result, there are distinct systems for production and condensate, which may or may not necessitate emission units on site. Chevron owns and operates a production system, and Williams OVM and Ergon own and operate gathering and processing systems for gas and condensate.

As a general matter, Williams OVM's business is to process and transport gas and condensate and Ergon's business is to process and transport condensate produced from wells owned by exploration and production companies. Companies like Williams OVM and Ergon are not producers, and they independently operate whatever equipment they may need to achieve their business goals. In the case of Williams OVM, compression and dehydration equipment and condensate storage and processing equipment are in service to support their business.

Before providing its services, Williams OVM—like its predecessors in interest—enters into contracts to move customers' gas and condensate from receipt points (wells) to delivery points. Moreover, Williams OVM's predecessors in interest had to design the gathering system in such a way to meet its contractual obligations. Gas and condensate entering and leaving Williams OVM's gathering system is not owned by Williams OVM but is rather owned by the producers with whom it contracts. The types of equipment and emission units that are required for gathering gas are typically compressors and dehydrators but may also include vapor destruction or vapor recovery units.

Here, Williams OVM provides pipeline and compression for gas and condensate gathering for 17 wells owned by Chevron. This analysis focuses on one well site in particular—the Francis Pad A (Francis site). For the Francis site, Williams OVM performs gas gathering services offsite, while condensate is pumped offsite for processing by Williams OVM.

At the Francis site, Chevron and Williams OVM perform separate operations. Chevron and Williams OVM each operate their separate equipment, serving separate functions—production and gathering—under a gas gathering agreement. To be clear, there is no common ownership of the equipment. Moreover, Chevron does not have decisionmaking authority over Williams OVM, nor does Williams OVM have such authority over Chevron, and there is no voting interest of one company in the other or shared board members. Finally, as discussed in more detail below, the key commonalities that EPA looks for in determining if a control relationship exists are not present here.

Consistent with the general arrangement discussed just above, Chevron owns specific equipment at the Francis site, and Williams OVM will own distinct gathering and processing equipment. Thus, Chevron owns twelve heaters, five produced water tanks, one test tank, eleven separators, one flash gas compressor, and a vapor recovery unit,

whereas Williams OVM will own a dehydrator and sales gas compressor. Moreover, the equipment is located more than 500 feet apart at this site.. Finally, there is not a common relationship in any event. Chevron cannot direct the operation of Williams OVM's equipment, nor can Williams OVM do the same to Chevron.

Moreover, it is possible that independent third parties might own and operate future wells at or near Chevron's well sites, and if that happens, it is anticipated that the Williams OVM's gathering system will accept any gas produced by these other owners and operators. Chevron does not have a say over what other gas Williams OVM processes.

Regulatory Definitions and Select Guidance

The emissions activities of two or more stationary sources cannot be aggregated unless the sources meet all of the following criteria:

> (1) they belong to the same industrial grouping;
>
> (2) they are located on contiguous or adjacent properties; and
>
> (3) they are under common control of the same person or persons under common control.[1]

In addition to the above factors, permitting authorities apply the guidelines established in the 1980 Preamble to EPA's New Source Review regulations. Those guidelines provide that, to be considered a source for aggregation purposes in the PSD and Title V context, the source must: (1) further the purposes of the PSD program, (2) meet a common sense idea of plant, and (3) not include pollutant activities that do not come within an ordinary concept of what constitutes a "building, structure, facility or installation." Permitting authorities have determined that these additional considerations must also be met in order for pollutant-emitting activities to be properly aggregated. Because source determinations are case-by-case, considering the specific facts of the situation,[2] prior agency statements and source determinations related to oil and gas activities may be instructive but are not determinative.[3] Thus, under EPA's own guidance, factors unique to the hydraulic-fracturing production and processing must be taken into account in conducting any aggregation analysis.

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[1] 40 C.F.R. § 70.2.

[2] Memorandum from Gina McCarthy, Assistant Administrator, Office of Air and Radiation, *Withdrawal of Source Determination for Oil and Gas Industry*, 2 (Sept. 22, 2009) available at http://www.epa.gov/region7/air/nsr/nsrmemos/oilgaswithdrawal.pdf (McCarthy Memo).

[3] CDPHE Frederick Station Response at 8.

In August 2012, the U.S. Court of Appeals for the Sixth Circuit rejected an effort by EPA to supplant the case-by-case aggregation analysis discussed above with a "functional interrelationship" test. *Summit Petroleum Co. v. EPA, et al.*, 690 F.3d 733 (6th Cir. 2012). The court reaffirmed that the plain meaning of EPA's regulatory requirements controlled and were governed by a case-by-case analysis.

Similarly, the Department of Air Quality (DAQ) reaffirmed the case-by-case approach in a May 1, 2013, letter to two West Virginia oil and gas trade associations regarding *Aggregation of Sources and Common Control* (May 2013 DAQ Letter). That letter responded to an April 16, 2013 letter from the associations that had expressed concern over recent DAQ source determinations. The associations' letter focused on DAQ's evaluation of whether an entity is under the "control" of another by suggesting that a common control relationship exists whenever 50% or more of the output or services of one company's facility are dedicated to operations at another company's facility. DAQ's response appropriately reinforced the case-by-case nature of source determinations, referencing the Securities and Exchange Commission (SEC) control definition, which considers control to be "the possession, direct or indirect, or the power to direct or cause the direction of the management and policies of a person (or organization or association) whether through ownership of voting shares, contract or otherwise," which has been applied by EPA and permitting authorities. DAQ explained that common control exists where there is an ownership relationship—*i.e.,* the same parent company or subsidiary of a parent company or where an entity has decision-making authority over the operation of the second entity through a contractual agreement or voting interest. Where neither of these exists, as here, DAQ stated that it would next look at "whether there is a contract for service relationship between the two entities or if a support/dependency relationship exists between the two entities *such that a common control relationship exists*."

Other regulatory agencies also have acknowledged the need for flexibility in source determinations in the oil and gas industry, noting that the "locations of natural gas wells and surface facilities are determined by a variety of factors," many of which are beyond the control of the oil and gas production companies that drill the wells. *See* In the Matter of Kerr-McGee/Anadarko Petroleum Corporation, Frederick Compressor Station, *Response of Colorado Department of Public Health and Environment, Air Pollution Control Division, to Order Granting Petition for Objection to Permit* at 7 (July 14, 2010) (CDPHE Frederick Station Response). For example, the Colorado Department of Public Health and Environment (CDPHE) specifically cited to spacing requirements for gas wells, which are established and regulated by a number of different entities in that state, including the Colorado Oil and Gas Conservation Commission on private and state-owned lands, Federal agencies such as the Bureau of Land Management on Federal lands, and Tribal authorities on Tribal lands. CDPHE further observed that oil and gas production companies must also negotiate surface use agreements, pipeline agreements and rights-of-way with surface right owners in the areas where wells are being drilled and developed, acknowledging that these agreements, which often focus on minimizing

the surface footprint and impact of the oil and gas operations, dictate the locations of surface facilities, minimum offsets from adjoining boundaries and the number of well pads allowed. Geological, topographical, and engineering considerations, along with logistical factors such as access restrictions and the availability of power, also drive siting decisions.

Aggregation Analysis

Because the Chevron and Williams OVM facilities will operate under the same two-digit SIC code (here major group 13), the key questions are whether the operations are on contiguous or adjacent property and are under common control. Although the operations are located in close proximity, there is separation of more than 500 feet in many instances, and, as the CDPHE recognized in Colorado, there are non-environmental-regulatory reasons explaining this proximity. In addition, Chevron and Williams OVM operations are not under the control of the same person or persons under common control. Indeed, they each will separately operate their separate equipment, and there is no strict interdependency but rather a contractual relationship between an upstream and midstream operator (which, as discussed below, reflect the unique nature of the oil and gas industry).

1. Located on Contiguous or Adjacent Properties

Emissions activities must be located on contiguous or adjacent property to be considered a single source. In keeping with the fact-specific nature of the aggregation analysis, there is no exact distance that would cause two activities to be considered contiguous. Physical proximity is the main, if not only, factor for determining whether properties are contiguous or adjacent, and consideration of functional interdependence of two activities is improper in assessing this criterion. *See* May 2013 DAQ Letter. This is consistent with the Sixth Circuit's decision in *Summit Petroleum*. Although, in certain instances, EPA and some state environmental agencies have included a functional interdependence test, Chevron agrees with DAQ's approach to that issue and with the *Summit Petroleum* decision rejecting an expansion of the three-pronged aggregation analysis.[4]

Here, some of the natural gas well pads for which Chevron seeks permits—the Francis site in particular—feature Chevron equipment and Williams OVM equipment directly adjacent on the same well pad, but at other sites, the equipment is separated by some distance. As noted by the court in *Summit Petroleum Co.*, there is no bright line distance for determining adjacency. Where the Williams OVM equipment is located on property that is separated by a road or otherwise from the location of the Chevron equipment,

[4] While EPA is not following the Summit Petroleum decision outside the 6th Circuit, Chevron believes that the reasoning therein is likely to be applied in other circuits and, in any case, DAQ is free to adopt the reasoning, whether or not DAQ is "following" the decision.

the contiguous/adjacency criterion would not be met and such equipment could not be aggregated for permitting purposes. With respect to those situations where the Chevron equipment and Williams OVM equipment are located directly on the same well pad, one must consider the myriad of technical and regulatory reasons that drive a siting determination.

Moreover, it is important to recognize that, although equipment may be located on contiguous or adjacent property, that proximity should not be used as a basis for supporting a positive finding under the separate, common-control criterion (which we discuss below). Indeed, the co- or nearby-location of such equipment is a function of terrain and siting requirements in West Virginia. These are selected based upon non-environmental regulatory requirements, such as to minimize the number of wells, and on negotiated agreements, such as surface-use agreements, pipeline agreements, and rights-of-way agreements with surface right owners who seek to minimize the site footprint and to consolidate equipment that might otherwise have been separately located. This point has been acknowledged by the CDPHE decision in the case of the Frederick Compressor Station in Colorado, discussed above, *CDPHE Frederick Station Response* at 7-8, and CDPHE emphasized that the siting considerations in the oil and gas industry are "unique and inherent" to that industry and do not necessarily establish a conclusion on the relationship between two facilities that might apply based on EPA guidance for other industrial sectors. CDPHE indicated its intent to evaluate issues, like common control, within the context of the oil and gas industry rather than concluding that co-location indicated a *per se* "control relationship." *Id.*

In sum, although spatial limitations of available drilling and production sites, terrain requirements, and a desire to minimize agreements with landowners drive the location of gathering equipment nearby wells, this in no way should be used to support aggregation of separately owned and operated equipment for permitting purposes.

2. Under Common Control of the Same Person or Persons Under Common Control

Even if equipment is located at a contiguous/adjacent location, if there is separate ownership and operation, and the operations are not under the control of the same person or persons under common control, the sources remain separate. This factor alone disposes of the analysis and compels a conclusion that the sources may not be aggregated in determining permitting applicability.

Although "common control" is not defined in the rules, source specific determinations and guidance have informed its meaning since EPA issued the underlying regulations in 1980. EPA has identified three alternative methods of establishing common control for purposes of source aggregation under Clean Air Act Titles I and V:

(1) common ownership;

(2) operational control; and

(3) control relationship.[5]

As to the first method, here, Chevron and Williams OVM do not have common ownership. As to the second, Chevron does not have decision-making authority over Williams OVM's operations, nor does Williams OVM have any such control over Chevron's operations, and there is no voting interest of one company in the other.

With respect to the third method of analyzing "common control"—looking at the "control relationship"—this effectively captures the concept in the SEC guidance of "indirect" control. EPA has identified several factors that it considers, which include several that militate against aggregation here.

- EPA focuses on whether the facilities share common workforces, plant managers, security forces, corporate executive officers, or board of executives. They do not here.
- EPA also considers whether the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions. They do not here as well.
- Another factor is whether the facilities share equipment, other property, or pollution control equipment. Here, they will not. Although the equipment at the Francis site may be co-located, it will not be shared. Moreover, it is important to recognize that this separately owned and operated equipment is to be located near to each other due to the space and other considerations discussed above, not for a control purpose.[6] It was Williams OVM's decision not to utilize a centralized gas gathering system, not Chevron's, that resulted in co-location. Thus, a common control interest is not present here as well.
- Yet another factor is whether the managing entity of one facility will be able to make decisions that affect pollution control at the other facility, and whether the facilities will share intermediates, products, byproducts, or other manufacturing equipment. Here, those factors are again not present—one will provide the service of gathering while the other produces.
- Finally, another factor that EPA has used at times is interdependence, though that factor distorts a traditional control analysis. Here, there will be separate

[5] Letter from Richard R. Long, USEPA Region 8, to Julie Wrend, Colorado Department of Public Health and the Environment, Re: Single Source Determination for Coors/TriGen (November 12, 1998) ("Long Letter").

[6] Williams is installing at each site produced water tanks that it will own and operate (applications are pending or will be submitted to DAQ by Williams OVM). The drivers behind the request are operational and safety requirements, primarily as it relates to overpressure protection. To address process safety concerns, Williams OVM's produced water tanks will manage blowdown from the Williams OVM dehydration units.

responsibility for compliance with air quality control requirements and liability for any violations. Although contracts are in place for Williams OVM to handle gas for Chevron, Williams OVM expects, as opportunities arise, to receive gas from other producers in the future, and Chevron has preserved the right to have its gas gathered or processed by other facilities. Moreover, with respect to the gas and condensate gathering systems, as noted above, Chevron uses Ergon to bring condensate to market at this site and could do so as well at other sites.

Chevron alone is and will be responsible for any decisions to produce or shut-in wellhead facilities and will have no control over the equipment installed, owned, and operated by Williams OVM. Moreover, if a well is shut in, for example, Williams OVM could use its compression equipment to serve other wells in the area. These characteristics are not consistent with sources under common control.

It would therefore be erroneous for DAQ to conclude that, in the face of all the indications of lack of common control noted above, because Williams OVM's equipment is currently servicing only the Chevron wells, a *de facto* control relationship exists. Such a simplistic conclusion would be inappropriate in light of the complexities of this industry and the information provided in Section 1 above, where we explained that co-location is driven largely by footprint and other non-air quality regulatory issues. It is also important to recognize that a "source determination" cannot be a one-way street. In other words, it applies to all emissions units in a complete manner. Thus, if Williams is determined to be an independent source because of its ability to handle gas from multiple customers, then concomitantly, Chevron must also be a separate source. It is not reasonable for DAQ to determine that Source A, was independent of Source B because Source A could process gas from numerous producers while simultaneously determining that Source B must be aggregated with Source A because Source B may only send its product to Source A. Under the Clean Air Act, emissions units are either part of one stationary source or they are not. To conclude otherwise would require DAQ to continually determine how much of Source A's emissions must be allocated to Source B. This is a clear reason why the Colorado agency appropriately decided that the unique nature of oil and gas operations militated against aggregation in situations such as this where there are multiple operators related to gas and condensate with respect to gathering and production.

The above conclusion is further supported upon consideration of the terms of the Gas Gathering Agreement (GGA), which clearly indicate separate operations:

- The agreement was the byproduct of an arms-length transaction between unrelated parties.

- The GGA provides for the construction of a pipeline and ancillary equipment to gather the gas, which includes the compression and dehydration equipment Williams OVM needs to meet its contractual obligations. Because this equipment is

part of the overall gas gathering system, and it is clear that the system overall should not be aggregated with the various wells, and treating this equipment separately from the system would be inappropriate.

- Chevron has the right to withdraw a well from the agreement if it determines it would be not be economical to use the Williams OVM gathering system and to use other means (including other pipelines) to move its gas.

- The GGA makes it clear that the location of the gathering equipment at the well site is for the convenience of the gatherer in constructing its gathering system and not for the producer's sake, explicitly indicating that the producer can reject the gatherer's location at the well site if there is not sufficient space.

- The GGA addresses commingling of gas from other producers subject to certain quality requirements, referencing "all sources in Gatherer's system," indicating that Williams OVM is not captive to Chevron in this situation and that a control relationship does not exist.

Indeed, a business relationship to achieve a the purpose of marketing gas between upstream and midstream should not dictate the conclusion of the control analysis, which relates not to whether one entity has agreed to enter a business relationship based on the distinct structure of the particular industry, but instead bears on whether one can dictate the other's operations. Here, there is no such control, and as noted above, Chevron can obtain processing support from other entities and in fact uses another entity to process its condensate at the site. Williams OVM and Ergon are business partners not controlled entities. Moreover, if a support relationship should have any bearing at all on the aggregation analysis, it already factors into the SIC prong, which takes into consideration a common industrial purpose. It would be inappropriate to conflate the factors that were clearly meant to be separate by grafting a support-facility analysis onto the control prong.[7]

And, even if it were appropriate to graft onto the control-relationship analysis the support facility concept, any servicing guidelines must be viewed as only one factor among many in the control-relationship analysis. Other factors include the degree to which the primary activity exerts control over the supporting activity's operations, the nature of the agreements, the reasons for the support activity's presence on the same site as the primary activity, and even the market realities of the service relationship. Considering those factors here, the parties negotiated an arms-length arrangement, they do not have any operational or ownership control over each other's facilities, and each

remains free to contract with other parties in the future.[8] In sum, there is no direct control and there should be no finding of indirect control between these parties.

Determination

For the above reasons, emissions from the Chevron production sources at the Francis site and from the Williams OVM gathering system equipment (*e.g.*, their compressors, dehydration units, and ancillary equipment) should not be aggregated for purposes of determining applicability of Clean Air Act Title I or Title V permitting programs or West Virginia's air permitting regulations. Even if the sources are at contiguous/adjacent property, these operations are separately owned and operated and are not under the control of the same person or persons under common control.

[8] We understand that that DAQ raised the issue of consistency with another source-specific, case-by-case determination, the Long Letter. We note that there are several distinguishing factors that make the Long Letter inapplicable here. First, the Long Letter is not a rulemaking, was a case-by-case determination, and is not binding on DAQ. Second, the facts in that case are distinct from those here. There, a power plant (previously owned by Coors) had been sold to TriGen and was going to continue to provide 100% of Coors power needs. In addition, Coors was relying on the boiler for pollution control to meet its regulatory obligations under a consent decree settlement. That is not the case here. Williams OVM is not enabling Chevron to produce its gas. Chevron is producing the gas and needs to have it processed by another company, here, Williams OVM. That is entirely different from the integrated nature of the TriGen operation to the Coors operation. Third, as recognized by Colorado, considerations related to the oil and gas business are "unique and inherent" to that industry and do not necessarily establish a conclusion on the relationship between two facilities that might apply based on EPA guidance for other industrial sectors. In other words, it does not make sense to analyze the relationship between midstream and upstream oil and gas companies in the same manner that one would a power generator and a traditional manufacturing plant. Finally, the Colorado determination related to the Frederick Station was issued in 2011, more than a decade after the Long Letter, so DAQ can if it chooses, rely on that determination to distinguish the unique nature of this industry in making its determination. .

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475 • *www.dep.wv.gov/daq*

APPLICATION FOR GENERAL PERMIT REGISTRATION

CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE

A STATIONARY SOURCE OF AIR POLLUTANTS

☒ CONSTRUCTION ☐ MODIFICATION ☐ RELOCATION ☐ CLASS I ADMINISTRATIVE UPDATE ☐ CLASS II ADMINISTRATIVE UPDATE

CHECK WHICH TYPE OF GENERAL PERMIT REGISTRATION YOU ARE APPLYING FOR:

☐ **G10-D –** Coal Preparation and Handling
☐ **G20-B –** Hot Mix Asphalt
☐ **G30-D –** Natural Gas Compressor Stations
☐ **G33-A –** Spark Ignition Internal Combustion Engines
☐ **G35-A –** Natural Gas Compressor Stations (Flare/Glycol Dehydration Unit)
☐ **G40-C –** Nonmetallic Minerals Processing
☐ **G50-B –** Concrete Batch
☐ **G60-C** - Class II Emergency Generator
☐ **G65-C –** Class I Emergency Generator
☒ **G70-A –** Class II Oil and Natural Gas Production Facility

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office):
Chevron Appalachia, LLC

2. Federal Employer ID No. **(FEIN):**
25-0527925

3. Applicant's mailing address:
1550 Coraopolis Heights Road, 2nd Floor
Moon Township, PA 15108

4. Applicant's physical address:
5258 Fork Ridge Road
Moundsville, WV 26041

5. If applicant is a subsidiary corporation, please provide the name of parent corporation: **Chevron U.S.A. Inc.**

6. **WV BUSINESS REGISTRATION.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**
- IF **YES,** provide a copy of the Certificate of **Incorporation/ Organization / Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A**.
- IF **NO,** provide a copy of the **Certificate of Authority / Authority of LLC / Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A**.

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.):
Class II Oil and Natural Gas Production Facility

8a. Standard Industrial Classification (SIC) code: **1311**
AND
8b. North American Industry System (NAICS) code: **211111**

9. DAQ Plant ID No. (for existing facilities only):
N/A

10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only):
N/A

A: PRIMARY OPERATING SITE INFORMATION

11A. Facility name of primary operating site:	12A. Address of primary operating site:
Francis Pad A Natural Gas Production Facility	Mailing: **1550 Coraopolis Heights Road, 2nd Floor** **Moon Township, PA 15108** Physical: **5258 Fork Ridge Road** **Moundsville, WV 26041**

13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? ☒ **YES** ☐ **NO**

- IF **YES**, please explain: **The applicant leases the proposed site.**
- IF **NO**, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.

14A. ☐ For **Modifications or Administrative Updates** at an existing facility, please provide directions to the present location of the facility from the nearest state road;

– For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a **MAP** as **Attachment F**.

15A. Nearest city or town:	16A. County:	17A. UTM Coordinates:
Moundsville	**Marshall**	Northing (KM): **4,413.24** Easting (KM): **526.14** Zone: **17 S**

18A. Briefly describe the proposed new operation or change (s) to the facility:	19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Chevron Appalachia, LLC is applying for a G70-A permit to authorize the construction of the Francis Pad A Natural Gas Production Facility.	Latitude: **39.86879** Longitude: **-80.69435**

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

23. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

24. Include a **Table of Contents** as the first page of your application package.

All of the required forms and additional information can be found under the Permitting Section (General Permits) of DAQ's website, or requested by phone.

25. Please check all attachments included with this permit application. Please refer to the appropriate reference document for an explanation of the attachments listed below.

- ☒ ATTACHMENT A : CURRENT BUSINESS CERTIFICATE
- ☒ ATTACHMENT B: PROCESS DESCRIPTION
- ☒ ATTACHMENT C: DESCRIPTION OF FUGITIVE EMISSIONS
- ☒ ATTACHMENT D: PROCESS FLOW DIAGRAM
- ☒ ATTACHMENT E: PLOT PLAN
- ☒ ATTACHMENT F: AREA MAP
- ☒ ATTACHMENT G: EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM
- ☒ ATTACHMENT H: AIR POLLUTION CONTROL DEVICE SHEETS
- ☒ ATTACHMENT I: EMISSIONS CALCULATIONS
- ☒ ATTACHMENT J: CLASS I LEGAL ADVERTISEMENT
- ☒ ATTACHMENT K: ELECTRONIC SUBMITTAL
- ☒ ATTACHMENT L: GENERAL PERMIT REGISTRATION APPLICATION FEE
- ☒ ATTACHMENT M: SITING CRITERIA WAIVER
- ☒ ATTACHMENT N: MATERIAL SAFETY DATA SHEETS (MSDS)
- ☒ ATTACHMENT O: EMISSIONS SUMMARY SHEETS
- ☒ OTHER SUPPORTING DOCUMENTATION NOT DESCRIBED ABOVE (Equipment Drawings, Aggregation Discussion, etc.)

Please mail an original and two copies of the complete General Permit Registration Application with the signature(s) to the DAQ Permitting Section, at the address shown on the front page of this application. Please DO NOT fax permit applications. For questions regarding applications or West Virginia Air Pollution Rules and Regulations, please refer to the website shown on the front page of the application or call the phone number also provided on the front page of the application.

SECTION IV. CERTIFICATION OF INFORMATION

This General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of a Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, Emission Inventory, Certified Emission Statement, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. Any administratively incomplete or improperly signed or unsigned Registration Application will be returned to the applicant.

FOR A CORPORATION (domestic or foreign)

☒ I certify that I am a President, Vice President, Secretary, Treasurer or in charge of a principal business function of the corporation

FOR A PARTNERSHIP

☐ I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

☐ I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

☐ I certify that I am the President or a member of the Board of Directors

FOR A JOINT VENTURE

☐ I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

☐ I certify that I am the Owner and Proprietor

☐ *I hereby certify that* (please print or type) _____

is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Office of Air Quality immediately, and/or,

I hereby certify that all information contained in this General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible

Signature _____

(please use blue ink) Responsible Official Date

Name & Title **Blake Loke, Appalachia Area Manager for Chevron Appalachia, LLC**

(please print or type)

Signature _____

(please use blue ink) Authorized Representative (if applicable) Date

Applicant's Name **Chevron Appalachia, LLC**

Phone & Fax **(412) 604-6739** **(412) 604-6797**

Phone Fax

Email **Amy.McGreevy@chevron.com**

Table of Contents

Attachment A

State of West Virginia

Certificate

I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that

the attached true and exact copy of the Articles of Amendment to the Articles of Organization of

ATLAS AMERICA, LLC

are filed in my office, signed and verified, as required by the provisions of West Virginia Code §31B-2-204 and conform to law. Therefore, I issue this

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

CHEVRON APPALACHIA, LLC

Given under my hand and the Great Seal of the State of West Virginia on this day of April 28, 2011

Natalie E Tennant

Secretary of State

Natalie E. Tennant
Secretary of State
1900 Kanawha Blvd E.
Bldg 1, Suite 157-K
Charleston, WV 25305

Penney Barker, Manager
Corporations Division
Tel: (304)558-8000
Fax: (304)558-8381
www.wvsos.com
Hrs: 8:30 a.m. – 5:00 p.m. ET

FILE ONE ORIGINAL
(Two if you want a filed stamped copy returned to you)
FEE: $25.00

WV APPLICATION FOR AMENDED CERTIFICATE OF AUTHORITY OF A LIMITED LIABILITY COMPANY

In accordance with the provisions of the West Virginia Code, the undersigned limited liability company hereby applies for an Amended Certificate of Authority and submits the following statement:

1. Name under which the organization was authorized to transact business in WV: Atlas America, LLC

2. Date Certificate of Authority was issued in West Virginia: 03/08/2007

3. Change of Name Information or Text of Amendment: (Attach one certified copy of the name change as filed in the home state)

   Change of name from: Atlas America, LLC

   To: Chevron Appalachia, LLC

   Name the organization elects to use in WV: _____
   (Due to home state name not being available)

   Other amendment (use additional pages if necessary)

FILED
APR 28 2011
IN THE OFFICE OF
SECRETARY OF STATE

4. Contact name and number to reach in case of a problem with filing: (optional, however, listing one may help to avoid a return or rejection of filing if there is a problem with the document)

   Jerome L. Suarez — Contact Name
   800-927-9801 x2207 — Phone Number

   Business e-mail address, if any: jsuarez@cscinfo.com

5. Signature of person executing document:

   _____ — Signature
   Assistant Secretary — Title/Capacity
   (Example: member, manager, etc.)

Attachment B

Attachment B
Process Description

This permit application is being filed by Chevron Appalachia, LLC (Chevron) and addresses operational activities associated with the Francis Pad A natural gas production site. Incoming raw natural gas from the wells enters the site through a pipeline. The raw gas is first routed through a line heater (BAP-0210, BAP-0310, BAP-0410, BAP-0610, BAP-0710, BAP-0810, BAP-0910, BAP-1010, BAP-1110, BAP-1210, or BAP-1310) to assist with the phase separation process in the downstream three-phase separator (MBD-0220, MBD-0320, MBD-0420, MBD-0620, MBD-0720, MBD-0820, MBD-0920, MBD-1020, MBD-1120, MBD-1220, or MBD-1320). In the separators, produced water is removed from the raw gas and transferred to the produced water tank and test tanks (ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0011E, ABJ-0014). Produced water flows from the separators to the test tank, where the tank acts as a separator. From the test tank, produced water flows to the five (5) produced water tanks.

Condensate is removed from the raw gas in the separators and is transferred to the condensate flash vessel (MBD-0040). The condensate is routed through a line heater (BAP-0012) prior to the condensate flash vessel to aid in fluid separation. At these pressure and temperature conditions light hydrocarbon constituents volatilize within the condensate flash vessel and are directed to the gas compression units (CBA-1055, CBA-2055). The permanent flash gas compressor (CBA-2055) will be an electric engine that will not generate emissions of regulated air pollutants. In order to handle the initial influx of fluids and associated volatilized hydrocarbons, Chevron Appalachia, LLC is proposing to install a second, temporary natural gas-fired flash gas compressor engine. The gas compressors increase the pressure of the recovered gas and are pumped into the natural gas sales line. The remaining condensate fluid flows from the condensate flash vessel to a condensate sales line. Two (2) electric condensate pumps are used to lift the condensate through the condensate sales line.

From the phase separators, natural gas flows to the downstream sales pipeline. Emissions from the produced water and test tanks are directed to the electric vapor recovery unit (CBA-0055), where they are routed to the flash gas compressors. From the storage tanks, the produced water and blowdown fluids are pumped into tank trucks on an as needed basis and are disposed of off-site. Vapors from the unloading of the tanks are directed to a vent stack (ZZZ-0011) and released to atmosphere. Blowdown

events and emergency vents from the tanks located at the Francis well pad are also directed to the vent stack.

Various control systems are used at the site to monitor and regulate temperature, flow, and pressure. Other sources of emissions at the production site include fugitive component leaks and maintenance blowdowns. Emissions realized from blowdown events are routed to a blowdown vent stack and are uncontrolled.

A process flow diagram is included as Attachment D.

Attachment C

Attachment C
G70-A General Permit Description of Fugitive Emissions

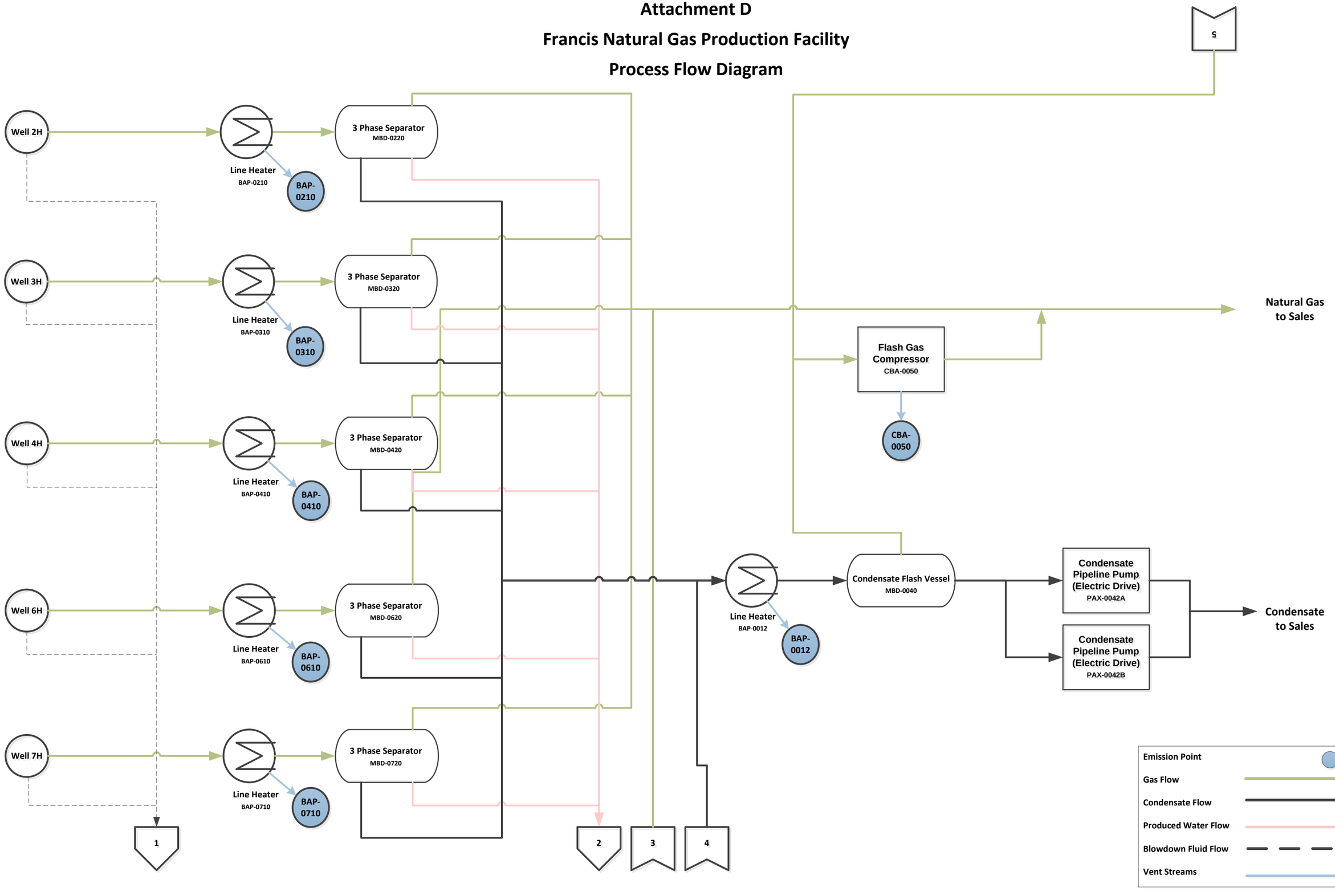
This permit application is being filed for Chevron Appalachia, LLC (Chevron) and addresses operational activities associated with the Francis Pad A natural gas production site. Fugitive emissions on the site are generated from a number of sources, including an unpaved haul road, equipment leaks, and emissions from blowdown operations conducted prior to completing maintenance activities. These fugitive emission sources cannot readily be controlled by air pollution control devices. Pneumatic devices on site will be operated by an electric air compressor and will not have associated gas emissions. Emission levels for fugitive emissions were calculated using AP-42 emission factors, results from ProMax simulation runs, and 40 CFR 98 Subpart W factors and equipment counts. A summary of the fugitive emissions on the Francis natural gas production site can be found in Attachment O – Emissions Summary Sheet.

Attachment D

Attachment D

Francis Natural Gas Production Facility

Process Flow Diagram



ERM

1

2

3

4

5

Well 8H

Line Heater
BAP-0810

BAP-0810

3 Phase Separator
MBD-0820

Well 9H

Line Heater
BAP-0910

BAP-0910

3 Phase Separator
MBD-0920

Well 10H

Line Heater
BAP-1010

BAP-1010

3 Phase Separator
MBD-1020

Well 11H

Line Heater
BAP-1110

BAP-1110

3 Phase Separator
MBD-1120

Well 12H

Line Heater
BAP-1210

BAP-1210

3 Phase Separator
MBD-1220

Well 13H

Line Heater
BAP-1310

BAP-1310

3 Phase Separator
MBD-1320

Test Tank
ABJ-0014

Produced Water Tank
ABJ-0011A

Produced Water Tank
ABJ-0011B

Produced Water Tank
ABJ-0011C

Produced Water Tank
ABJ-0011D

Produced Water Tank
ABJ-0011E

Produced Water From Storage Tanks

ZZZ-0011

For Blowdown and Overpressure events

ZZZ-0011

CBA-0055

VRU
(Electric Drive)
CBA-0055

Emission Point

Gas Flow

Condensate Flow

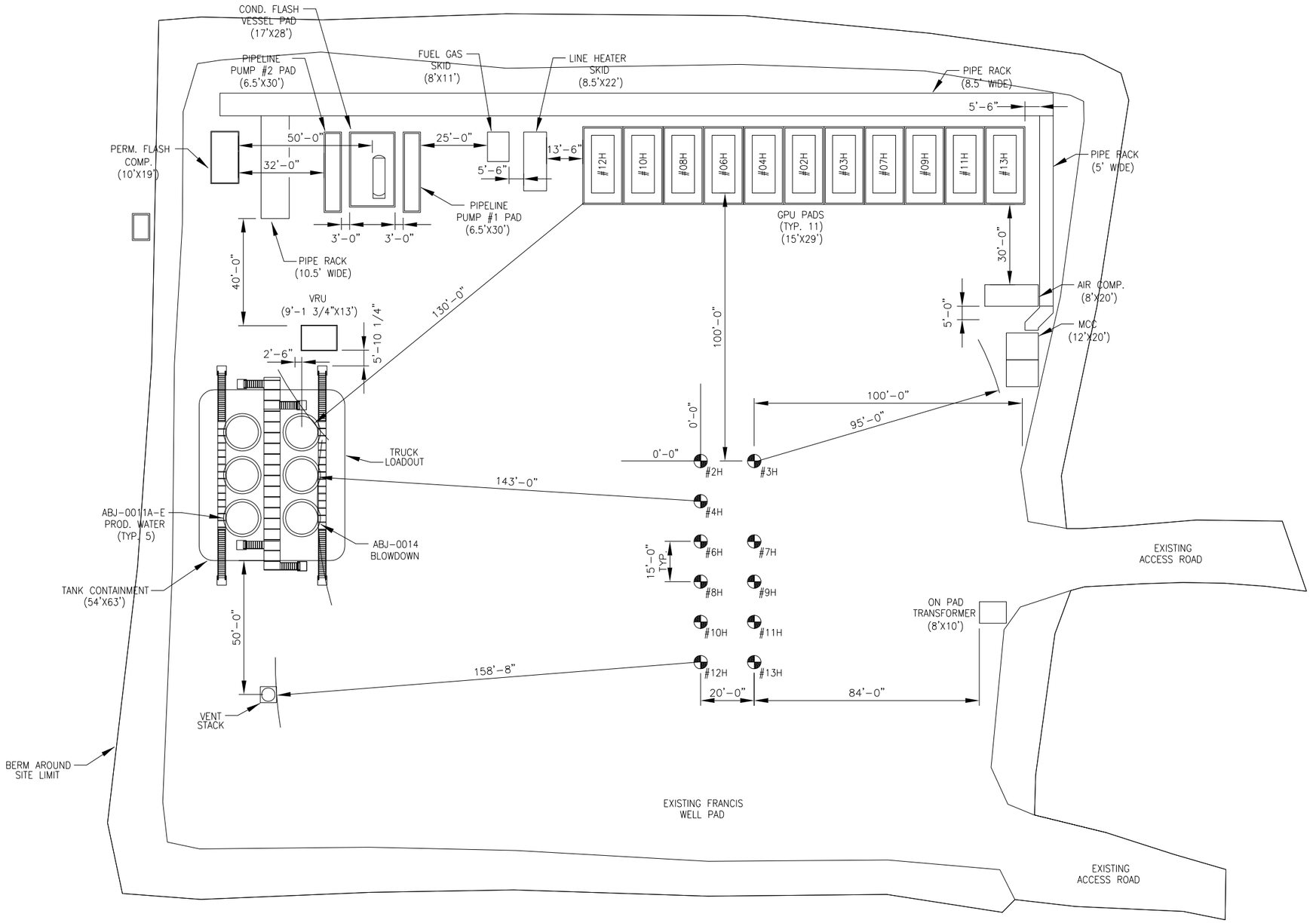
Produced Water Flow

Blowdown Fluid Flow

Vent Streams

ERM

Attachment E



NO	BY	REVISION DESCRIPTION	DATE	CHK	APP
A	IRH	FOR CLIENT REVIEW	02/06/15	TMB	

Chevron

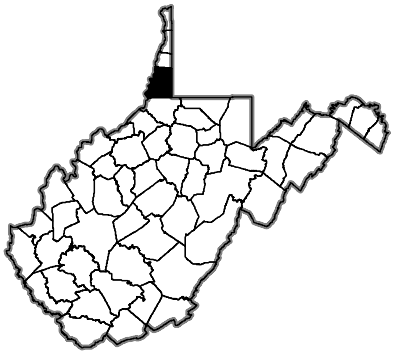
Chevron U.S.A. Inc.

DWG. SCALE:	NONE
ORIG. DATE:	02/06/15
PLOT SCALE:	NONE
DRAWN BY:	IRH-EDG (6492.001)
CHECKED BY:	TMB
APPROVED BY:	
PLOT DATE:	

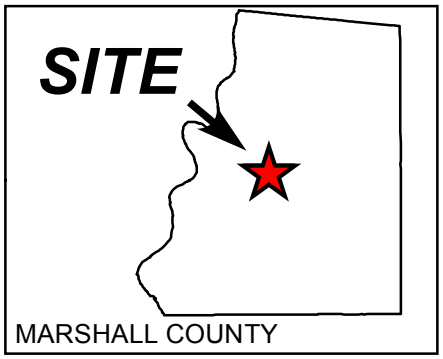
CHEVRON NORTH AMERICA
EXPLORATION & PRODUCTION
APPALACHIAN MICHIGAN BUSINESS UNIT
FRANCIS FACILITY SITE
EQUIPMENT LAYOUT

SHEET	DRAWING NUMBER	REV
C	6492001-B01	A

Attachment F



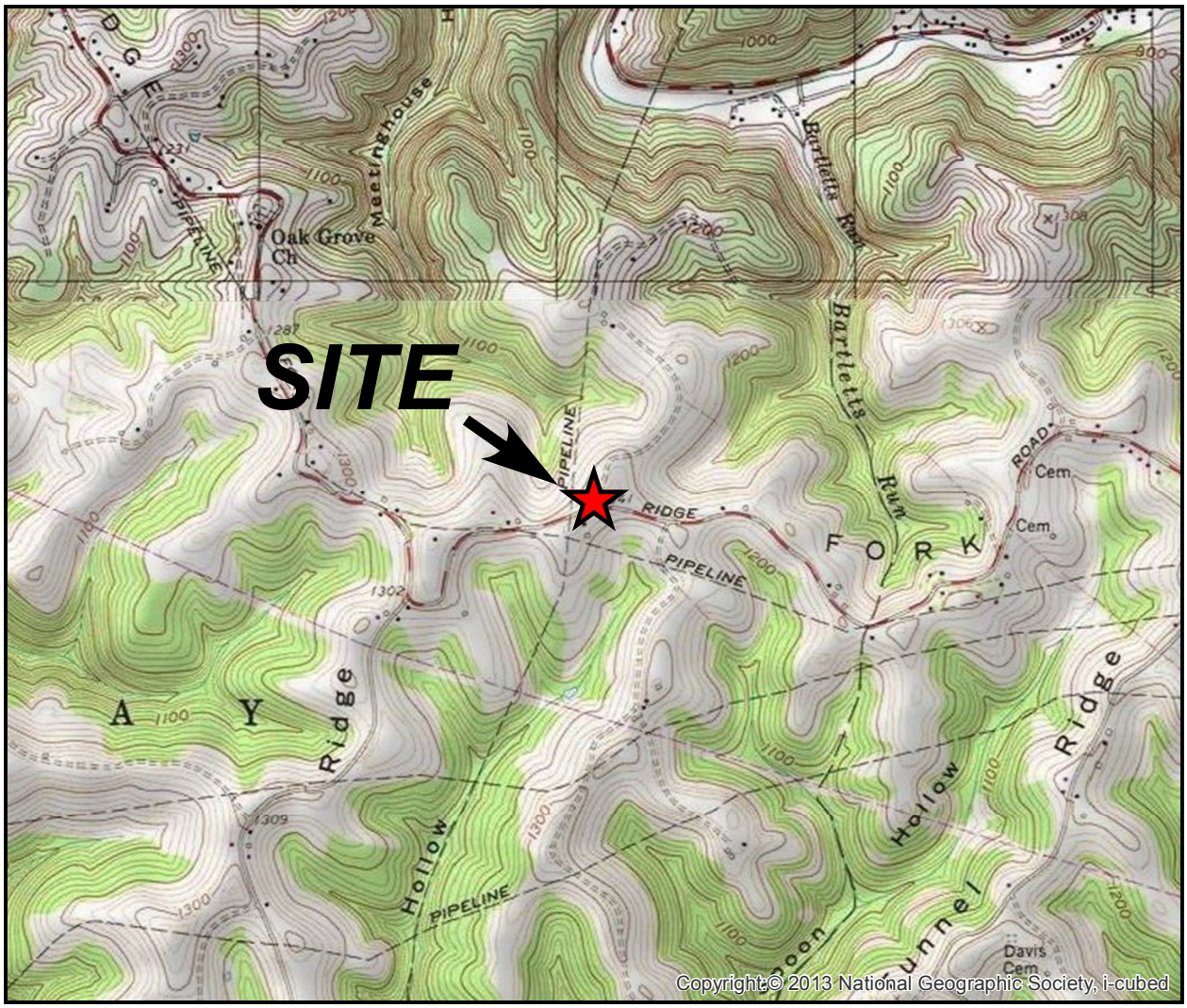
WEST VIRGINIA



N
W E
S

LAT. 39.868797 LONG. -80.694356
CITY OF MOUNDSVILLE
MARSHALL COUNTY
WEST VIRGINIA

0 1,350 2,700
FEET



SITE LOCATION MAP

USGS 24K QUAD GRID
GLEN EASTON

ERM	**Chevron Appalachia, LLC** **Francis Natural Gas Production Facility** FORK RIDGE ROAD MOUNDSVILLE, WV 26041	Review GM CHK'D GM 0208717
Drawn By FB 5/15/15	Environmental Resources Management	ATTACHMENT F

Attachment G

General Permit G70-A Registration
Section Applicability Form

General Permit G70-A was developed to allow qualified applicants to seek registration for a variety of sources. These sources include natural gas well affected facilities, storage tanks, natural gas-fired compressor engines (RICE), natural gas producing units, natural gas-fired in-line heaters, pneumatic controllers, heater treaters, tank truck loading, glycol dehydration units, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-A allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

Section 5	Natural Gas Well Affected Facility	☒
Section 6	Storage Vessels*	☒
Section 7	Gas Producing Units, In-Line Heaters, Heater Treaters, and Glycol Dehydration Reboilers	☒
Section 8	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)	☐
Section 9	*Reserved*	☐
Section 10	Natural gas-fired Compressor Engine(s) (RICE) **	☒
Section 11	Tank Truck Loading Facility ***	☒
Section 12	Standards of Performance for Storage Vessel Affected Facilities (NSPS, Subpart OOOO)	☒
Section 13	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (NSPS, Subpart JJJJ)	☐
Section 14	Control Devices not subject to NSPS, Subpart OOOO	☐
Section 15	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (40CFR63, Subpart ZZZZ)	☒
Section 16	Glycol Dehydration Units	☐
Section 17	Dehydration Units With Exemption from NESHAP Standard, Subpart HH § 63.764(d) (40CFR63, Subpart HH)	☐
Section 18	Dehydration Units Subject to NESHAP Standard, Subpart HH and Not Located Within an UA/UC (40CFR63, Subpart HH)	☐
Section 19	Dehydration Units Subject to NESHAP Standard, Subpart HH and Located Within an UA/UC (40CFR63, Subpart HH)	☐

***** *Applicants that are subject to Section 6 may also be subject to Section 12 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 14.*

****** *Applicants that are subject to Section 10 may also be subject to the applicable RICE requirements of Section 13 and/or Section 15.*

******* *Applicants that are subject to Section 11 may also be subject to control device requirements of Section 14.*

ATTACHMENT G
NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification, or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

Please provide the API number(s) for each NG well at this facility:	
Francis 2H = 047-051-01710	
Francis 3H = 047-051-01711	
Francis 4H = 047-051-01712	
Francis 6H = 047-051-01713	
Francis 7H = 047-051-01714	
Francis 8H = 047-051-01715	
Francis 9H = 047-051-01716	
Francis 10H = 047-051-01717	
Francis 11H = 047-051-01718	
Francis 12H = 047-051-01719	
Francis 13H = 047-051-01720	

Note: This is the same API well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API (American Petroleum Institute) number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

Attachment G
Emission Source Data Sheets

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
BAP-0210	BAP-0210	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0310	BAP-0310	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0410	BAP-0410	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0610	BAP-0610	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0710	BAP-0710	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0810	BAP-0810	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0910	BAP-0910	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-1010	BAP-1010	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-1110	BAP-1110	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-1210	BAP-1210	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-1310	BAP-1310	Line Heater	2015	1.25 MMBtu/hr	New	NA
BAP-0012	BAP-0012	Line Heater	2015	1.25 MMBtu/hr	New	NA
CBA-0050	CBA-0050	Flash Gas Compressor	2015	415 bhp	New	NA
ABJ-0011A	ABJ-0011A	Produced Water Tank	2015	400 bbl	New	CBA-0055
ABJ-0011B	ABJ-0011B	Produced Water Tank	2015	400 bbl	New	CBA-0055
ABJ-0011C	ABJ-0011C	Produced Water Tank	2015	400 bbl	New	CBA-0055
ABJ-0011D	ABJ-0011D	Produced Water Tank	2015	400 bbl	New	CBA-0055
ABJ-0011E	ABJ-0011E	Produced Water Tank	2015	400 bbl	New	CBA-0055
ABJ-0014	ABJ-0014	Test Tank	2015	400 bbl	New	CBA-0055
CBA-0055	CBA-0055	Vapor Recovery Unit	2015	NA	New	NA
ZZZ-0011A	ZZZ-0111	Tank Unloading Events	2015	107,000 gal/day	New	NA
ZZZ-0011B	ZZZ-0111	Tank Unloading Events	2015	107,000 gal/day	New	NA
ZZZ-0011C	ZZZ-0111	Tank Unloading Events	2015	107,000 gal/day	New	NA

*Three (3) separate connections are proposed on the Francis Site for Tank Unloading Events. The emissions from these three (3) connections have been calculated as the total fluid throughput of the Site and are being represented as one emission point.

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed / Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
BAP-0210	BAP-0210	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0310	BAP-0310	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0410	BAP-0410	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0610	BAP-0610	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0710	BAP-0710	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0810	BAP-0810	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0910	BAP-0910	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-1010	BAP-1010	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-1110	BAP-1110	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-1210	BAP-1210	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-1310	BAP-1310	Pietro Fiorentini 6362001-1440-J100	2015	New	NA	1.25	1,250
BAP-0012	BAP-0012	Pietro Fiorentini 6492001-J120	2015	New	NA	1.25	1,250

NATURAL GAS-FIRED COMPRESSOR ENGINE (RICE)
EMISSION UNIT DATA SHEET

Complete this section for any natural gas-fired reciprocating internal combustion engine.

Emission Unit (Source) ID No.[1]		**CBA-0050**					
Emission Point ID No. [2]		**CBA-0050**					
Engine Manufacturer and Model		**CATERPILLAR**					
Manufacturer's Rated bhp/rpm		**415.00**					
Source Status[3]		**NS**					
Date Installed/Modified/Removed[4]		**2015**					
Engine Manufactured/Reconstruction Date[5]		**Prior to June 12, 2006**					
Is this engine subject to 40CFR60, Subpart JJJJ?		**No**					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60, Subpart JJJJ? (Yes or No)[6]		**No**					
Is this engine subject to 40CFR63, Subpart ZZZZ? (yes or no)		**Yes**					
Engine, Fuel and Combustion Data							
	APCD Type[8]	**Catalyst**					
	Fuel Type[9]	**PQ**					
	H_2S (gr/100 scf)						
	Operating bhp/rpm	**415/1200**					
	BSFC (Btu/bhp-hr)	**7,464**					
	Fuel throughput (ft^3/hr)	**2,410**					
	Fuel throughput ($MMft^3$/yr)	**21.12**					
	Operation (hrs/yr)	**8,760**					
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	0.23	1.00				
	CO	0.27	1.20				
	VOC	0.18	0.80				
	SO_2	0.002	0.008				
	$PM_{Filterable}$	<0.001	0.001				
	$PM_{condensable}$	0.03	0.13				
	Formaldehyde	0.17	0.75				

Emission Unit (Source) ID No.[1]		**CBA-0050**
Emission Point ID No. [2]		**CBA-0050**
Engine Manufacturer and Model		**CATERPILLAR**
Manufacturer's Rated bhp/rpm		**415.00**
Source Status[3]		**NS**
Date Installed/Modified/Removed[4]		**2015**
MRR[12]	Proposed Monitoring:	**Chevron Appalachia, LLC will comply will all monitoring requirements outlined in the G70-A Permit.**
	Proposed Recordkeeping:	**Chevron Appalachia, LLC will comply will all recordkeeping requirements outlined in the G70-A Permit.**
	Proposed Reporting:	**Chevron Appalachia, LLC will comply will all reporting requirements outlined in the G70-A Permit.**

Instructions for completing the Engine Emission Unit Data Sheet:

[1] Enter the appropriate Emission Unit (Source) identification number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the production pad. Multiple compressor engines should be designated CE-1S, CE-2S, etc. or other appropriate designation. Generator engines should be designated GE-1S, GE-2S, etc. or other appropriate designation. If more than three (3) engines exist, please use additional sheets.

[2] For Emission Points, use the following numbering system: 1E, 2E, etc. or other appropriate designation.

[3] Enter the Source Status using the following codes: NS = Construction of New Source (installation); ES = Existing Source; MS = Modification of Existing Source; and RS = Removal of Source

[4] Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.

[5] Enter the date that the engine was manufactured, modified or reconstructed.

[6] Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate. ***Provide a manufacturer's data sheet for all engines being registered and a manufacturer's EPA certification of conformity sheet.***

[7] Enter the Engine Type designation(s) using the following codes: LB2S = Lean Burn Two Stroke, RB4S = Rich Burn Four Stroke, and LB4S =Lean Burn Four Stroke.

[8] Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes: NSCR = Rich Burn & Non-Selective Catalytic Reduction, PSC = Rich Burn & Prestratified Charge, SCR = Lean Burn & Selective Catalytic Reduction, or CAT = Lean Burn & Catalytic Oxidation

[9] Enter the Fuel Type using the following codes: PQ = Pipeline Quality Natural Gas, or RG = Raw Natural Gas

[10] Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*. Codes: MD = Manufacturer's Data, AP = AP-42 Factors, GR = GRI-HAPCalc™ , or OT = Other _____ (please list)

[11] Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet as Attachment O*.

[12] Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the operation of this engine operation and associated air pollution control device. Include operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.

Attachment G
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **Produced Water Tank Area**	2. Tank Name **Produced Water Tanks**
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) **ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0011E**	4. Emission Point Identification No. (as assigned on *Equipment List Form*) **CBA-0055**
5. Date of Commencement of Construction (for existing tanks) **2015**	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) **NA**	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). **NA**	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): **NA**	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. **400 bbls**	
9A. Tank Internal Diameter (ft) **12**	9B. Tank Internal Height (or Length) (ft) **20**
10A. Maximum Liquid Height (ft) **18**	10B. Average Liquid Height (ft) **10**
11A. Maximum Vapor Space Height (ft) **18**	11B. Average Vapor Space Height (ft) **10**
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. **400 bbls**	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
39,035,304 (All Tanks)	**106,946**

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) **2,324**

15. Maximum tank fill rate (gal/min) **49**

16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
NA	**NA**

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**

20A. Shell Color **Dark Green**	20B. Roof Color **Dark Green**	20C. Year Last Painted **2015**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): **0.031 to 1**

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) **6**

24B. For cone roof, provide slope (ft/ft) **NA**

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. **Charleston, WV**
28. Daily Average Ambient Temperature (°F) **70 °F**
29. Annual Average Maximum Temperature (°F) **65.5 °F**
30. Annual Average Minimum Temperature (°F) **44.0 °F**
31. Average Wind Speed (miles/hr) **18 mph**
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day)) **1,123**
33. Atmospheric Pressure (psia) **14.70**

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: Ambient	
34A. Minimum (°F) **NA**	34B. Maximum (°F) **NA**
35. Average operating pressure range of tank: **0.52 psig**	
35A. Minimum (psig) **NA**	35B. Maximum (psig) **NA**
36A. Minimum Liquid Surface Temperature (°F) **NA**	36B. Corresponding Vapor Pressure (psia) **NA**
37A. Average Liquid Surface Temperature (°F) **NA**	37B. Corresponding Vapor Pressure (psia) **NA**
38A. Maximum Liquid Surface Temperature (°F) **NA**	38B. Corresponding Vapor Pressure (psia) **NA**

39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.

39A.	Material Name or Composition	**Produced Water**		
39B.	CAS Number	**NA**		
39C.	Liquid Density (lb/gal)	**8.35**		
39D.	Liquid Molecular Weight (lb/lb-mole)	**18.02**		
39E.	Vapor Molecular Weight (lb/lb-mole)	**18.02**		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	 **NA** **NA**		
Months Storage per Year 39H. From 39I. To	 **January** **December**		

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): **Vapor Recovery Unit**

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
***See calculations included in Attachment I.**					
***For emission calculation purposes, the total throughput is assumed to go through each produced water tank, ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, and ABJ-0011E. Therefore, annual emission rates are not additive. Actual throughput for each tank will vary based on operations.**					

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment G
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **Test Tank**	2. Tank Name **Test Tank**
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) **ABJ-0014**	4. Emission Point Identification No. (as assigned on *Equipment List Form*) **ZZZ-0011**
5. Date of Commencement of Construction (for existing tanks) **2015**	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) **NA**	
7A. Does the tank have more than one mode of operation? ☒ Yes ☐ No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). **The test tank has 2 modes of operation. This tank form covers the throughputs associated with the loading of produced water from the wellhead separators.**	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): **NA**	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. **400 bbls**	
9A. Tank Internal Diameter (ft) **12**	9B. Tank Internal Height (or Length) (ft) **20**
10A. Maximum Liquid Height (ft) **18**	10B. Average Liquid Height (ft) **10**
11A. Maximum Vapor Space Height (ft) **18**	11B. Average Vapor Space Height (ft) **10**
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. **400 bbls**	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
39,035,304	**106,946**

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) **2,324**

15. Maximum tank fill rate (gal/min) **49**

16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☐ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
NA	**NA**

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**

20A. Shell Color **Dark Green**	20B. Roof Color **Dark Green**	20C. Year Last Painted **2015**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): **0.031 to 1**

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) **6**

24B. For cone roof, provide slope (ft/ft) **NA**

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. **Charleston, WV**
28. Daily Average Ambient Temperature (°F) **70 °F**
29. Annual Average Maximum Temperature (°F) **65.5 °F**
30. Annual Average Minimum Temperature (°F) **44.0 °F**
31. Average Wind Speed (miles/hr) **18 mph**
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day)) **1,123**
33. Atmospheric Pressure (psia) **14.70**

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: Ambient	
34A. Minimum (°F) **NA**	34B. Maximum (°F) **NA**
35. Average operating pressure range of tank: **0.52 psig**	
35A. Minimum (psig) **NA**	35B. Maximum (psig) **NA**
36A. Minimum Liquid Surface Temperature (°F) **NA**	36B. Corresponding Vapor Pressure (psia) **NA**
37A. Average Liquid Surface Temperature (°F) **NA**	37B. Corresponding Vapor Pressure (psia) **NA**
38A. Maximum Liquid Surface Temperature (°F) **NA**	38B. Corresponding Vapor Pressure (psia) **NA**

39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.

39A.	Material Name or Composition	**Produced Water**		
39B.	CAS Number	**NA**		
39C.	Liquid Density (lb/gal)	**8.35**		
39D.	Liquid Molecular Weight (lb/lb-mole)	**18.02**		
39E.	Vapor Molecular Weight (lb/lb-mole)	**18.02**		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	 **NA** **NA**		
Months Storage per Year 39H. From 39I. To	 **January** **December**		

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): **Vapor Recovery Unit**

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
***See calculations included in Attachment I.**					
***For emission calculation purposes, the total throughput is assumed to go through each tank ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0011E, and ABJ-0014. Therefore, annual emission rates are not additive. Actual throughput for each tank will vary based on operations.**					

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment G
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **Test Tank**	2. Tank Name **Test Tank**
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) **ABJ-0014**	4. Emission Point Identification No. (as assigned on *Equipment List Form*) **ZZZ-0011**
5. Date of Commencement of Construction (for existing tanks) **2015**	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) **NA**	
7A. Does the tank have more than one mode of operation? ☒ Yes ☐ No (e.g. Is there more than one product stored in the tank?)	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). **This tank form outlines the throughputs realized during maintenance blowdown events to the test tank. The tank also receives produced water from the wellheads.**	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): **NA**	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. **400 bbls**	
9A. Tank Internal Diameter (ft) **12**	9B. Tank Internal Height (or Length) (ft) **20**
10A. Maximum Liquid Height (ft) **18**	10B. Average Liquid Height (ft) **10**
11A. Maximum Vapor Space Height (ft) **18**	11B. Average Vapor Space Height (ft) **10**
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. **400 bbls**	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
3,360	**1,120**

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) **1**

15. Maximum tank fill rate (gal/min) **74.67**

16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☐ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
NA	**NA**

18. Type of tank (check all that apply):
- ☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☐ Internal Floating Roof ___ vertical column support ___ self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) **Welded**

20A. Shell Color **Dark Green**	20B. Roof Color **Dark Green**	20C. Year Last Painted **2015**

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): **0.031 to 1**

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) **6**

24B. For cone roof, provide slope (ft/ft) **NA**

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one) ☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal ☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. **Charleston, WV**
28. Daily Average Ambient Temperature (°F) **70 °F**
29. Annual Average Maximum Temperature (°F) **65.5 °F**
30. Annual Average Minimum Temperature (°F) **44.0 °F**
31. Average Wind Speed (miles/hr) **18 mph**
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day)) **1,123**
33. Atmospheric Pressure (psia) **14.70**

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: Ambient	
34A. Minimum (°F) **NA**	34B. Maximum (°F) **NA**
35. Average operating pressure range of tank: **0.52 psig**	
35A. Minimum (psig) **NA**	35B. Maximum (psig) **NA**
36A. Minimum Liquid Surface Temperature (°F) **NA**	36B. Corresponding Vapor Pressure (psia) **NA**
37A. Average Liquid Surface Temperature (°F) **NA**	37B. Corresponding Vapor Pressure (psia) **NA**
38A. Maximum Liquid Surface Temperature (°F) **NA**	38B. Corresponding Vapor Pressure (psia) **NA**

39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.

39A.	Material Name or Composition	**Produced Water**		
39B.	CAS Number	**NA**		
39C.	Liquid Density (lb/gal)	**8.35**		
39D.	Liquid Molecular Weight (lb/lb-mole)	**18.02**		
39E.	Vapor Molecular Weight (lb/lb-mole)	**18.02**		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	 **NA** **NA**		
Months Storage per Year 39H. From 39I. To	 **January** **December**		

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☒ Other[1] (describe): **Vapor Recovery Unit**

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
***See calculations included in Attachment I.**					
***For emission calculation purposes, the total throughput is assumed to go through each tank ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0011E, and ABJ-0014. Therefore, annual emission rates are not additive. Actual throughput for each tank will vary based on operations.**					

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☒ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment G
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): **ZZZ-0011**

1. Loading Area Name: **Tank Truck Loading Area – Produced Water**

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Car ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	**0**
Number of liquids loaded	**1**
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	**2**

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
NA

6. Are cargo vessels pressure tested for leaks at this or any other location?
☐ Yes ☒ No
If YES, describe:

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	**As Needed**			
days/week	**As Needed**			
weeks/quarter	**As Needed**			

8. Bulk Liquid Data *(add pages as necessary):*		
Pump ID No.		**NA**
Liquid Name		**Produced Water**
Max. daily throughput (1000 gal/day)		**107**
Max. annual throughput (1000 gal/yr)		**39,035**
Loading Method [1]		**Submerged**
Max. Fill Rate (gal/min)		**200**
Average Fill Time (min/loading)		**21**
Max. Bulk Liquid Temperature (^{o}F)		**70 ^{o}F**
True Vapor Pressure [2]		**14.7**
Cargo Vessel Condition [3]		**C**
Control Equipment or Method [4]		**NA**
Minimum control efficiency (%)		**NA**
Maximum Emission Rate	Loading (lb/hr)	**0.71**
	Annual (lb/yr)	**2.30**
Estimation Method [5]		**ProMax**

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):
CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation
SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption
TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation
VB = Dedicated Vapor Balance (closed system) O = other (descibe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Chevron will comply with all monitoring requirements set forth in the permit that is issued.	**Chevron will comply with all recordkeeping requirements set forth in the permit that is issued.**
REPORTING	TESTING
Chevron will comply with all reporting requirements set forth in the permit that is issued.	**Chevron will comply with all testing requirements set forth in the permit that is issued.**

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NA

Attachment G
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): **ZZZ-0011**

1. Loading Area Name: **Tank Truck Loading Area – Blowdown Fluids – Blowdown Fluids**

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Car ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	**0**
Number of liquids loaded	**2**
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	**1**

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
NA

6. Are cargo vessels pressure tested for leaks at this or any other location?
☐ Yes ☒ No
If YES, describe:

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	**As Needed**			
days/week	**As Needed**			
weeks/quarter	**As Needed**			

8. Bulk Liquid Data *(add pages as necessary):*		
Pump ID No.		**NA**
Liquid Name		**Blowdown Fluids**
Max. daily throughput (1000 gal/day)		
Max. annual throughput (1000 gal/yr)		**Based on tank throughputs**
Loading Method [1]		**Submerged**
Max. Fill Rate (gal/min)		
Average Fill Time (min/loading)		
Max. Bulk Liquid Temperature (^{o}F)		**70 ^{o}F**
True Vapor Pressure [2]		**23.3**
Cargo Vessel Condition [3]		**C**
Control Equipment or Method [4]		**NA**
Minimum control efficiency (%)		**NA**
Maximum Emission Rate	Loading (lb/hr)	
	Annual (lb/yr)	
Estimation Method [5]		**EPA AP-42**

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):
CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation
SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption
TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation
VB = Dedicated Vapor Balance (closed system) O = other (descibe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Chevron will comply with all monitoring requirements set forth in the permit that is issued.	**Chevron will comply with all recordkeeping requirements set forth in the permit that is issued.**
REPORTING	TESTING
Chevron will comply with all reporting requirements set forth in the permit that is issued.	**Chevron will comply with all testing requirements set forth in the permit that is issued.**

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NA

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]	--	--	--	--
	heavy liquid VOC[8]	--	--	--	--
	Non-VOC[9]	--	--	--	--
Valves[10]	Gas VOC	**397**	**N/A**	**N/A**	**2,188.37**
	Light Liquid VOC	--	--	--	--
	Heavy Liquid VOC	--	--	--	--
	Non-VOC	--	--	--	--
Safety Relief Valves[11]	Gas VOC	**11**	**N/A**	**N/A**	**84.71**
	Non VOC	--	--	--	--
Open-ended Lines[12]	VOC	**28**	**N/A**	**N/A**	**322.95**
	Non-VOC	--	--	--	--
Sampling Connections[13]	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Compressors	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Flanges	VOC	**1739**	**N/A**	**N/A**	**1,070.21**
	Non-VOC	--	--	--	--
Other	VOC	--	--	--	--
	Non-VOC	--	--	--	--

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.

2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

   Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

   If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category “valves, gas service:” 0/50/0/75/0/50 (bimonthly).

3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.

4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).

5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)

6. Volatile organic compounds (VOC) means the term as defined in 40 CFR □51.100 (s).

7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.

8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.

9. LIST CO, H_2S, mineral acids, NO, NO_2, SO_3, etc. DO NOT LIST CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.

10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.

11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.

12 Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.

13. Do not include closed-purge sampling connections.

Attachment H

Attachment H
Air Pollution Control Devices

Chevron Appalachia, LLC (Chevron) will operate an electric drive vapor recovery unit (VRU) to collect and capture emissions from flashing, working, and breathing emissions from the produced water and test tanks. Chevron is applying for 95% control efficiency of the tank emissions through the use of a VRU. Tank unloading events will be vented directly to atmosphere.

Attachment I

Flash Gas Compressor - CBA-0050

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Heat Value of Natural Gas (Btu/scf)	Rated bhp	BSFC (Btu/hp-hr)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	0.2	g/bhp-hr	Manufacturer Guarantee	1,285	415	7,464	8,760	0.18	0.80
Hexane	4.45E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.001	0.006
Formaldehyde	0.06	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.17	0.75
Benzene	4.40E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.001	0.006
Toluene	4.08E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.001	0.006
Ethylbenzene	1.08E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	<0.001	0.001
Xylenes	2.68E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	<0.001	0.004
CO	0.3	g/bhp-hr	Manufacturer Guarantee	1,285	415	7,464	8,760	0.27	1.20
NOx	0.25	g/bhp-hr	Manufacturer Guarantee	1,285	415	7,464	8,760	0.23	1.00
PMFilterable	7.71E-05	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	<0.001	0.001
PMCondensable	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.03	0.13
SO_2	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	1,285	415	7,464	8,760	0.002	0.008
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1,285	415	7,464	8,760	74.57	326.63
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	1,285	415	7,464	8,760	0.001	0.006
N_2O	1.00E-04	kg CO_2 / MMBtu	40 CFR Subpart C	1,285	415	7,464	8,760	<0.001	<0.001
Total HAPs								0.18	0.77
Total CO_2e								74.65	326.96

Notes:

-Engine emissions are controlled through the operation of NSCR.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

- AP-42, Chapter 3.2 references are from the August 2000 revision.

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **(lb/MMBtu)** x BSFC **(Btu/hp-hr)** ÷ 1,000,000 x Engine Rating (bhp)

Line Heaters

BAP-0210, BAP-0310, BAP-0410, BAP-0610, BAP-0710, BAP-0810, BAP-0910, BAP-1010, BAP-1110, BAP-1210, BAP-1310,

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Heater Rating (MMBtu/hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions. (lb/hr)	Max. Annual Emissions. (tpy)
VOC's	5.5	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	0.005	0.02
Hexane	1.8	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	0.002	0.008
Formaldehyde	0.075	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	<0.001	<0.001
Benzene	0.0021	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	<0.001	<0.001
Toluene	0.0034	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	<0.001	<0.001
Pb	0.0005	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	<0.001	<0.001
CO	84	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	0.08	0.36
NOx	100	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	0.10	0.43
PM_{10}	7.6	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	0.007	0.03
SO_2	0.6	$lb/10^6$ scf	AP-42 Chapter 1.4	1.25	1,285	8,760	<0.001	0.003
CO_2	53.06	kg CO_2 / MMBtu	40 CFR Subpart C	1.25	1,285	8,760	146.22	640.45
CH_4	0.001	kg CO_2 / MMBtu	40 CFR Subpart C	1.25	1,285	8,760	0.003	0.01
N_2O	0.0001	kg CO_2 / MMBtu	40 CFR Subpart C	1.25	1,285	8,760	<0.001	0.001
Total HAPs							0.002	0.008
Total CO_2e							146.37	641.11

Notes:

-Emission rates displayed above represent the max. hourly and max. annual emissions for one line heater. Cumulative emission rates for all 11 line heaters are diplayed in the Total Site Emissions Table.

-Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.

-AP-42, Chapter 1.4 references are from the July 1998 revision.

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Equations:

Max. Hourly Emission Rate **(lb/hr) =** Emission Factor **($lb/10^6$ scf) ÷** Heating Value of Natural Gas **(Btu/scf)** x Boiler Rating (**MMBtu/hr)**

Produced Water Tanks ABJ-0011(A-E) and Test Tank ABJ-0014

Pollutant	Max. Uncontrolled Hourly Emissions using ProMax (lb/hr)	Max. Uncontrolled Annual Emissions using ProMax (tons/yr)
VOCs	202.53	887.07
Total HAPs	8.12	35.57
Hexane	7.60	33.27
Benzene	0.08	0.33
Toluene	0.20	0.86
Ethylbenzene	0.08	0.34
Xylenes	0.19	0.82
CO_2	0.50	2.20
CH_4	46.18	202.28
Total CO_2e	1,155.07	5,059.20

Notes:

-Emission rates for Produced Water Tanks ABJ-0011A, ABJ-0011B, ABJ-0011C, ABJ-0011D, ABJ-0011E, and Test Tank ABJ-0014 were calculated using ProMax software. ProMax output sheets for the Francis Pad are attached.

-The Test Tank (ABJ-0014) is a tank with 2 modes of operation. The tank will act as as a produced water tank during normal operations and will receive produced water from the separators. The produced water tanks and test tank are manifolded together. The test tank will also recieve fluids from maintenance blowdown actitivies, as represented in the Test Tank calculations.

-The emission rates displayed above are pre-control device emissions.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) of "Flash Gas" from the ProMax output sheets.

-For emission calculation purposes, the total throughput for tanks ABJ-0011(A-E), ABJ-0014 is modeled as being received through a single tank. The throughput value represents the total throughput for all six (6) 400-barrel tanks. Therefore, emission rates represent a total from all produced fluids tanks located on the well pad. Actual throughput for each tank will vary based on operations.

Test Tank (ABJ-0014)

Pollutant	Max. Uncontrolled Hourly Emissions using ProMax (lb/hr)	Max. Uncontrolled Annual Emissions using ProMax (tons/yr)
VOCs	192.17	0.29
Total HAPs	8.88	0.01
Hexane	30.11	0.05
Benzene	0.37	0.001
Toluene	1.55	0.002
Ethylbenzene	0.96	0.001
Xylenes	2.52	0.004
CO_2	1.59	0.002
CH_4	262.42	0.39
Total CO_2e	6,561.98	9.84

Notes:

-Emissions from short term maintenance blowdowns are not included in the Site PTE for Max. Hourly Emissions (lb/hr), as displayed in the calculation summary table of this application, since they are irregular and are associated with site maintenance activities.

-Emission rates for test tank ABJ-0014 were calculated using ProMax software. ProMax blowdown summary sheets are attached.

-Pound/hour emissions based on one 15 minute blowdown event. The well is blowndown 3 times per year.

-Blowdown events are routed to a vent stack (ZZZ-0011) and are uncontrolled emission releases.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Subpart W Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

-CO_2 and CH_4 emissions solved for using emissions rates (lb/hr) of flash gas from ProMax summary sheets.

Equations

VOCs **(lb/hr)** = Total emission rate output from ProMax **(lb/hr) x .25 (hrs)**

VOCs **(tons/yr)** = Max. Hourly Emissions **(lb/hr)** x 3 blowdowns per year ÷ 2000 (**lbs/ton**)

Tank Unloading Operations ZZZ-0011

Total Emissions from Tank Unloading Operations

Pollutant	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
VOCs	0.25	0.83
HAPs	<0.001	0.003
CO_2	0.07	0.31
CH_4	0.45	1.96
Total CO_2e	11.24	49.23

Notes:

Tank Unloading Operations will be uncontrolled at the Francis natural gas production facility

-Emission rates for liquid unloading operations were calculated using ProMax software. ProMax summary sheets are attached.

Vapor Recovery Unit (CBA-0055)

Emissions from Tanks

Waste Gas to VRU	Pollutant	Amount of Gas Sent to VRU (lbs/hr)	Amount of Gas Sent to VRU (tons/year)	VRU Control Efficiency	Max. Hourly Emissions (lb/hr)	Max. Yearly Emissions (tons/yr)
Produced Water Tanks ABJ-0011(A-E), Test Tank ABJ-0014	VOCs	202.53	887.07	95%	10.13	44.35
	Total HAPs	8.12	35.57	95%	0.41	1.78
	Hexane	7.60	33.27	95%	0.38	1.66
	Benzene	0.08	0.33	95%	0.004	0.02
	Toluene	0.20	0.86	95%	0.01	0.04
	Ethylbenzene	0.08	0.34	95%	0.004	0.02
	Xylenes	0.19	0.82	95%	0.009	0.04
	CO_2	0.50	2.20	95%	0.03	0.11
	CH_4	46.18	202.28	95%	2.31	10.11
	CO_2e	1,155.07	5,059.20	95%	57.75	252.96

Notes:

-Max. Annual Emissions based upon Max. Hourly Emissions @ 8760 hr/yr.

-CO_2 equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO_2=1, GWP CH_4=25, GWP N_2O=298

Example Calculations:

Waste Gas Flow Rate **(lb/hr)** x 1- Control Efficiency **(%)** = Emission Rate **(lb/hr)**

Fugitive Emissions from Unpaved Haul Roads

Constant	Industrial Roads		
	PM	PM-10	PM-2.5
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

where

k		Patricle size multiplier[1]
s	4.8	Silt content of road surface material (%)
p	150	Number of days per year with precipitation

Item Number	Description	Number of Wheels	W: Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Year	Control Efficiency (%)	PM Emissions (lbs/hr)	PM Emissions (tons/yr)	PM-10 Emissions (lbs/hr)	PM-10 Emissions (tons/yr)	PM-2.5 Emissions (lbs/hr)	PM-2.5 Emissions (tons/yr)
1	Liquids Hauling	14	30	0.72	9,294	NA	3.10	14.40	0.79	3.67	0.08	0.37
2	Employee Vehicles	4	3	0.72	200	NA	1.10	0.11	0.28	0.03	0.03	0.003
						Totals:	**4.20**	**14.51**	**1.07**	**3.70**	**0.11**	**0.37**

Notes:

[1] - Particle Size Multiplier used from AP-42 13.2.2 - Final Version 11/2006

[2] - Silt Content of Road Surface uses Sand and Gravel Processing Plant Road from AP-42 13.2.2 - Final Version 11/2006

[3] - Number of days per year with precipitation >0.01 in3 found using AP-42 13.2.2 Figure 13.2.2-1 - Final Version 11/2006

Example Calculations:

Emissions (lb/Vehicle Mile Traveled) - $E = k \times (s/12)^a \times (W/3)^b$ Equation 1a from AP-42 13.2.2 - Final Version 11/2006

Size Specific Emissions (lb/VMT) - $E_{ext} = E[(365-p)/365]$ Equation 2 from AP-42 13.2.2 - Final Version 11/2006

Fugitive Leaks

Default Average Component Counts for Major Onshore Natural Gas Production Equipment[1]				
Facility Equipment Type	**Valves**	**Connectors**	**Open-ended Lines**	**Pressure Relief Valves**
Wellheads	8	38	0.5	0
Separators	1	6	0	0
Meters/Piping	12	45	0	0
Compressors	12	57	0	0
In-line Heaters	14	65	2	1
Dehydrators	24	90	2	2

[1]- Table W-1B to 40CFR98 Subpart W

Well Specific Equipment Counts	
Facility Equipment Type	**Count on Site**
Wellheads	11
Separators	11
Meters/Piping	12
Compressors	2
In-line Heaters	11
Dehydrators	0

Well Gas Composition														
Emissions from Flaring Operations	**Propane**	**Butane**	**Pentanes**	**Heptane**	**Octane**	**Nonanes**	**Decanes**	**Hexane**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**CO_2**	**CH_4**
Mole %	7.19	3.32	1.51	0.36	0.54	0.34	0.293	0.40	0.01	0.026	0.023	0.071	0.15	68.81
MW	44	58	72	100	114	128	142	86.00	78.00	92.00	106.00	106.00	44.00	16.00

Fugitive Emissions													
Facility Equipment Type	**Total Count**	**Emission Rate (scf/hr/component)[2]**	**Hours of Operation**	**VOCs (lbs/hr)**	**VOCs (tons/yr)**	**HAPs (lbs/hr)**	**HAPs (tons/yr)**	**CO_2 (lbs/hr)**	**CO_2 (tons/yr)**	**CH_4 (lbs/hr)**	**CH_4 (tons/yr)**	**Total CO_2e (lbs/hr)**	**Total CO_2e (tons/yr)**
Valves	421	0.027	8760	0.25	1.09	0.014	0.06	0.002	0.009	0.32	1.42	8.12	35.55
Connectors	1853	0.003	8760	0.12	0.54	0.007	0.03	0.001	0.004	0.16	0.70	3.97	17.39
Open-ended Lines	28	0.06	8760	0.04	0.16	0.002	0.009	<0.001	0.001	0.05	0.21	1.20	5.25
Pressure Relief Valves	11	0.04	8760	0.010	0.04	<0.001	0.002	<0.001	<0.001	0.01	0.06	0.31	1.38
			Total Emissions:	**0.42**	**1.83**	**0.02**	**0.10**	**0.003**	**0.02**	**0.54**	**2.38**	**13.60**	**59.56**

[2]- Table W-1A to 40CFR98 Subpart W

Notes:
-The "Combine Stream" gas composition in the attached ProMax simulations is utilized to calculate emission from fugitive leaks.
-Gas Composition data for Francis site was unavailable. Gas composition was used to determine fugitive emissions based upon a nearby similar natural gas production site operated by Chevron Appalachia, LLC.

Example Equations:
Fugitive Emissions (lb/hr) = Count x Emission Rate x Hours of Operation ÷ 385.5 scf/lbmol x mol VOC's

Total Francis Pad A Natural Gas Production Site Total Controlled Emission Levels

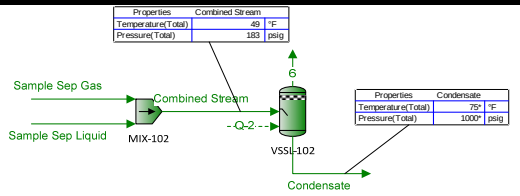
	VOCs		HAPs		CO		NO_x		PM		SO_2		CO_2		CH_4		N_2O		CO_2e	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (BAP-0210)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0310)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0410)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0610)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0710)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0810)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0910)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-1010)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-1110)	0.005	0.02	0.002	0.01	0.08	0.36	0.10	0.43	0.007	0.03	<0.001	0.003	146.22	640.45	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-1210)	0.008	0.03	0.003	0.01	0.12	0.52	0.14	0.62	0.01	0.05	<0.001	0.004	180.14	789.03	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-1310)	0.008	0.03	0.003	0.01	0.12	0.52	0.14	0.62	0.01	0.05	<0.001	0.004	180.14	789.03	0.003	0.01	<0.001	0.001	146.37	641.11
Line Heater (BAP-0012)	0.008	0.03	0.003	0.01	0.12	0.52	0.14	0.62	0.01	0.05	<0.001	0.004	180.14	789.03	0.003	0.01	<0.001	0.001	146.37	641.11
Flash Gas Compressor	0.18	0.80	0.18	0.77	0.27	1.20	0.23	1.00	0.03	0.13	0.002	0.008	74.57	326.63	0.001	0.006	<0.001	0.001	74.65	326.96
Vapor Recovery Unit (CBA-0050)	10.13	44.35	0.41	1.78	--	--	--	--	--	--	--	--	0.03	0.11	2.31	10.11	--	--	57.75	252.96
Tank Truck Loading Activities (ZZZ-0011)	0.25	0.83	<0.001	0.003	--	--	--	--	--	--	--	--	0.07	0.31	0.45	1.96	--	--	11.24	49.23
Test Tank Blowdown Emissions (ZZZ-0011)	--	0.29	--	0.01	--	--	--	--	--	--	--	--	--	0.002	--	0.39	--	--	--	9.84
Haul Roads	--	--	--	--	--	--	--	--	4.20	14.51	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.42	1.83	0.02	0.10	--	--	--	--	--	--	--	--	0.003	0.02	0.54	2.38	--	--	13.60	59.56
Totals	**11.05**	**48.42**	**0.63**	**2.77**	**1.37**	**5.99**	**1.53**	**6.70**	**4.33**	**15.08**	**0.01**	**0.04**	**1,931.10**	**8,458.22**	**3.34**	**15.01**	**0.01**	**0.02**	**1,913.71**	**8,391.89**

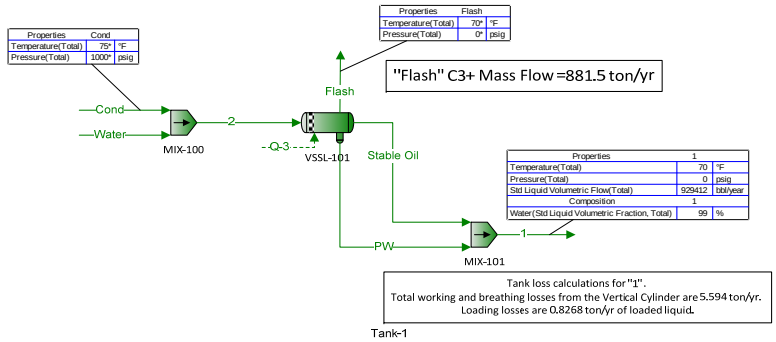
Total Francis Pad A Natural Gas Production Site Total Controlled Emission Levels - HAP Speciation

	Total Controlled Emissions													
	Total HAPs		Hexane		Benzene		Toluene		Ethylbenzene		Xylene		Formaldehyde	
Emission Sources	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Line Heater (BAP-0210)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0310)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0410)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0610)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0710)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0810)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0910)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-1010)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-1110)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-1210)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-1310)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Line Heater (BAP-0012)	0.002	0.008	0.002	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Flash Gas Compressor	0.18	0.77	0.001	0.006	0.001	0.006	0.001	0.006	<0.001	0.001	<0.001	0.004	0.17	0.75
Vapor Recovery Unit (CBA-005)	0.41	1.78	0.38	1.66	0.004	0.02	0.01	0.04	0.004	0.02	0.009	0.041	--	--
Tank Truck Loading Activities (ZZZ-0011)	<0.001	0.003	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	--	--
Test Tank Blowdown Emissions	--	0.01	--	0.05	--	0.001	--	0.00	--	0.00144	--	0.004	--	--
Haul Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fugitives Leaks	0.02	0.11	0.02	0.07	<0.001	0.001	<0.001	0.01	<0.001	0.01	<0.001	0.02	--	--
Totals	**0.63**	**2.77**	**0.42**	**1.88**	**0.01**	**0.02**	**0.01**	**0.06**	**0.00**	**0.03**	**0.01**	**0.07**	**0.17**	**0.75**

Flowsheet1
Plant Schematic

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	





* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	Combined Stream	Cond	Condensate	Flash	PW
From Block	MIX-102	--	VSSL-102	VSSL-101	VSSL-101
To Block	VSSL-102	MIX-100	--	--	MIX-101

Stream Composition

Mole Fraction	Combined Stream %	Cond %		Condensate %	Flash %	PW %
Hydrogen Sulfide	0	0	*	0	0	0
Nitrogen	0.419126	0.0761394	*	0.0761394	0.0945501	1.158E-06
Carbon Dioxide	0.149093	0.116983	*	0.116983	0.12951	6.73385E-05
Methane	66.805	26.4499	*	26.4499	32.7183	0.000821711
Ethane	16.8518	19.7764	*	19.7764	24.2615	0.000718058
Propane	7.19486	15.6292	*	15.6292	18.7072	0.000635208
Isobutane	0.884865	2.68445	*	2.68445	3.07183	3.56854E-05
n-Butane	2.43177	8.247	*	8.247	9.09315	0.000229616
2,2-Dimethylpropane	0.0143476	0.051876	*	0.051876	0.0550075	6.58756E-07
Isopentane	0.613405	2.54242	*	2.54242	2.37713	4.20348E-05
n-Pentane	0.895973	3.91996	*	3.91996	3.37673	5.79226E-05
2,2-Dimethylbutane	0.0155259	0.0733016	*	0.0733016	0.0530703	3.18827E-07
Cyclopentane	0.00184745	0.00865536	*	0.00865536	0.00657405	7.29468E-07
2,3-Dimethylbutane	0.034535	0.168999	*	0.168999	0.106059	1.47246E-06
2-Methylpentane	0.209303	1.03437	*	1.03437	0.61396	4.96671E-06
3-Methylpentane	0.133013	0.664948	*	0.664948	0.371839	8.29886E-06
n-Hexane	0.399997	2.03587	*	2.03587	1.0001	6.46081E-06
Methylcyclopentane	0.0363572	0.186492	*	0.186492	0.0899182	6.38405E-06
Benzene	0.00580528	0.0296765	*	0.0296765	0.010982	3.82902E-05
Cyclohexane	0.0583326	0.302981	*	0.302981	0.124649	1.35803E-05
2-Methylhexane	0.118394	0.632979	*	0.632979	0.169772	1.25567E-06
3-Methylhexane	0.125708	0.674162	*	0.674162	0.174427	1.34329E-06
2,2,4-Trimethylpentane	0	0	*	0	0	0
n-Heptane	0.357175	1.93228	*	1.93228	0.412934	3.34346E-06
Methylcyclohexane	0.135387	0.736054	*	0.736054	0.159268	7.27687E-06
Toluene	0.0261027	0.143059	*	0.143059	0.0240742	6.90556E-05
n-Octane	0.53742	3.01037	*	3.01037	0.224369	1.09259E-06
Ethylbenzene	0.0231196	0.130257	*	0.130257	0.00825934	2.2096E-05
m-Xylene	0.0240517	0.135911	*	0.135911	0.00727984	1.99508E-05
o-Xylene	0.0468409	0.265227	*	0.265227	0.0127209	4.6898E-05
n-Nonane	0.336182	1.91744	*	1.91744	0.047072	3.70159E-07
n-Decane	0.293546	1.68586	*	1.68586	0.0133587	6.35358E-08
C11	0.821119	4.73673	*	4.73673	0.0109081	6.70408E-08
Water	0	0	*	0	2.47355	99.9971

Molar Flow	Combined Stream lbmol/h	Cond lbmol/h		Condensate lbmol/h	Flash lbmol/h	PW lbmol/h
Hydrogen Sulfide	0	0	*	0	0	0
Nitrogen	0.0638133	0.0083463	*	0.0020023	0.00831917	2.36422E-05
Carbon Dioxide	0.0226999	0.0128235	*	0.0030764	0.0113952	0.00137481
Methane	10.1713	2.8994	*	0.695575	2.87878	0.0167764
Ethane	2.56575	2.16786	*	0.520078	2.13469	0.0146601
Propane	1.09544	1.71325	*	0.411014	1.64599	0.0129686
Isobutane	0.134724	0.294266	*	0.0705953	0.270281	0.000728566
n-Butane	0.370245	0.904025	*	0.216878	0.800078	0.00468792
2,2-Dimethylpropane	0.00218448	0.00568658	*	0.00136423	0.00483994	1.34494E-05
Isopentane	0.0933928	0.278697	*	0.0668601	0.209156	0.000858197
n-Pentane	0.136415	0.429701	*	0.103087	0.297108	0.00118257
2,2-Dimethylbutane	0.00236386	0.00803522	*	0.00192767	0.00466949	6.50929E-06
Cyclopentane	0.000281281	0.000948789	*	0.000227617	0.00057843	1.48931E-05
2,3-Dimethylbutane	0.00525807	0.0185254	*	0.00444432	0.0093318	3.00623E-05

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	Combined Stream lbmol/h	Cond lbmol/h	Condensate lbmol/h	Flash lbmol/h	PW lbmol/h
2-Methylpentane	0.0318671	0.113386 *	0.0272017	0.0540204	0.000101402
3-Methylpentane	0.0202517	0.0728907 *	0.0174867	0.032717	0.000169433
n-Hexane	0.0609008	0.223169 *	0.053539	0.0879957	0.000131906
Methylcyclopentane	0.0055355	0.020443 *	0.00490433	0.00791162	0.000130339
Benzene	0.000883873	0.0032531 *	0.000780428	0.000966271	0.000781748
Cyclohexane	0.00888133	0.0332124 *	0.00796775	0.0109675	0.000277261
2-Methylhexane	0.0180259	0.0693863 *	0.016646	0.0149377	2.56362E-05
3-Methylhexane	0.0191395	0.0739007 *	0.017729	0.0153473	2.74251E-05
2,2,4-Trimethylpentane	0	0 *	0	0	0
n-Heptane	0.054381	0.211814 *	0.0508148	0.0363328	6.82614E-05
Methylcyclohexane	0.0206131	0.0806853 *	0.0193566	0.0140135	0.000148567
Toluene	0.00397422	0.0156819 *	0.00376213	0.00211822	0.00140987
n-Octane	0.0818239	0.329993 *	0.0791664	0.0197415	2.23066E-05
Ethylbenzene	0.00352003	0.0142786 *	0.00342548	0.000726714	0.000451121
m-Xylene	0.00366195	0.0148984 *	0.00357415	0.00064053	0.000407323
o-Xylene	0.00713168	0.0290738 *	0.00697489	0.00111927	0.000957487
n-Nonane	0.0511849	0.210187 *	0.0504245	0.00414172	7.55731E-06
n-Decane	0.0446933	0.184802 *	0.0443345	0.00117539	1.29717E-06
C11	0.125018	0.519234 *	0.124566	0.000959771	1.36873E-06
Water	0	0 *	0	0.21764	2041.58

Mass Fraction	Combined Stream %	Cond %	Condensate %	Flash %	PW %
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	0.44238	0.0406721 *	0.0406721	0.0736848	1.80061E-06
Carbon Dioxide	0.247223	0.0981728 *	0.0981728	0.158562	0.000164496
Methane	40.3798	8.09127 *	8.09126	14.602	0.000731702
Ethane	19.092	11.3394 *	11.3394	20.2949	0.00119846
Propane	11.9537	13.1418 *	13.1418	22.9485	0.00155473
Isobutane	1.93778	2.97522 *	2.97522	4.96694	0.000115127
n-Butane	5.32537	9.14029 *	9.14029	14.703	0.000740778
2,2-Dimethylpropane	0.0390027	0.0713703 *	0.0713703	0.110408	2.63814E-06
Isopentane	1.66748	3.49783 *	3.49782	4.77125	0.000168338
n-Pentane	2.43562	5.39303 *	5.39302	6.77759	0.000231964
2,2-Dimethylbutane	0.0504108	0.120453 *	0.120453	0.127229	1.52504E-06
Cyclopentane	0.0048818	0.0115752 *	0.0115752	0.0128264	2.8397E-06
2,3-Dimethylbutane	0.112132	0.277708 *	0.277709	0.254261	7.0432E-06
2-Methylpentane	0.679586	1.69973 *	1.69974	1.47188	2.37573E-05
3-Methylpentane	0.431879	1.09268 *	1.09268	0.891432	3.96959E-05
n-Hexane	1.29875	3.34545 *	3.34545	2.3976	3.0904E-05
Methylcyclopentane	0.115286	0.299285 *	0.299285	0.210524	2.98225E-05
Benzene	0.0170854	0.044203 *	0.0442029	0.0238642	0.000166016
Cyclohexane	0.184969	0.486228 *	0.486229	0.291839	6.34393E-05
2-Methylhexane	0.446984	1.20945 *	1.20945	0.473252	6.98385E-06
3-Methylhexane	0.474597	1.28814 *	1.28814	0.486229	7.47118E-06
2,2,4-Trimethylpentane	0	0 *	0	0	0
n-Heptane	1.34847	3.69205 *	3.69206	1.15108	1.85959E-05
Methylcyclohexane	0.500853	1.3781 *	1.3781	0.435039	3.96587E-05
Toluene	0.0906173	0.251349 *	0.251349	0.0617083	0.00035317
n-Octane	2.31299	6.55717 *	6.55717	0.712995	6.92747E-06
Ethylbenzene	0.0924796	0.263696 *	0.263696	0.0243936	0.000130209
m-Xylene	0.0962083	0.275143 *	0.275142	0.0215007	0.000117567
o-Xylene	0.187366	0.536934 0	0.536933	0.0375707	0.000276363
n-Nonane	1.62456	4.68941 *	4.68941	0.167953	2.63516E-06
n-Decane	1.57365	4.57396 *	4.57396	0.0528764	5.01778E-07
C11	4.83585	14.1183 *	14.1183	0.0474331	5.81655E-07
Water	0	0 *	0	1.23969	99.9938

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	Combined Stream lb/h	Cond lb/h	Condensate lb/h	Flash lb/h	PW lb/h
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	1.78763	0.233808 *	0.0560913	0.233048	0.000662298
Carbon Dioxide	0.99901	0.564357 *	0.135391	0.501496	0.0605046
Methane	163.172	46.5135 *	11.1587	46.1827	0.269134
Ethane	77.1495	65.1855 *	15.6382	64.1881	0.440817
Propane	48.3042	75.5469 *	18.1239	72.5809	0.57186
Isobutane	7.83043	17.1034 *	4.10316	15.7093	0.0423459
n-Butane	21.5194	52.5439 *	12.6055	46.5023	0.272472
2,2-Dimethylpropane	0.157607	0.41028 *	0.0984274	0.349196	0.000970359
Isopentane	6.73818	20.1076 *	4.82388	15.0904	0.0619179
n-Pentane	9.84216	31.0024 *	7.43757	21.436	0.0853209
2,2-Dimethylbutane	0.203707	0.692438 *	0.166118	0.402395	0.000560941
Cyclopentane	0.019727	0.0665413 *	0.0159635	0.040567	0.0010445
2,3-Dimethylbutane	0.453116	1.59644 *	0.382991	0.804171	0.00259063
2-Methylpentane	2.74616	9.7711 *	2.34412	4.65523	0.00873837
3-Methylpentane	1.74519	6.28138 *	1.50692	2.8194	0.0146009
n-Hexane	5.24815	19.2317 *	4.61374	7.58306	0.0113671
Methylcyclopentane	0.465865	1.72047 *	0.412746	0.665838	0.0109693
Benzene	0.069041	0.254105 *	0.0609607	0.0754772	0.0610638
Cyclohexane	0.747448	2.79514 *	0.670562	0.923019	0.0233342
2-Methylhexane	1.80623	6.95264 *	1.66796	1.49679	0.00256879
3-Methylhexane	1.91781	7.405 *	1.77648	1.53783	0.00274804
2,2,4-Trimethylpentane	0	0 *	0	0	0
n-Heptane	5.44908	21.2242 *	5.09175	3.64062	0.00683992
Methylcyclohexane	2.02391	7.92217 *	1.90055	1.37593	0.0145872
Toluene	0.366178	1.44491 *	0.346637	0.195169	0.129903
n-Octane	9.34662	37.6946 *	9.04306	2.25504	0.00254806
Ethylbenzene	0.373704	1.51589 *	0.363666	0.0771516	0.0478932
m-Xylene	0.388771	1.58169 *	0.37945	0.0680019	0.0432434
o-Xylene	0.757134	3.08662 *	0.740489	0.118827	0.101652
n-Nonane	6.56472	26.9576 *	6.4672	0.531197	0.000969264
n-Decane	6.35903	26.2939 *	6.30798	0.167236	0.000184564
C11	19.5413	81.1606 *	19.4707	0.15002	0.000213944
Water	0	0 *	0	3.92085	36779.6

Stream Properties

Property	Units	Combined Stream	Cond	Condensate	Flash	PW
Temperature	°F	48.7939	75 *	75 *	70 *	70
Pressure	psia	197.696	1014.7 *	1014.7 *	14.6959 *	14.6959
Mole Fraction Vapor	%	92.218	0	0	100	0
Mole Fraction Light Liquid	%	7.78205	100	100	0	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	26.5409	52.4419	52.4419	35.9459	18.0159
Mass Density	lb/ft^3	1.10928	34.7449	34.7449	0.0939954	62.2744
Molar Flow	lbmol/h	15.2253	10.9619	2.62978	8.79869	2041.64
Mass Flow	lb/h	404.093	574.861	137.911	316.277	36781.9
Vapor Volumetric Flow	ft^3/h	364.283	16.5452	3.96924	3364.82	590.642
Liquid Volumetric Flow	gpm	45.4171	2.06277	0.494866	419.51	73.6385
Std Vapor Volumetric Flow	MMSCFD	0.138667	0.0998366	0.0239511	0.0801352	18.5945
Std Liquid Volumetric Flow	sgpm	2.05777	2.11711 *	0.5079	1.38202	73.5345
Compressibility		0.866854	0.266915	0.266915	0.988716	0.000747953
Specific Gravity			0.557086	0.557086	1.24112	0.998483
API Gravity			117.554	117.554		10.0156
Enthalpy	Btu/h	-587672	-647010	-155220	-384570	-2.51151E+08
Mass Enthalpy	Btu/lb	-1454.3	-1125.51	-1125.51	-1215.93	-6828.12
Mass Cp	Btu/(lb*°F)	0.493609	0.587403	0.587403	0.419869	0.983148
Ideal Gas CpCv Ratio		1.20515	1.10335	1.10335	1.15259	1.32583
Dynamic Viscosity	cP		0.148175	0.148175	0.00896582	0.99566

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Combined Stream	Cond	Condensate	Flash	PW
Kinematic Viscosity	cSt		0.266233	0.266233	5.95474	0.998115
Thermal Conductivity	Btu/(h*ft*°F)		0.062478	0.0624779	0.0125346	0.34704
Surface Tension	lbf/ft		0.000363345 ?	0.000363345 ?		0.00504244 ?
Net Ideal Gas Heating Value	Btu/ft^3	1424.07	2716.65	2716.65	1875.12	0.056814
Net Liquid Heating Value	Btu/lb	20265.7	19504.1	19504.1	19646.7	-1058.51
Gross Ideal Gas Heating Value	Btu/ft^3	1561.05	2945.62	2945.62	2044.93	50.3701
Gross Liquid Heating Value	Btu/lb	22224	21160.2	21160.2	21439.1	1.28841

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
From Block	--	--	VSSL-101	--	MIX-101
To Block	MIX-102	MIX-102	MIX-101	MIX-100	--

Stream Composition

Mole Fraction	Sample Sep Gas %	Sample Sep Liquid %	Stable Oil %	Water %	1 %
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.452 *	0.0210002 *	0.000150179	0 *	1.32738E-06
Carbon Dioxide	0.16 *	0.0170002 *	0.00230441	0 *	6.98813E-05
Methane	71.877 *	5.37905 *	0.165581	0 *	0.00100898
Ethane	17.518 *	8.78409 *	0.796769	0 *	0.00162288
Propane	6.744 *	12.6551 *	2.33705	0 *	0.00329087
Isobutane	0.688 *	3.26903 *	1.00104	0 *	0.00117347
n-Butane	1.672 *	11.6331 *	4.27242	0 *	0.00508556
2,2-Dimethylpropane	0.01 *	0.0670007 *	0.0358631	0 *	4.14215E-05
Isopentane	0.263 *	4.85705 *	2.95629	0 *	0.00340223
n-Pentane	0.323 *	7.83508 *	5.65631	0 *	0.00648704
2,2-Dimethylbutane	0.005 *	0.143001 *	0.144592	0 *	0.000164667
Cyclopentane	0.002 *	0 *	0.0153004	0 *	1.81197E-05
2,3-Dimethylbutane	0.007 *	0.368004 *	0.39443	0 *	0.000449796
2-Methylpentane	0.046 *	2.18702 *	2.55093	0 *	0.00290445
3-Methylpentane	0.026 *	1.42901 *	1.72191	0 *	0.00196548
n-Hexane	0.065 *	4.45704 *	5.81262	0 *	0.00661332
Methylcyclopentane	0.006 *	0.404004 *	0.53378	0 *	0.000613093
Benzene	0.001 *	0.0640006 *	0.0647834	0 *	0.000111882
Cyclohexane	0.007 *	0.680007 *	0.945556	0 *	0.00108832
2-Methylhexane	0.011 *	1.41901 *	2.34254	0 *	0.00266388
3-Methylhexane	0.01 *	1.52702 *	2.51914	0 *	0.0028647
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.025 *	4.38004 *	7.55033	0 *	0.00858535
Methylcyclohexane	0.009 *	1.66602 *	2.86337	0 *	0.00326189
Toluene	0.002 *	0.318003 *	0.523141	0 *	0.0006636
n-Octane	0.026 *	6.73107 *	13.3532	0 *	0.0151789
Ethylbenzene	0.001 *	0.291003 *	0.563899	0 *	0.000663021
m-Xylene	0.003 *	0.279003 *	0.596171	0 *	0.00069756
o-Xylene	0.001 *	0.602006 *	1.16204	0 *	0.00136767
n-Nonane	0.023 *	4.12904 *	8.86853	0 *	0.0100807
n-Decane	0.014 *	3.67904 *	7.90381	0 *	0.00898385
C11	0.003 *	10.7291 *	22.3081	0 *	0.0253564
Water	0 *	0 *	0.0379921	100 *	99.8835

Molar Flow	Sample Sep Gas lbmol/h	Sample Sep Liquid lbmol/h	Stable Oil lbmol/h	Water lbmol/h	1 lbmol/h
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.0635694 *	0.000243873 *	3.48904E-06	0 *	2.71312E-05
Carbon Dioxide	0.0225025 *	0.000197421 *	5.35372E-05	0 *	0.00142835
Methane	10.1088 *	0.0624664 *	0.00384685	0 *	0.0206232
Ethane	2.46374 *	0.102009 *	0.0185109	0 *	0.0331711
Propane	0.948478 *	0.146963 *	0.0542954	0 *	0.0672641
Isobutane	0.0967606 *	0.037963 *	0.0232567	0 *	0.0239852
n-Butane	0.235151 *	0.135094 *	0.0992588	0 *	0.103947
2,2-Dimethylpropane	0.0014064 *	0.000778072 *	0.00083319	0 *	0.000846639
Isopentane	0.0369884 *	0.0564044 *	0.0686821	0 *	0.0695403
n-Pentane	0.0454268 *	0.090988 *	0.13141	0 *	0.132593
2,2-Dimethylbutane	0.000703202 *	0.00166066 *	0.00335922	0 *	0.00336573
Cyclopentane	0.000281281 *	0 *	0.000355466	0 *	0.000370359
2,3-Dimethylbutane	0.000984482 *	0.00427359 *	0.00916358	0 *	0.00919365

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	Sample Sep Gas lbmol/h	Sample Sep Liquid lbmol/h	Stable Oil lbmol/h	Water lbmol/h	1 lbmol/h
2-Methylpentane	0.00646946 *	0.0253977 *	0.0592644	0 *	0.0593658
3-Methylpentane	0.00365665 *	0.016595 *	0.0400043	0 *	0.0401737
n-Hexane	0.00914162 *	0.0517592 *	0.135042	0 *	0.135174
Methylcyclopentane	0.000843842 *	0.00469166 *	0.012401	0 *	0.0125314
Benzene	0.00014064 *	0.000743233 *	0.00150508	0 *	0.00228683
Cyclohexane	0.000984482 *	0.00789685 *	0.0219676	0 *	0.0222449
2-Methylhexane	0.00154704 *	0.0164789 *	0.054423	0 *	0.0544486
3-Methylhexane	0.0014064 *	0.0177331 *	0.058526	0 *	0.0585534
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.00351601 *	0.050865 *	0.175413	0 *	0.175481
Methylcyclohexane	0.00126576 *	0.0193473 *	0.0665232	0 *	0.0666718
Toluene	0.000281281 *	0.00369294 *	0.0121539	0 *	0.0135637
n-Octane	0.00365665 *	0.0781672 *	0.310229	0 *	0.310251
Ethylbenzene	0.00014064 *	0.00337939 *	0.0131008	0 *	0.0135519
m-Xylene	0.000421921 *	0.00324003 *	0.0138505	0 *	0.0142579
o-Xylene	0.00014064 *	0.00699104 *	0.0269971	0 *	0.0279546
n-Nonane	0.00323473 *	0.0479501 *	0.206038	0 *	0.206045
n-Decane	0.00196896 *	0.0427243 *	0.183625	0 *	0.183626
C11	0.000421921 *	0.124596 *	0.518273	0 *	0.518274
Water	0 *	0 *	0.000882651	2041.8 *	2041.58

Mass Fraction	Sample Sep Gas %	Sample Sep Liquid %	Stable Oil %	Water %	1 %
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.574027 *	0.00727825 *	3.75595E-05	0 *	2.05182E-06
Carbon Dioxide	0.319223 *	0.00925629 *	0.00090542	0 *	0.000169701
Methane	52.2744 *	1.06761 *	0.0237151	0 *	0.000893164
Ethane	23.8799 *	3.26779 *	0.213892	0 *	0.00269267
Propane	13.4816 *	6.90398 *	0.92004	0 *	0.00800723
Isobutane	1.81284 *	2.35071 *	0.519443	0 *	0.00376348
n-Butane	4.40562 *	8.36519 *	2.21697	0 *	0.0163101
2,2-Dimethylpropane	0.0327083 *	0.0598061 *	0.0231005	0 *	0.000164904
Isopentane	0.860227 *	4.3355 *	1.90423	0 *	0.0135447
n-Pentane	1.05648 *	6.99375 *	3.64339	0 *	0.0258257
2,2-Dimethylbutane	0.0195336 *	0.152462 *	0.111242	0 *	0.000783009
Cyclopentane	0.00635887 *	0 *	0.00958006	0 *	7.01211E-05
2,3-Dimethylbutane	0.027347 *	0.392349 *	0.303457	0 *	0.00213882
2-Methylpentane	0.179709 *	2.33171 *	1.96257	0 *	0.013811
3-Methylpentane	0.101575 *	1.52355 *	1.32476	0 *	0.00934608
n-Hexane	0.253936 *	4.7519 *	4.47197	0 *	0.031447
Methylcyclopentane	0.0228919 *	0.420655 *	0.40106	0 *	0.00284712
Benzene	0.00354116 *	0.0618499 *	0.0451777	0 *	0.00048223
Cyclohexane	0.0267073 *	0.708033 *	0.710451	0 *	0.00505402
2-Methylhexane	0.0499686 *	1.75914 *	2.09559	0 *	0.0147288
3-Methylhexane	0.045426 *	1.89303 *	2.25358	0 *	0.0158392
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.113565 *	5.4299 *	6.75439	0 *	0.0474691
Methylcyclohexane	0.0400609 *	2.0238 *	2.50999	0 *	0.0176724
Toluene	0.00835409 *	0.362501 *	0.430331	0 *	0.00337383
n-Octane	0.134641 *	9.51253 *	13.6177	0 *	0.0956736
Ethylbenzene	0.00481293 *	0.382222 *	0.534473	0 *	0.00388405
m-Xylene	0.0144388 *	0.366461 *	0.565062	0 *	0.00408639
o-Xylene	0.00481293 *	0.790714 *	1.1014	0 *	0.00801194
n-Nonane	0.133731 *	6.55181 *	10.1548	0 *	0.0713414
n-Decane	0.0903037 *	6.47621 *	10.0399	0 *	0.0705323
C11	0.0212584 *	20.7483 *	31.1307	0 *	0.218698
Water	0 *	0 *	0.00611052	100 *	99.2913

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	Sample Sep Gas lb/h	Sample Sep Liquid lb/h	Stable Oil lb/h	Water lb/h	1 lb/h
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	1.7808 *	0.00683172 *	9.77399E-05	0 *	0.000760038
Carbon Dioxide	0.990322 *	0.00868841 *	0.00235614	0 *	0.0628608
Methane	162.17 *	1.00212 *	0.061713	0 *	0.330847
Ethane	74.0822 *	3.06731 *	0.556605	0 *	0.997422
Propane	41.8237 *	6.48041 *	2.39419	0 *	2.96605
Isobutane	5.62394 *	2.20649 *	1.35173	0 *	1.39407
n-Butane	13.6675 *	7.85197 *	5.76914	0 *	6.04161
2,2-Dimethylpropane	0.10147 *	0.056137 *	0.0601136	0 *	0.061084
Isopentane	2.66867 *	4.06951 *	4.95533	0 *	5.01725
n-Pentane	3.27749 *	6.56467 *	9.48108	0 *	9.5664
2,2-Dimethylbutane	0.0605987 *	0.143108 *	0.289482	0 *	0.290043
Cyclopentane	0.019727 *	0 *	0.0249299	0 *	0.0259744
2,3-Dimethylbutane	0.0848381 *	0.368278 *	0.789675	0 *	0.792266
2-Methylpentane	0.557508 *	2.18865 *	5.10713	0 *	5.11587
3-Methylpentane	0.315113 *	1.43008 *	3.44739	0 *	3.46199
n-Hexane	0.787783 *	4.46037 *	11.6373	0 *	11.6486
Methylcyclopentane	0.0710173 *	0.394848 *	1.04367	0 *	1.05463
Benzene	0.0109857 *	0.0580553 *	0.117565	0 *	0.178628
Cyclohexane	0.0828535 *	0.664595 *	1.84878	0 *	1.87212
2-Methylhexane	0.155017 *	1.65121 *	5.45329	0 *	5.45585
3-Methylhexane	0.140924 *	1.77689 *	5.86442	0 *	5.86716
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.352311 *	5.09677 *	17.5767	0 *	17.5836
Methylcyclohexane	0.12428 *	1.89963 *	6.53165	0 *	6.54624
Toluene	0.0259168 *	0.340262 *	1.11984	0 *	1.24974
n-Octane	0.417694 *	8.92893 *	35.437	0 *	35.4395
Ethylbenzene	0.0149311 *	0.358773 *	1.39084	0 *	1.43874
m-Xylene	0.0447932 *	0.343978 *	1.47044	0 *	1.51368
o-Xylene	0.0149311 *	0.742203 *	2.86614	0 *	2.9678
n-Nonane	0.41487 *	6.14985 *	26.4254	0 *	26.4264
n-Decane	0.280148 *	6.07888 *	26.1265	0 *	26.1267
C11	0.0659497 *	19.4754 *	81.0103	0 *	81.0105
Water	0 *	0 *	0.0159012	36783.6 *	36779.6

Stream Properties

Property	Units	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
Temperature	°F	49 *	49 *	70	75 *	70
Pressure	psia	197.696 *	197.696 *	14.6959	1014.7 *	14.6959
Mole Fraction Vapor	%	99.7899	0	0	0	0
Mole Fraction Light Liquid	%	0.210132	100	100	100	0.113664
Mole Fraction Heavy Liquid	%	0	0	0	0	99.8863
Molecular Weight	lb/lbmol	22.0583	80.8281	112.01	18.0153	18.1227
Mass Density	lb/ft^3	0.856758	41.7837	44.2882	62.2832	62.0972
Molar Flow	lbmol/h	14.064	1.16129	2.32325	2041.8	2043.96
Mass Flow	lb/h	310.228	93.8649	260.227	36783.6	37042.1
Vapor Volumetric Flow	ft^3/h	362.096	2.24645	5.87576	590.586	596.518
Liquid Volumetric Flow	gpm	45.1444	0.280077	0.732562	73.6315	74.3711
Std Vapor Volumetric Flow	MMSCFD	0.12809 *	0.0105766	0.0211593	18.5959	18.6156
Std Liquid Volumetric Flow	sgpm	1.7661	0.291667 *	0.733563	73.533 *	74.2681
Compressibility		0.932418	0.0700573	0.00653878	0.0511513	0.000754535
Specific Gravity			0.669943	0.710099	0.998624	0.995643
API Gravity			81.6351	66.4663	9.89088	10.4142
Enthalpy	Btu/h	-493860	-93811.7	-238531	-2.50891E+08	-2.5139E+08
Mass Enthalpy	Btu/lb	-1591.92	-999.433	-916.627	-6820.73	-6786.59
Mass Cp	Btu/(lb*°F)	0.490708	0.503909	0.494113	0.981026	0.979712
Ideal Gas CpCv Ratio		1.24402	1.06997	1.04853	1.3256	1.32373
Dynamic Viscosity	cP		0.330885	0.544263	0.947668	0.991214

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
Kinematic Viscosity	cSt		0.494367	0.767186	0.949871	0.99584
Thermal Conductivity	Btu/(h*ft*°F)		0.0697798	0.0730172	0.349407	0.344341
Surface Tension	lbf/ft		0.00118245 ?	0.0014494 ?	0.00500456	0.00500704 ?
Net Ideal Gas Heating Value	Btu/ft^3	1201.01	4125.45	5666.63	0	6.49767
Net Liquid Heating Value	Btu/lb	20588.6	19198.4	19023.7	-1059.76	-917.425
Gross Ideal Gas Heating Value	Btu/ft^3	1322.14	4454.37	6104.38	50.31	57.2514
Gross Liquid Heating Value	Btu/lb	22672.6	20741.5	20505.4	0	145.333

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	2	6			
From Block	MIX-100	VSSL-102			
To Block	VSSL-101	--			

Stream Composition

Mole Fraction	2 %	6 %			
Hydrogen Sulfide	0	0			
Nitrogen	0.000406589	0.490737			
Carbon Dioxide	0.000624697	0.155797			
Methane	0.141244	75.2306			
Ethane	0.105607	16.2412			
Propane	0.0834609	5.43388			
Isobutane	0.0143351	0.509134			
n-Butane	0.0440395	1.21763			
2,2-Dimethylpropane	0.000277021	0.0065122			
Isopentane	0.0135767	0.210652			
n-Pentane	0.0209328	0.264604			
2,2-Dimethylbutane	0.000391435	0.00346305			
Cyclopentane	4.62202E-05	0.00042605			
2,3-Dimethylbutane	0.000902465	0.00646064			
2-Methylpentane	0.0055236	0.03704			
3-Methylpentane	0.00355086	0.0219519			
n-Hexane	0.0108717	0.0584479			
Methylcyclopentane	0.000995879	0.00501104			
Benzene	0.000158474	0.000821286			
Cyclohexane	0.00161794	0.00725319			
2-Methylhexane	0.00338015	0.0109557			
3-Methylhexane	0.00360007	0.0111981			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.0103185	0.028313			
Methylcyclohexane	0.00393057	0.00997502			
Toluene	0.000763944	0.00168383			
n-Octane	0.0160756	0.0210988			
Ethylbenzene	0.000695581	0.000750682			
m-Xylene	0.000725773	0.000697056			
o-Xylene	0.00141633	0.0012448			
n-Nonane	0.0102393	0.00603669			
n-Decane	0.0090026	0.00284846			
C11	0.0252944	0.00359054			
Water	99.466	0			

Molar Flow	2 lbmol/h	6 lbmol/h			
Hydrogen Sulfide	0	0			
Nitrogen	0.0083463	0.061811			
Carbon Dioxide	0.0128235	0.0196235			
Methane	2.8994	9.4757			
Ethane	2.16786	2.04567			
Propane	1.71325	0.684427			
Isobutane	0.294266	0.0641282			
n-Butane	0.904025	0.153366			
2,2-Dimethylpropane	0.00568658	0.000820247			
Isopentane	0.278697	0.0265327			
n-Pentane	0.429701	0.0333283			
2,2-Dimethylbutane	0.00803522	0.00043619			
Cyclopentane	0.000948789	5.36633E-05			
2,3-Dimethylbutane	0.0185254	0.000813753			
2-Methylpentane	0.113386	0.00466538			
3-Methylpentane	0.0728907	0.00276496			
n-Hexane	0.223169	0.00736182			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	2 lbmol/h	6 lbmol/h			
Methylcyclopentane	0.020443	0.000631168			
Benzene	0.0032531	0.000103445			
Cyclohexane	0.0332124	0.000913579			
2-Methylhexane	0.0693863	0.00137992			
3-Methylhexane	0.0739007	0.00141046			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.211814	0.00356618			
Methylcyclohexane	0.0806853	0.00125641			
Toluene	0.0156819	0.000212088			
n-Octane	0.329993	0.0026575			
Ethylbenzene	0.0142786	9.45524E-05			
m-Xylene	0.0148984	8.7798E-05			
o-Xylene	0.0290738	0.00015679			
n-Nonane	0.210187	0.000760354			
n-Decane	0.184802	0.000358779			
C11	0.519234	0.000452248			
Water	2041.8	0			

Mass Fraction	2 %	6 %			
Hydrogen Sulfide	0	0			
Nitrogen	0.000625851	0.650507			
Carbon Dioxide	0.00151065	0.324446			
Methane	0.124506	57.1088			
Ethane	0.174487	23.1087			
Propane	0.202222	11.3382			
Isobutane	0.0457819	1.40027			
n-Butane	0.140648	3.34883			
2,2-Dimethylpropane	0.00109823	0.0222328			
Isopentane	0.0538235	0.719169			
n-Pentane	0.0829863	0.903364			
2,2-Dimethylbutane	0.0018535	0.0141214			
Cyclopentane	0.000178116	0.0014139			
2,3-Dimethylbutane	0.0042733	0.0263449			
2-Methylpentane	0.026155	0.15104			
3-Methylpentane	0.0168138	0.0895142			
n-Hexane	0.0514789	0.238336			
Methylcyclopentane	0.00460531	0.0199558			
Benzene	0.000680183	0.00303563			
Cyclohexane	0.00748194	0.0288848			
2-Methylhexane	0.0186106	0.051946			
3-Methylhexane	0.0198215	0.0530955			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.0568123	0.134245			
Methylcyclohexane	0.0212058	0.0463448			
Toluene	0.00386769	0.00734136			
n-Octane	0.1009	0.114043			
Ethylbenzene	0.00405769	0.00377116			
m-Xylene	0.00423382	0.00350176			
o-Xylene	0.00826219	0.00625345			
n-Nonane	0.0721593	0.0366363			
n-Decane	0.0703828	0.0191777			
C11	0.217248	0.026557			
Water	98.4612	0			

Mass Flow	2 lb/h	6 lb/h			
Hydrogen Sulfide	0	0			
Nitrogen	0.233808	1.73154			
Carbon Dioxide	0.564357	0.863619			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	2 lb/h	6 lb/h			
Methane	46.5135	152.014			
Ethane	65.1855	61.5113			
Propane	75.5469	30.1802			
Isobutane	17.1034	3.72727			
n-Butane	52.5439	8.914			
2,2-Dimethylpropane	0.41028	0.0591798			
Isopentane	20.1076	1.9143			
n-Pentane	31.0024	2.4046			
2,2-Dimethylbutane	0.692438	0.0375888			
Cyclopentane	0.0665413	0.00376357			
2,3-Dimethylbutane	1.59644	0.0701254			
2-Methylpentane	9.7711	0.402041			
3-Methylpentane	6.28138	0.238271			
n-Hexane	19.2317	0.634408			
Methylcyclopentane	1.72047	0.0531188			
Benzene	0.254105	0.00808031			
Cyclohexane	2.79514	0.0768863			
2-Methylhexane	6.95264	0.138271			
3-Methylhexane	7.405	0.141331			
2,2,4-Trimethylpentane	0	0			
n-Heptane	21.2242	0.357338			
Methylcyclohexane	7.92217	0.123362			
Toluene	1.44491	0.0195414			
n-Octane	37.6946	0.303563			
Ethylbenzene	1.51589	0.0100382			
m-Xylene	1.58169	0.00932107			
o-Xylene	3.08662	0.0166456			
n-Nonane	26.9576	0.0975193			
n-Decane	26.2939	0.0510476			
C11	81.1606	0.0706901			
Water	36783.6	0			

Stream Properties

Property	Units	2	6			
Temperature	°F	75.0854	75			
Pressure	psia	1014.7	1014.7			
Mole Fraction Vapor	%	0	100			
Mole Fraction Light Liquid	%	0.441901	0			
Mole Fraction Heavy Liquid	%	99.5581	0			
Molecular Weight	lb/lbmol	18.1991	21.1331			
Mass Density	lb/ft^3	61.6075	4.97533			
Molar Flow	lbmol/h	2052.76	12.5955			
Mass Flow	lb/h	37358.4	266.182			
Vapor Volumetric Flow	ft^3/h	606.394	53.5005			
Liquid Volumetric Flow	gpm	75.6023	6.67019			
Std Vapor Volumetric Flow	MMSCFD	18.6958	0.114716			
Std Liquid Volumetric Flow	sgpm	75.6501	1.54987			
Compressibility		0.0522316	0.75115			
Specific Gravity		0.987791	0.729668			
API Gravity		11.4073				
Enthalpy	Btu/h	-2.51538E+08	-442953			
Mass Enthalpy	Btu/lb	-6733.1	-1664.1			
Mass Cp	Btu/(lb*°F)	0.97566	0.699758			
Ideal Gas CpCv Ratio		1.3219	1.24598			
Dynamic Viscosity	cP	0.921352	0.0132701			
Kinematic Viscosity	cSt	0.92757	0.166506			
Thermal Conductivity	Btu/(h*ft*°F)	0.341204	0.0221203			
Surface Tension	lbf/ft	0.00488547 ?				
Net Ideal Gas Heating Value	Btu/ft^3	14.5071	1154.19			
Net Liquid Heating Value	Btu/lb	-743.329	20660.3			

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	2	6			
Gross Ideal Gas Heating Value	Btu/ft^3	65.7711	1271.97			
Gross Liquid Heating Value	Btu/lb	325.607	22775.2			

Remarks

Energy Stream Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-2	-10501.5 Btu/h	-4.12723 hp	--	VSSL-102
Q-3	-236465 Btu/h	-92.9341 hp	--	VSSL-101

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	Modified: 11:14 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:35 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Cond	Inlet		Water	Inlet	
2	Outlet	VSSL-101			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 2	100 %

Remarks

Blocks
MIX-101
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	Modified: 10:34 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:35 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
PW	Inlet	VSSL-101	Stable Oil	Inlet	VSSL-101
1	Outlet				

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 1	100 %

Remarks

Blocks
MIX-102
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	Modified: 10:05 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 10:15 AM, 5/18/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Sample Sep Liquid	Inlet		Sample Sep Gas	Inlet	
Combined Stream	Outlet	VSSL-102			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream Combined Stream	100 %

Remarks

Blocks
VSSL-101
Separator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	Modified: 11:14 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:35 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
2	Inlet	MIX-100	Flash	Vapor Outlet	
Stable Oil	Light Liquid Outlet	MIX-101	PW	Heavy Liquid Outlet	MIX-101
Q-3	Energy				

Block Parameters

Pressure Drop	1000	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	0.428627	%	Heat Duty	-236465	Btu/h
Mole Fraction Light Liquid	0.113177	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	99.4582	%	Heat Release Curve Increments	5	

Remarks

Blocks
VSSL-102
Separator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	Modified: 10:20 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 10:20 AM, 5/18/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Combined Stream	Inlet	MIX-102	6	Vapor Outlet	
Condensate	Light Liquid Outlet		Q-2	Energy	

Block Parameters

Pressure Drop	-817	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	82.7276	%	Heat Duty	-10501.5	Btu/h
Mole Fraction Light Liquid	17.2724	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0	%	Heat Release Curve Increments	5	

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!Blocks!VSSL-102!Properties!PDrop
Warning: A negative pressure drop of -817 psi was encountered in block VSSL-102.

Remarks

Flowsheet Environment
Environment1

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	1 %

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Hydrogen Sulfide	False	False	Methylcyclopentane	False	False
Nitrogen	False	False	Benzene	False	False
Carbon Dioxide	False	False	Cyclohexane	False	False
Methane	False	False	2-Methylhexane	False	False
Ethane	False	False	3-Methylhexane	False	False
Propane	False	False	2,2,4-Trimethylpentane	False	False
Isobutane	False	False	n-Heptane	False	False
n-Butane	False	False	Methylcyclohexane	False	False
2,2-Dimethylpropane	False	False	Toluene	False	False
Isopentane	False	False	n-Octane	False	False
n-Pentane	False	False	Ethylbenzene	False	False
2,2-Dimethylbutane	False	False	m-Xylene	False	False
Cyclopentane	False	False	o-Xylene	False	False
2,3-Dimethylbutane	False	False	n-Nonane	False	False
2-Methylpentane	False	False	n-Decane	False	False
3-Methylpentane	False	False	C11	False	False
n-Hexane	False	False	Water	False	True

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Calculator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	

Simple Solver 1

Source Code

Residual Error (for CV1) = Water/99-1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	2521.13
Unit	bbl/d

Measured Variable [Water]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!1!Phases!Total!Composition!Std. Liquid Volumetric Fraction!Water
Value	98.9997
Unit	%

Solver Properties

Status: Solved

Error	-3.26542E-06		Iterations	5
Calculated Value	73.533	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

Simple Solver 2

Source Code

Residual Error (for CV1) = Thruput/929412-1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Cond!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	72.5865
Unit	bbl/d

Measured Variable [Thruput]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!1!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	929412
Unit	bbl/year

Solver Properties

Status: Solved

Error	-6.42374E-08		Iterations	5
Calculated Value	2.11711	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	

Cn+ Flow/Frac.52

User Value [CnPlusSum]

* Parameter	881.479	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={10D7F511-F21C-4663-8C95-1EDF94CD32CF}

Tank-1

User Value [BlockReady]

* Parameter	1	fractional	Upper Bound	fractional
Lower Bound		fractional	* Enforce Bounds	False

User Value [ShellLength]

* Parameter	20	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.03	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.03	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [DomeRadius]

Parameter		ft	Upper Bound	ft
Lower Bound		ft	* Enforce Bounds	False

User Value [OpPress]

* Parameter	0.5	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	25.0161	bbl/day	Upper Bound	bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	0	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	

User Value [MaxAvgT]

* Parameter	59.9	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MinAvgT]

* Parameter	40.7	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [AvgP]

* Parameter	14.1085	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [Therml]

* Parameter	1069	Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	9.1	mi/h	Upper Bound	mi/h
Lower Bound		mi/h	* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	14.1085	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [TVP]

* Parameter	5.58085	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	60.2465	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	70.3624	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	5.59385	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.273794	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.844977	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production
Location:	Francis Wellpad	

User Value [LoadingLosses]

* Parameter	0.826759	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0.624276	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

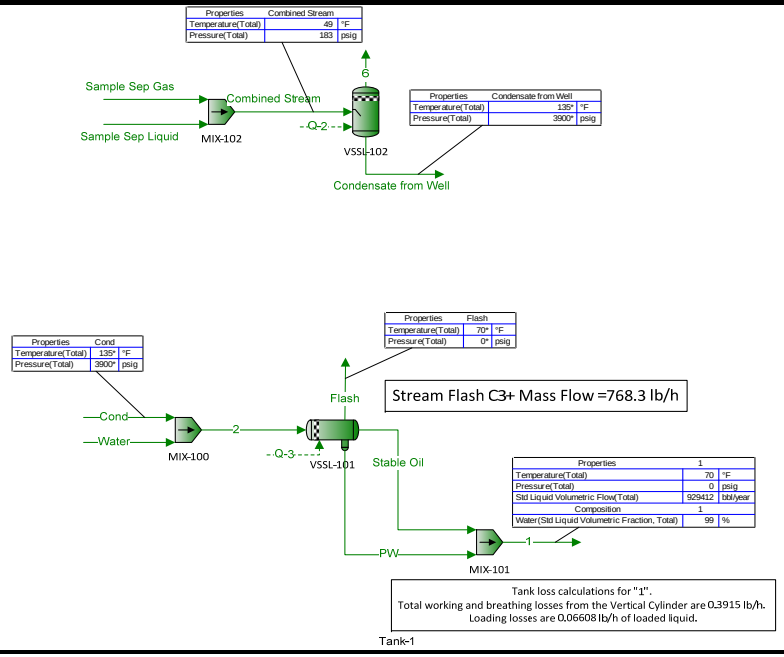
* Parameter	0.0537294	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={4DEAFC69-B549-4E7C-957A-1D44EDE2D6E4}

Flowsheet1
Plant Schematic

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	Combined Stream	Cond	Condensate from Well	Flash	PW
From Block	MIX-102	--	VSSL-102	VSSL-101	VSSL-101
To Block	VSSL-102	MIX-100	--	--	MIX-101

Stream Composition

Mole Fraction	Combined Stream %	Cond %		Condensate from Well %	Flash %	PW %
Hydrogen Sulfide	0	0	*		0	0
Nitrogen	0.419126	0.419126	*		0.417647	5.09211E-06
Carbon Dioxide	0.149093	0.149093	*		0.146966	7.62641E-05
Methane	66.805	66.805	*		66.5468	0.00166639
Ethane	16.8518	16.8518	*		16.7756	0.000496534
Propane	7.19486	7.19486	*		7.14765	0.00024334
Isobutane	0.884865	0.884865	*		0.875775	1.02224E-05
n-Butane	2.43177	2.43177	*		2.39911	6.08971E-05
2,2-Dimethylpropane	0.0143476	0.0143476	*		0.0141024	1.70012E-07
Isopentane	0.613405	0.613405	*		0.595504	1.06023E-05
n-Pentane	0.895973	0.895973	*		0.862159	1.49024E-05
2,2-Dimethylbutane	0.0155259	0.0155259	*		0.0146374	8.8775E-08
Cyclopentane	0.00184745	0.00184745	*		0.00175198	1.95766E-07
2,3-Dimethylbutane	0.034535	0.034535	*		0.0319259	4.47671E-07
2-Methylpentane	0.209303	0.209303	*		0.191876	1.56825E-06
3-Methylpentane	0.133013	0.133013	*		0.120807	2.72414E-06
n-Hexane	0.399997	0.399997	*		0.355387	2.32067E-06
Methylcyclopentane	0.0363572	0.0363572	*		0.0321681	2.306E-06
Benzene	0.00580528	0.00580528	*		0.00482541	1.69583E-05
Cyclohexane	0.0583326	0.0583326	*		0.0500311	5.50065E-06
2-Methylhexane	0.118394	0.118394	*		0.0914114	6.84766E-07
3-Methylhexane	0.125708	0.125708	*		0.0960706	7.49252E-07
2,2,4-Trimethylpentane	0	0	*		0	0
n-Heptane	0.357175	0.357175	*		0.256957	2.10775E-06
Methylcyclohexane	0.135387	0.135387	*		0.0979104	4.52623E-06
Toluene	0.0261027	0.0261027	*		0.0171004	4.95998E-05
n-Octane	0.53742	0.53742	*		0.236539	1.1702E-06
Ethylbenzene	0.0231196	0.0231196	*		0.00921607	2.49815E-05
m-Xylene	0.0240517	0.0240517	*		0.00858984	2.38603E-05
o-Xylene	0.0468409	0.0468409	*		0.0155209	5.79909E-05
n-Nonane	0.336182	0.336182	*		0.0668817	5.35961E-07
n-Decane	0.293546	0.293546	*		0.0212307	1.03114E-07
C11	0.821119	0.821119	*		0.0179872	1.13294E-07
Water	0	0	*		2.47989	99.9972

Molar Flow	Combined Stream lbmol/h	Cond lbmol/h		Condensate from Well lbmol/h	Flash lbmol/h	PW lbmol/h
Hydrogen Sulfide	0	0	*	0	0	0
Nitrogen	0.0638133	0.410758	*	0	0.41064	0.000103962
Carbon Dioxide	0.0226999	0.146116	*	0	0.144501	0.00155703
Methane	10.1713	65.4711	*	0	65.4303	0.0340217
Ethane	2.56575	16.5154	*	0	16.4941	0.0101374
Propane	1.09544	7.05121	*	0	7.02773	0.00496812
Isobutane	0.134724	0.867197	*	0	0.861081	0.000208703
n-Butane	0.370245	2.38322	*	0	2.35886	0.0012433
2,2-Dimethylpropane	0.00218448	0.0140612	*	0	0.0138658	3.47103E-06
Isopentane	0.0933928	0.601157	*	0	0.585512	0.000216461
n-Pentane	0.136415	0.878084	*	0	0.847694	0.000304253
2,2-Dimethylbutane	0.00236386	0.0152159	*	0	0.0143918	1.81246E-06
Cyclopentane	0.000281281	0.00181057	*	0	0.00172259	3.99684E-06
2,3-Dimethylbutane	0.00525807	0.0338455	*	0	0.0313902	9.1398E-06

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	Combined Stream lbmol/h	Cond lbmol/h	Condensate from Well lbmol/h	Flash lbmol/h	PW lbmol/h
2-Methylpentane	0.0318671	0.205124 *	0	0.188657	3.20179E-05
3-Methylpentane	0.0202517	0.130357 *	0	0.11878	5.5617E-05
n-Hexane	0.0609008	0.392011 *	0	0.349425	4.73796E-05
Methylcyclopentane	0.0055355	0.0356313 *	0	0.0316283	4.708E-05
Benzene	0.000883873	0.00568938 *	0	0.00474445	0.000346227
Cyclohexane	0.00888133	0.057168 *	0	0.0491917	0.000112303
2-Methylhexane	0.0180259	0.11603 *	0	0.0898777	1.39804E-05
3-Methylhexane	0.0191395	0.123198 *	0	0.0944587	1.5297E-05
2,2,4-Trimethylpentane	0	0 *	0	0	0
n-Heptane	0.054381	0.350043 *	0	0.252646	4.30325E-05
Methylcyclohexane	0.0206131	0.132683 *	0	0.0962677	9.24092E-05
Toluene	0.00397422	0.0255815 *	0	0.0168135	0.00101265
n-Octane	0.0818239	0.526689 *	0	0.232571	2.38913E-05
Ethylbenzene	0.00352003	0.022658 *	0	0.00906145	0.000510032
m-Xylene	0.00366195	0.0235715 *	0	0.00844572	0.000487141
o-Xylene	0.00713168	0.0459057 *	0	0.0152605	0.00118396
n-Nonane	0.0511849	0.32947 *	0	0.0657596	1.09424E-05
n-Decane	0.0446933	0.287685 *	0	0.0208745	2.10521E-06
C11	0.125018	0.804724 *	0	0.0176854	2.31305E-06
Water	0	0 *	0	2.43829	2041.58

Mass Fraction	Combined Stream %	Cond %	Condensate from Well %	Flash %	PW %
Hydrogen Sulfide	0	0 *		0	0
Nitrogen	0.44238	0.44238 *		0.484211	7.91799E-06
Carbon Dioxide	0.247223	0.247223 *		0.267685	0.000186302
Methane	40.3798	40.3798 *		44.1832	0.00148388
Ethane	19.092	19.092 *		20.8764	0.000828743
Propane	11.9537	11.9537 *		13.0442	0.000595608
Isobutane	1.93778	1.93778 *		2.10666	3.29795E-05
n-Butane	5.32537	5.32537 *		5.77101	0.000196467
2,2-Dimethylpropane	0.0390027	0.0390027 *		0.0421095	6.80864E-07
Isopentane	1.66748	1.66748 *		1.77817	4.24601E-05
n-Pentane	2.43562	2.43562 *		2.5744	5.96811E-05
2,2-Dimethylbutane	0.0504108	0.0504108 *		0.0522041	4.24644E-07
Cyclopentane	0.0048818	0.0048818 *		0.00508523	7.62099E-07
2,3-Dimethylbutane	0.112132	0.112132 *		0.113864	2.14138E-06
2-Methylpentane	0.679586	0.679586 *		0.684327	7.50153E-06
3-Methylpentane	0.431879	0.431879 *		0.430858	1.30306E-05
n-Hexane	1.29875	1.29875 *		1.26749	1.11006E-05
Methylcyclopentane	0.115286	0.115286 *		0.112044	1.07724E-05
Benzene	0.0170854	0.0170854 *		0.0155995	7.35276E-05
Cyclohexane	0.184969	0.184969 *		0.174262	2.56962E-05
2-Methylhexane	0.446984	0.446984 *		0.379084	3.80864E-06
3-Methylhexane	0.474597	0.474597 *		0.398406	4.16731E-06
2,2,4-Trimethylpentane	0	0 *		0	0
n-Heptane	1.34847	1.34847 *		1.0656	1.17232E-05
Methylcyclohexane	0.500853	0.500853 *		0.397867	2.46682E-05
Toluene	0.0906173	0.0906173 *		0.0652089	0.000253672
n-Octane	2.31299	2.31299 *		1.11824	7.41972E-06
Ethylbenzene	0.0924796	0.0924796 *		0.0404936	0.000147215
m-Xylene	0.0962083	0.0962083 *		0.037742	0.000140608
o-Xylene	0.187366	0.187366 *		0.0681957	0.000341738
n-Nonane	1.62456	1.62456 *		0.35501	3.81557E-06
n-Decane	1.57365	1.57365 *		0.125018	8.14362E-07
C11	4.83585	4.83585 *		0.11636	9.82971E-07
Water	0	0 *		1.84898	99.9955

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	Combined Stream lb/h	Cond lb/h	Condensate from Well lb/h	Flash lb/h	PW lb/h
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	1.78763	11.5067 *	0	11.5034	0.00291234
Carbon Dioxide	0.99901	6.4305 *	0	6.3594	0.0685243
Methane	163.172	1050.32 *	0	1049.66	0.545792
Ethane	77.1495	496.601 *	0	495.963	0.304822
Propane	48.3042	310.927 *	0	309.892	0.219072
Isobutane	7.83043	50.4034 *	0	50.048	0.0121303
n-Butane	21.5194	138.518 *	0	137.102	0.0722631
2,2-Dimethylpropane	0.157607	1.0145 *	0	1.0004	0.000250431
Isopentane	6.73818	43.3728 *	0	42.244	0.0156174
n-Pentane	9.84216	63.3527 *	0	61.1601	0.0219515
2,2-Dimethylbutane	0.203707	1.31123 *	0	1.24022	0.000156189
Cyclopentane	0.019727	0.12698 *	0	0.12081	0.00028031
2,3-Dimethylbutane	0.453116	2.91665 *	0	2.70507	0.000787626
2-Methylpentane	2.74616	17.6767 *	0	16.2576	0.00275916
3-Methylpentane	1.74519	11.2336 *	0	10.2359	0.00479281
n-Hexane	5.24815	33.7817 *	0	30.1118	0.00408295
Methylcyclopentane	0.465865	2.99871 *	0	2.66183	0.00396223
Benzene	0.069041	0.444408 *	0	0.370598	0.0270444
Cyclohexane	0.747448	4.81123 *	0	4.13995	0.00945137
2-Methylhexane	1.80623	11.6265 *	0	9.00592	0.00140086
3-Methylhexane	1.91781	12.3447 *	0	9.46495	0.00153279
2,2,4-Trimethylpentane	0	0 *	0	0	0
n-Heptane	5.44908	35.075 *	0	25.3156	0.00431194
Methylcyclohexane	2.02391	13.0277 *	0	9.45215	0.00907329
Toluene	0.366178	2.35704 *	0	1.54917	0.0933036
n-Octane	9.34662	60.163 *	0	26.5662	0.00272907
Ethylbenzene	0.373704	2.40548 *	0	0.962009	0.0541475
m-Xylene	0.388771	2.50247 *	0	0.89664	0.0517173
o-Xylene	0.757134	4.87357 *	0	1.62013	0.125695
n-Nonane	6.56472	42.2562 *	0	8.43401	0.00140341
n-Decane	6.35903	40.9322 *	0	2.97006	0.000299533
C11	19.5413	125.785 *	0	2.76437	0.000361549
Water	0	0 *	0	43.9264	36779.6

Stream Properties

Property	Units	Combined Stream	Cond	Condensate from Well	Flash	PW
Temperature	°F	48.7939	135 *	135 *	70 *	70
Pressure	psia	197.696	3914.7 *	3914.7 *	14.6959 *	14.6959
Mole Fraction Vapor	%	92.218	100		100	0
Mole Fraction Light Liquid	%	7.78205	0		0	100
Mole Fraction Heavy Liquid	%	0	0		0	0
Molecular Weight	lb/lbmol	26.5409	26.5409		24.1625	18.0156
Mass Density	lb/ft^3	1.10928	20.4182		0.0627923	62.2743
Molar Flow	lbmol/h	15.2253	98.0034	0	98.3222	2041.64
Mass Flow	lb/h	404.093	2601.1	0	2375.71	36781.3
Vapor Volumetric Flow	ft^3/h	364.283	127.391		37834.3	590.633
Liquid Volumetric Flow	gpm	45.4171	15.8825		4717.01	73.6374
Std Vapor Volumetric Flow	MMSCFD	0.138667	0.892579	0	0.895482	18.5945
Std Liquid Volumetric Flow	sgpm	2.05777	13.2456 *	0	12.5905	73.5328
Compressibility		0.866854	0.797361		0.994862	0.000747942
Specific Gravity			0.916384		0.834264	0.998482
API Gravity						10.0159
Enthalpy	Btu/h	-587672	-3.85689E+06	0	-3.69657E+06	-2.51151E+08
Mass Enthalpy	Btu/lb	-1454.3	-1482.79		-1555.99	-6828.22
Mass Cp	Btu/(lb*°F)	0.493609	0.750782		0.4585	0.983149
Ideal Gas CpCv Ratio		1.20515	1.18432		1.21953	1.32584
Dynamic Viscosity	cP		0.0411885		0.0101401	0.995648

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Combined Stream	Cond	Condensate from Well	Flash	PW
Kinematic Viscosity	cSt		0.125932		10.0812	0.998105
Thermal Conductivity	Btu/(h*ft*°F)		0.0493632		0.0159018	0.347051
Surface Tension	lbf/ft					0.00504253 ?
Net Ideal Gas Heating Value	Btu/ft^3	1424.07	1424.07		1281.18	0.0411135
Net Liquid Heating Value	Btu/lb	20265.7	20265.7		20015.8	-1058.85
Gross Ideal Gas Heating Value	Btu/ft^3	1561.05	1561.05		1408.36	50.3534
Gross Liquid Heating Value	Btu/lb	22224	22224		22013.1	0.938155

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
From Block	--	--	VSSL-101	--	MIX-101
To Block	MIX-102	MIX-102	MIX-101	MIX-100	--

Stream Composition

Mole Fraction	Sample Sep Gas %	Sample Sep Liquid %	Stable Oil %	Water %	1 %
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.452 *	0.0210002 *	0.000675288	0 *	5.76877E-06
Carbon Dioxide	0.16 *	0.0170002 *	0.00283248	0 *	7.90469E-05
Methane	71.877 *	5.37905 *	0.332056	0 *	0.00199997
Ethane	17.518 *	8.78409 *	0.537693	0 *	0.00103891
Propane	6.744 *	12.6551 *	0.897114	0 *	0.00114886
Isobutane	0.688 *	3.26903 *	0.286284	0 *	0.000299257
n-Butane	1.672 *	11.6331 *	1.12008	0 *	0.00119172
2,2-Dimethylpropane	0.01 *	0.0670007 *	0.00930194	0 *	9.56149E-06
Isopentane	0.263 *	4.85705 *	0.747714	0 *	0.000765516
n-Pentane	0.323 *	7.83508 *	1.45807	0 *	0.00148702
2,2-Dimethylbutane	0.005 *	0.143001 *	0.0398506	0 *	4.03236E-05
Cyclopentane	0.002 *	0 *	0.0040701	0 *	4.30492E-06
2,3-Dimethylbutane	0.007 *	0.368004 *	0.118548	0 *	0.000120139
2-Methylpentane	0.046 *	2.18702 *	0.796517	0 *	0.000805765
3-Methylpentane	0.026 *	1.42901 *	0.558375	0 *	0.000566482
n-Hexane	0.065 *	4.45704 *	2.06158	0 *	0.00208377
Methylcyclopentane	0.006 *	0.404004 *	0.191715	0 *	0.000195867
Benzene	0.001 *	0.0640006 *	0.0290149	0 *	4.62359E-05
Cyclohexane	0.007 *	0.680007 *	0.381115	0 *	0.000390285
2-Methylhexane	0.011 *	1.41901 *	1.26677	0 *	0.00127967
3-Methylhexane	0.01 *	1.52702 *	1.39208	0 *	0.00140625
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.025 *	4.38004 *	4.71815	0 *	0.00476576
Methylcyclohexane	0.009 *	1.66602 *	1.76036	0 *	0.00178186
Toluene	0.002 *	0.318003 *	0.375852	0 *	0.000429026
n-Octane	0.026 *	6.73107 *	14.2529	0 *	0.0143915
Ethylbenzene	0.001 *	0.291003 *	0.634217	0 *	0.000665289
m-Xylene	0.003 *	0.279003 *	0.70944	0 *	0.000740118
o-Xylene	0.001 *	0.602006 *	1.42779	0 *	0.0014995
n-Nonane	0.023 *	4.12904 *	12.7798	0 *	0.0129036
n-Decane	0.014 *	3.67904 *	12.9305	0 *	0.0130553
C11	0.003 *	10.7291 *	38.1426	0 *	0.0385105
Water	0 *	0 *	0.0370296	100 *	99.8963

Molar Flow	Sample Sep Gas lbmol/h	Sample Sep Liquid lbmol/h	Stable Oil lbmol/h	Water lbmol/h	1 lbmol/h
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.0635694 *	0.000243873 *	1.3934E-05	0 *	0.000117896
Carbon Dioxide	0.0225025 *	0.000197421 *	5.84457E-05	0 *	0.00161548
Methane	10.1088 *	0.0624664 *	0.00685167	0 *	0.0408734
Ethane	2.46374 *	0.102009 *	0.0110948	0 *	0.0212322
Propane	0.948478 *	0.146963 *	0.0185111	0 *	0.0234792
Isobutane	0.0967606 *	0.037963 *	0.00590721	0 *	0.00611591
n-Butane	0.235151 *	0.135094 *	0.0231118	0 *	0.0243551
2,2-Dimethylpropane	0.0014064 *	0.000778072 *	0.000191937	0 *	0.000195408
Isopentane	0.0369884 *	0.0564044 *	0.0154284	0 *	0.0156448
n-Pentane	0.0454268 *	0.090988 *	0.0300859	0 *	0.0303902
2,2-Dimethylbutane	0.000703202 *	0.00166066 *	0.000822281	0 *	0.000824093
Cyclopentane	0.000281281 *	0 *	8.39828E-05	0 *	8.79796E-05
2,3-Dimethylbutane	0.000984482 *	0.00427359 *	0.00244613	0 *	0.00245527

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	Sample Sep Gas lbmol/h	Sample Sep Liquid lbmol/h	Stable Oil lbmol/h	Water lbmol/h	1 lbmol/h
2-Methylpentane	0.00646946 *	0.0253977 *	0.0164354	0 *	0.0164674
3-Methylpentane	0.00365665 *	0.016595 *	0.0115216	0 *	0.0115772
n-Hexane	0.00914162 *	0.0517592 *	0.0425387	0 *	0.0425861
Methylcyclopentane	0.000843842 *	0.00469166 *	0.00395586	0 *	0.00400294
Benzene	0.00014064 *	0.000743233 *	0.000598695	0 *	0.000944922
Cyclohexane	0.000984482 *	0.00789685 *	0.00786395	0 *	0.00797626
2-Methylhexane	0.00154704 *	0.0164789 *	0.0261387	0 *	0.0261527
3-Methylhexane	0.0014064 *	0.0177331 *	0.0287243	0 *	0.0287396
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.00351601 *	0.050865 *	0.0973547	0 *	0.0973978
Methylcyclohexane	0.00126576 *	0.0193473 *	0.0363234	0 *	0.0364158
Toluene	0.000281281 *	0.00369294 *	0.00775536	0 *	0.00876801
n-Octane	0.00365665 *	0.0781672 *	0.294095	0 *	0.294119
Ethylbenzene	0.00014064 *	0.00337939 *	0.0130865	0 *	0.0135965
m-Xylene	0.000421921 *	0.00324003 *	0.0146386	0 *	0.0151258
o-Xylene	0.00014064 *	0.00699104 *	0.0294612	0 *	0.0306452
n-Nonane	0.00323473 *	0.0479501 *	0.2637	0 *	0.263711
n-Decane	0.00196896 *	0.0427243 *	0.266808	0 *	0.26681
C11	0.000421921 *	0.124596 *	0.787037	0 *	0.787039
Water	0 *	0 *	0.000764071	2044.02 *	2041.58

Mass Fraction	Sample Sep Gas %	Sample Sep Liquid %	Stable Oil %	Water %	1 %
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	0.574027 *	0.00727825 *	0.00014583	0 *	8.91436E-06
Carbon Dioxide	0.319223 *	0.00925629 *	0.000960958	0 *	0.000191899
Methane	52.2744 *	1.06761 *	0.0410652	0 *	0.00176985
Ethane	23.8799 *	3.26779 *	0.124636	0 *	0.00172321
Propane	13.4816 *	6.90398 *	0.304954	0 *	0.0027945
Isobutane	1.81284 *	2.35071 *	0.128272	0 *	0.000959462
n-Butane	4.40562 *	8.36519 *	0.501859	0 *	0.00382082
2,2-Dimethylpropane	0.0327083 *	0.0598061 *	0.00517361	0 *	3.80536E-05
Isopentane	0.860227 *	4.3355 *	0.415868	0 *	0.00304666
n-Pentane	1.05648 *	6.99375 *	0.810957	0 *	0.00591815
2,2-Dimethylbutane	0.0195336 *	0.152462 *	0.0264734	0 *	0.000191683
Cyclopentane	0.00635887 *	0 *	0.00220048	0 *	1.66544E-05
2,3-Dimethylbutane	0.027347 *	0.392349 *	0.0787533	0 *	0.000571093
2-Methylpentane	0.179709 *	2.33171 *	0.529138	0 *	0.0038303
3-Methylpentane	0.101575 *	1.52355 *	0.370937	0 *	0.00269284
n-Hexane	0.253936 *	4.7519 *	1.36954	0 *	0.00990547
Methylcyclopentane	0.0228919 *	0.420655 *	0.12438	0 *	0.000909298
Benzene	0.00354116 *	0.0618499 *	0.0174714	0 *	0.000199222
Cyclohexane	0.0267073 *	0.708033 *	0.247258	0 *	0.00181187
2-Methylhexane	0.0499686 *	1.75914 *	0.978512	0 *	0.00707321
3-Methylhexane	0.045426 *	1.89303 *	1.0753	0 *	0.00777286
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.113565 *	5.4299 *	3.64451	0 *	0.026342
Methylcyclohexane	0.0400609 *	2.0238 *	1.33242	0 *	0.0096508
Toluene	0.00835409 *	0.362501 *	0.266961	0 *	0.00218055
n-Octane	0.134641 *	9.51253 *	12.5507	0 *	0.0906821
Ethylbenzene	0.00481293 *	0.382222 *	0.519051	0 *	0.00389613
m-Xylene	0.0144388 *	0.366461 *	0.580615	0 *	0.00433435
o-Xylene	0.00481293 *	0.790714 *	1.16852	0 *	0.00878148
n-Nonane	0.133731 *	6.55181 *	12.6354	0 *	0.0912907
n-Decane	0.0903037 *	6.47621 *	14.1825	0 *	0.102465
C11	0.0212584 *	20.7483 *	45.9603	0 *	0.332049
Water	0 *	0 *	0.00514258	100 *	99.2731

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	Sample Sep Gas lb/h	Sample Sep Liquid lb/h	Stable Oil lb/h	Water lb/h	1 lb/h
Hydrogen Sulfide	0 *	0 *	0	0 *	0
Nitrogen	1.7808 *	0.00683172 *	0.000390337	0 *	0.00330267
Carbon Dioxide	0.990322 *	0.00868841 *	0.00257216	0 *	0.0710965
Methane	162.17 *	1.00212 *	0.109918	0 *	0.655709
Ethane	74.0822 *	3.06731 *	0.33361	0 *	0.638432
Propane	41.8237 *	6.48041 *	0.816259	0 *	1.03533
Isobutane	5.62394 *	2.20649 *	0.34334	0 *	0.35547
n-Butane	13.6675 *	7.85197 *	1.34331	0 *	1.41557
2,2-Dimethylpropane	0.10147 *	0.056137 *	0.013848	0 *	0.0140984
Isopentane	2.66867 *	4.06951 *	1.11314	0 *	1.12876
n-Pentane	3.27749 *	6.56467 *	2.17066	0 *	2.19261
2,2-Dimethylbutane	0.0605987 *	0.143108 *	0.0708604	0 *	0.0710166
Cyclopentane	0.019727 *	0 *	0.00588995	0 *	0.00617026
2,3-Dimethylbutane	0.0848381 *	0.368278 *	0.210796	0 *	0.211584
2-Methylpentane	0.557508 *	2.18865 *	1.41633	0 *	1.41909
3-Methylpentane	0.315113 *	1.43008 *	0.992875	0 *	0.997668
n-Hexane	0.787783 *	4.46037 *	3.66579	0 *	3.66987
Methylcyclopentane	0.0710173 *	0.394848 *	0.332923	0 *	0.336885
Benzene	0.0109857 *	0.0580553 *	0.0467652	0 *	0.0738096
Cyclohexane	0.0828535 *	0.664595 *	0.661826	0 *	0.671278
2-Methylhexane	0.155017 *	1.65121 *	2.61915	0 *	2.62055
3-Methylhexane	0.140924 *	1.77689 *	2.87823	0 *	2.87976
2,2,4-Trimethylpentane	0 *	0 *	0	0 *	0
n-Heptane	0.352311 *	5.09677 *	9.75513	0 *	9.75945
Methylcyclohexane	0.12428 *	1.89963 *	3.56645	0 *	3.57552
Toluene	0.0259168 *	0.340262 *	0.714567	0 *	0.80787
n-Octane	0.417694 *	8.92893 *	33.594	0 *	33.5968
Ethylbenzene	0.0149311 *	0.358773 *	1.38933	0 *	1.44347
m-Xylene	0.0447932 *	0.343978 *	1.55411	0 *	1.60583
o-Xylene	0.0149311 *	0.742203 *	3.12775	0 *	3.25345
n-Nonane	0.41487 *	6.14985 *	33.8208	0 *	33.8222
n-Decane	0.280148 *	6.07888 *	37.9619	0 *	37.9622
C11	0.0659497 *	19.4754 *	123.02	0 *	123.021
Water	0 *	0 *	0.013765	36823.6 *	36779.6

Stream Properties

Property	Units	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
Temperature	°F	49 *	49 *	70	75 *	70
Pressure	psia	197.696 *	197.696 *	14.6959	1014.7 *	14.6959
Mole Fraction Vapor	%	99.7899	0	0	0	0
Mole Fraction Light Liquid	%	0.210132	100	100	100	0.100964
Mole Fraction Heavy Liquid	%	0	0	0	0	99.899
Molecular Weight	lb/lbmol	22.0583	80.8281	129.721	18.0153	18.1284
Mass Density	lb/ft^3	0.856758	41.7837	45.367	62.2832	62.1071
Molar Flow	lbmol/h	14.064	1.16129	2.06341	2044.02	2043.7
Mass Flow	lb/h	310.228	93.8649	267.667	36823.6	37048.9
Vapor Volumetric Flow	ft^3/h	362.096	2.24645	5.90003	591.228	596.533
Liquid Volumetric Flow	gpm	45.1444	0.280077	0.735588	73.7115	74.373
Std Vapor Volumetric Flow	MMSCFD	0.12809 *	0.0105766	0.0187928	18.6162	18.6132
Std Liquid Volumetric Flow	sgpm	1.7661	0.291667 *	0.735244	73.6129 *	74.2681
Compressibility		0.932418	0.0700573	0.0073926	0.0511513	0.000754651
Specific Gravity			0.669943	0.727397	0.998624	0.9958
API Gravity			81.6351	61.8577	9.89088	10.3921
Enthalpy	Btu/h	-493860	-93811.7	-240115	-2.51164E+08	-2.51391E+08
Mass Enthalpy	Btu/lb	-1591.92	-999.433	-897.068	-6820.73	-6785.37
Mass Cp	Btu/(lb*°F)	0.490708	0.503909	0.489641	0.981026	0.979584
Ideal Gas CpCv Ratio		1.24402	1.06997	1.04155	1.3256	1.3236
Dynamic Viscosity	cP		0.330885	0.752205	0.947668	0.993241

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Sample Sep Gas	Sample Sep Liquid	Stable Oil	Water	1
Kinematic Viscosity	cSt		0.494367	1.03508	0.949871	0.998471
Thermal Conductivity	Btu/(h*ft*°F)		0.0697798	0.0755051	0.349407	0.344365
Surface Tension	lbf/ft		0.00118245 ?	0.00153684 ?	0.00500456	0.00500785 ?
Net Ideal Gas Heating Value	Btu/ft^3	1201.01	4125.45	6548.01	0	6.65223
Net Liquid Heating Value	Btu/lb	20588.6	19198.4	18990.2	-1059.76	-914.002
Gross Ideal Gas Heating Value	Btu/ft^3	1322.14	4454.37	7049.59	50.31	57.4201
Gross Liquid Heating Value	Btu/lb	22672.6	20741.5	20456.9	0	148.726

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Connections

	2	6			
From Block	MIX-100	VSSL-102			
To Block	VSSL-101	--			

Stream Composition

Mole Fraction	2 %	6 %			
Hydrogen Sulfide	0	0			
Nitrogen	0.0191762	0.419126			
Carbon Dioxide	0.00682141	0.149093			
Methane	3.05651	66.805			
Ethane	0.771018	16.8518			
Propane	0.329185	7.19486			
Isobutane	0.040485	0.884865			
n-Butane	0.11126	2.43177			
2,2-Dimethylpropane	0.000656445	0.0143476			
Isopentane	0.028065	0.613405			
n-Pentane	0.0409933	0.895973			
2,2-Dimethylbutane	0.000710351	0.0155259			
Cyclopentane	8.45261E-05	0.00184745			
2,3-Dimethylbutane	0.00158007	0.034535			
2-Methylpentane	0.00957621	0.209303			
3-Methylpentane	0.00608571	0.133013			
n-Hexane	0.018301	0.399997			
Methylcyclopentane	0.00166344	0.0363572			
Benzene	0.000265608	0.00580528			
Cyclohexane	0.00266888	0.0583326			
2-Methylhexane	0.00541687	0.118394			
3-Methylhexane	0.0057515	0.125708			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.0163417	0.357175			
Methylcyclohexane	0.00619431	0.135387			
Toluene	0.00119427	0.0261027			
n-Octane	0.0245884	0.53742			
Ethylbenzene	0.00105778	0.0231196			
m-Xylene	0.00110043	0.0240517			
o-Xylene	0.0021431	0.0468409			
n-Nonane	0.0153813	0.336182			
n-Decane	0.0134305	0.293546			
C11	0.0375685	0.821119			
Water	95.4247	0			

Molar Flow	2 lbmol/h	6 lbmol/h			
Hydrogen Sulfide	0	0			
Nitrogen	0.410758	0.0638133			
Carbon Dioxide	0.146116	0.0226999			
Methane	65.4711	10.1713			
Ethane	16.5154	2.56575			
Propane	7.05121	1.09544			
Isobutane	0.867197	0.134724			
n-Butane	2.38322	0.370245			
2,2-Dimethylpropane	0.0140612	0.00218448			
Isopentane	0.601157	0.0933928			
n-Pentane	0.878084	0.136415			
2,2-Dimethylbutane	0.0152159	0.00236386			
Cyclopentane	0.00181057	0.000281281			
2,3-Dimethylbutane	0.0338455	0.00525807			
2-Methylpentane	0.205124	0.0318671			
3-Methylpentane	0.130357	0.0202517			
n-Hexane	0.392011	0.0609008			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Molar Flow	2 lbmol/h	6 lbmol/h			
Methylcyclopentane	0.0356313	0.0055355			
Benzene	0.00568938	0.000883873			
Cyclohexane	0.057168	0.00888133			
2-Methylhexane	0.11603	0.0180259			
3-Methylhexane	0.123198	0.0191395			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.350043	0.054381			
Methylcyclohexane	0.132683	0.0206131			
Toluene	0.0255815	0.00397422			
n-Octane	0.526689	0.0818239			
Ethylbenzene	0.022658	0.00352003			
m-Xylene	0.0235715	0.00366195			
o-Xylene	0.0459057	0.00713168			
n-Nonane	0.32947	0.0511849			
n-Decane	0.287685	0.0446933			
C11	0.804724	0.125018			
Water	2044.02	0			

Mass Fraction	2 %	6 %			
Hydrogen Sulfide	0	0			
Nitrogen	0.0291866	0.44238			
Carbon Dioxide	0.0163109	0.247223			
Methane	2.66412	40.3798			
Ethane	1.25962	19.092			
Propane	0.788663	11.9537			
Isobutane	0.127847	1.93778			
n-Butane	0.351348	5.32537			
2,2-Dimethylpropane	0.00257326	0.0390027			
Isopentane	0.110014	1.66748			
n-Pentane	0.160693	2.43562			
2,2-Dimethylbutane	0.00332592	0.0504108			
Cyclopentane	0.000322084	0.0048818			
2,3-Dimethylbutane	0.00739804	0.112132			
2-Methylpentane	0.0448366	0.679586			
3-Methylpentane	0.0284938	0.431879			
n-Hexane	0.0856867	1.29875			
Methylcyclopentane	0.00760618	0.115286			
Benzene	0.00112723	0.0170854			
Cyclohexane	0.0122036	0.184969			
2-Methylhexane	0.0294904	0.446984			
3-Methylhexane	0.0313122	0.474597			
2,2,4-Trimethylpentane	0	0			
n-Heptane	0.0889673	1.34847			
Methylcyclohexane	0.0330445	0.500853			
Toluene	0.0059786	0.0906173			
n-Octane	0.152602	2.31299			
Ethylbenzene	0.00610147	0.0924796			
m-Xylene	0.00634747	0.0962083			
o-Xylene	0.0123617	0.187366			
n-Nonane	0.107182	1.62456			
n-Decane	0.103824	1.57365			
C11	0.319052	4.83585			
Water	93.4024	0			

Mass Flow	2 lb/h	6 lb/h			
Hydrogen Sulfide	0	0			
Nitrogen	11.5067	1.78763			
Carbon Dioxide	6.4305	0.99901			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Mass Flow	2 lb/h	6 lb/h			
Methane	1050.32	163.172			
Ethane	496.601	77.1495			
Propane	310.927	48.3042			
Isobutane	50.4034	7.83043			
n-Butane	138.518	21.5194			
2,2-Dimethylpropane	1.0145	0.157607			
Isopentane	43.3728	6.73818			
n-Pentane	63.3527	9.84216			
2,2-Dimethylbutane	1.31123	0.203707			
Cyclopentane	0.12698	0.019727			
2,3-Dimethylbutane	2.91665	0.453116			
2-Methylpentane	17.6767	2.74616			
3-Methylpentane	11.2336	1.74519			
n-Hexane	33.7817	5.24815			
Methylcyclopentane	2.99871	0.465865			
Benzene	0.444408	0.069041			
Cyclohexane	4.81123	0.747448			
2-Methylhexane	11.6265	1.80623			
3-Methylhexane	12.3447	1.91781			
2,2,4-Trimethylpentane	0	0			
n-Heptane	35.075	5.44908			
Methylcyclohexane	13.0277	2.02391			
Toluene	2.35704	0.366178			
n-Octane	60.163	9.34662			
Ethylbenzene	2.40548	0.373704			
m-Xylene	2.50247	0.388771			
o-Xylene	4.87357	0.757134			
n-Nonane	42.2562	6.56472			
n-Decane	40.9322	6.35903			
C11	125.785	19.5413			
Water	36823.6	0			

Stream Properties

Property	Units	2	6			
Temperature	°F	75.0419	135			
Pressure	psia	1014.7	3914.7			
Mole Fraction Vapor	%	3.65604	100			
Mole Fraction Light Liquid	%	0.798874	0			
Mole Fraction Heavy Liquid	%	95.5451	0			
Molecular Weight	lb/lbmol	18.4053	26.5409			
Mass Density	lb/ft^3	41.4496	20.4182			
Molar Flow	lbmol/h	2142.02	15.2253			
Mass Flow	lb/h	39424.6	404.093			
Vapor Volumetric Flow	ft^3/h	951.147	19.7908			
Liquid Volumetric Flow	gpm	118.585	2.46743			
Std Vapor Volumetric Flow	MMSCFD	19.5087	0.138667			
Std Liquid Volumetric Flow	sgpm	86.8585	2.05777			
Compressibility		0.0785192	0.797361			
Specific Gravity			0.916384			
API Gravity						
Enthalpy	Btu/h	-2.5502E+08	-599187			
Mass Enthalpy	Btu/lb	-6468.55	-1482.79			
Mass Cp	Btu/(lb*°F)	0.961238	0.750782			
Ideal Gas CpCv Ratio		1.31635	1.18432			
Dynamic Viscosity	cP		0.0411885			
Kinematic Viscosity	cSt		0.125932			
Thermal Conductivity	Btu/(h*ft*°F)		0.0493632			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	65.155	1424.07			
Net Liquid Heating Value	Btu/lb	347.215	20265.7			

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	2	6			
Gross Ideal Gas Heating Value	Btu/ft^3	119.431	1561.05			
Gross Liquid Heating Value	Btu/lb	1466.26	22224			

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!2

Warning: The temperature of 75.0419 °F is within 10 °F of hydrate formation.

Remarks

Energy Stream Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-2	-11515.7 Btu/h	-4.52582 hp	--	VSSL-102
Q-3	-66963.1 Btu/h	-26.3175 hp	--	VSSL-101

Remarks

Blocks
MIX-100
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	Modified: 11:14 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:45 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Cond	Inlet		Water	Inlet	
2	Outlet	VSSL-101			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 2	100 %

Remarks

Blocks
MIX-101
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	Modified: 10:34 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:45 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
PW	Inlet	VSSL-101	Stable Oil	Inlet	VSSL-101
1	Outlet				

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 1	100 %

Remarks

Blocks
MIX-102
Mixer/Splitter Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	Modified: 10:05 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 10:15 AM, 5/18/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Sample Sep Liquid	Inlet		Sample Sep Gas	Inlet	
Combined Stream	Outlet	VSSL-102			

Block Parameters

Pressure Drop	0 psi	Fraction to PStream Combined Stream	100 %

Remarks

Blocks
VSSL-101
Separator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	Modified: 11:14 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 9:45 AM, 5/21/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
2	Inlet	MIX-100	Flash	Vapor Outlet	
Stable Oil	Light Liquid Outlet	MIX-101	PW	Heavy Liquid Outlet	MIX-101
Q-3	Energy				

Block Parameters

Pressure Drop	1000	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	4.59016	%	Heat Duty	-66963.1	Btu/h
Mole Fraction Light Liquid	0.0963299	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	95.3135	%	Heat Release Curve Increments	5	

Remarks

Blocks
VSSL-102
Separator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	Modified: 10:20 AM, 5/18/2015
Flowsheet:	Flowsheet1	Status: Solved 4:22 PM, 5/18/2015

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Combined Stream	Inlet	MIX-102	6	Vapor Outlet	
Condensate from Well	Light Liquid Outlet		Q-2	Energy	

Block Parameters

Pressure Drop	-3717	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	100	%	Heat Duty	-11515.7	Btu/h
Mole Fraction Light Liquid	0	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0	%	Heat Release Curve Increments	5	

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!Blocks!VSSL-102!Properties!PDrop

Warning: A negative pressure drop of -3717 psi was encountered in block VSSL-102.

Remarks

Flowsheet Environment
Environment1

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	
Flowsheet:	Flowsheet1	

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	1 %

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Hydrogen Sulfide	False	False	Methylcyclopentane	False	False
Nitrogen	False	False	Benzene	False	False
Carbon Dioxide	False	False	Cyclohexane	False	False
Methane	False	False	2-Methylhexane	False	False
Ethane	False	False	3-Methylhexane	False	False
Propane	False	False	2,2,4-Trimethylpentane	False	False
Isobutane	False	False	n-Heptane	False	False
n-Butane	False	False	Methylcyclohexane	False	False
2,2-Dimethylpropane	False	False	Toluene	False	False
Isopentane	False	False	n-Octane	False	False
n-Pentane	False	False	Ethylbenzene	False	False
2,2-Dimethylbutane	False	False	m-Xylene	False	False
Cyclopentane	False	False	o-Xylene	False	False
2,3-Dimethylbutane	False	False	n-Nonane	False	False
2-Methylpentane	False	False	n-Decane	False	False
3-Methylpentane	False	False	C11	False	False
n-Hexane	False	False	Water	False	True

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Calculator Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	

Simple Solver 1

Source Code

Residual Error (for CV1) = Water/99-1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	2523.87
Unit	bbl/d

Measured Variable [Water]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!1!Phases!Total!Composition!Std. Liquid Volumetric Fraction!Water
Value	98.9996
Unit	%

Solver Properties

Status: Solved

Error	-3.6305E-06		Iterations	5
Calculated Value	73.6129	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

Simple Solver 2

Source Code

Residual Error (for CV1) = Thruput/929412-1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Cond!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	454.135
Unit	bbl/d

Measured Variable [Thruput]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!1!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	929412
Unit	bbl/year

Solver Properties

Status: Solved

Error	-3.54759E-08		Iterations	5
Calculated Value	13.2456	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	

Tank-1

User Value [BlockReady]

* Parameter	1	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [ShellLength]

* Parameter	20	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds	False	

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds	False	

User Value [BreatherVP]

* Parameter	0.03	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [BreatherVacP]

* Parameter	-0.03	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [DomeRadius]

Parameter		ft	Upper Bound		ft
Lower Bound		ft	* Enforce Bounds	False	

User Value [OpPress]

* Parameter	0.5	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [AnnNetTP]

* Parameter	25.0827	bbl/day	Upper Bound		bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False	

User Value [OREff]

* Parameter	0	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [MaxAvgT]

* Parameter	59.9	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [MinAvgT]

* Parameter	40.7	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [AvgP]

* Parameter	14.1085	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	

User Value [ThermI]

* Parameter	1069	Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	9.1	mi/h	Upper Bound	mi/h
Lower Bound		mi/h	* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	14.1085	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [TVP]

* Parameter	1.96554	psia	Upper Bound	psia
Lower Bound		psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	60.2465	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	70.3624	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	0.391509	lb/h	Upper Bound	lb/h
Lower Bound		lb/h	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0218823	lb/h	Upper Bound	lb/h
Lower Bound		lb/h	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.0564195	lb/h	Upper Bound	lb/h
Lower Bound		lb/h	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	0.0660766	lb/h	Upper Bound	lb/h
Lower Bound		lb/h	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr

User Value Sets Report

Client Name:	Chevron Appalachia, LLC	Job: 929,412 bbls/yr PW Production Blowdown
Location:	Francis Wellpad	

User Value [DeckSeamLosses]

Lower Bound	ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0532621 kg/mol	Upper Bound	kg/mol
Lower Bound	kg/mol	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={4DEAFC69-B549-4E7C-957A-1D44EDE2D6E4}

Cn+ Flow/Frac.15

User Value [CnPlusSum]

* Parameter	3365.12 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={E2913DB8-B3A4-45CF-8EF6-021564A4B5AF}

Retrograde Gas PVT Fluid Study
for

AB Resources, LLC

Cavenney No. 1-H

Wildcat
Marshall County, West Virginia

FESCO, Ltd.
Petroleum Engineers

Table of Contents

February 15, 2010

Mr. Mark Deal
AB Resources, LLC
6802 W. Snowville Road, Suite E
Brecksville, Ohio 44141

Re:		
	Well:	Cavenney No. 1-H
	Field:	Wildcat
	Location:	Marshall County, West Virginia
	Formation:	Marcellus Shale
	Perforations:	Horizontal Completion; Datum - Unavailable
	Test Type:	Retrograde Gas PVT Fluid Study

Dear Mr. Deal:

The attached report contains results from a laboratory study performed on the recombined separator fluids from the subject well. The study determined the type and character of the reservoir fluid. The fluid study was performed using first-stage separator gas and oil samples obtained from the well on December 16, 2009 by FESCO, Ltd. FESCO then delivered the separator samples to its PVT laboratory in Alice, Texas. Extended compositional analyses were performed on the separator gas (C_{11+}) and on the separator oil (C_{31+}) samples. Tables 1-A through 1-C list the compositional analyses of the separator gas, separator oil and mathematically recombined wellstream fluid through C_{7+}, C_{11+} and C_{31+}, respectively. The Appendix contains the Report of Water Analysis. Table 2 reports the fluid properties measured as the separator oil was flashed from separator conditions to ambient laboratory conditions.

The separator gas and oil were physically recombined in a visual PVT cell at the reservoir temperature of 135 °F and at the reported gas-oil ratio of 12809 Scf/Sep Bbl (18000 Scf/STB). The recombined fluid was evaluated during a Constant Composition Expansion (CCE) process at pressures ranging from 7000 to 825 psig. The resulting CCE data is reported in Table 3. ***A retrograde dew point was observed at 2981 psig.*** The static reservoir pressure is higher than the observed retrograde dew point pressure. Therefore, the reservoir fluid exists as undersaturated (single-phase) gas at static reservoir conditions of 3900 psig and 135 °F. Figures 1 through 7 illustrate the data reported in Table 3.

A constant volume depletion (CVD) study was performed on the reservoir fluid to model wellstream production below the dew point. A CVD study consists of a series of expansions and constant pressure displacements terminating at the original saturated reservoir (dew point) volume. Table 4 provides the displaced wellstream volume and compositional analysis measured at each depletion pressure. The abandonment CVD residual oil composition is reported in the Appendix. Figures 8 and 10 illustrate the gas deviation factors (equilibrium gas and 2-phase) and cumulative produced wellstream volume, respectively, versus pressure as reported in Table 4. Figure 9 shows the corresponding P/Z (equilibrium gas and 2-phase) versus cumulative produced wellstream percent. Figure 11 presents the C_{3+}, C_{4+} and C_{5+} GPM content of the wellstream gas at each depletion pressure.

The cumulative stock tank oil and sales gas recoveries using normal-temperature single-stage separation were calculated from the produced wellstream volumes and their corresponding compositions. The plant liquid products produced during the single-stage separation were also calculated. The total plant products in the wellstream were then determined. The results are shown in Table 5. All recoveries are based on one MMscf of original reservoir fluid at the retrograde dew point and 100 percent plant efficiency.

Table 6 contains the cumulative retrograde liquid volume that condensed during the CVD process at reservoir temperature (135 °F). The maximum observed volume of condensed retrograde liquid was 5.155 percent of the hydrocarbon pore space at 1500 psig. Figures 12 and 13 illustrate the condensed retrograde liquid volume reported in Table 6 versus pressure.

Thank you for this opportunity to serve AB Resources, LLC. Please call me if you have any questions or concerns regarding this report.

Sincerely,

FESCO, Ltd.

Armando Ramirez
Natural Gas Engineer
Alice, Texas
Phone: 361-661-7015
Email:Armando.Ramirez@FescoInc.com

Eddie Bickham, P. E.
Vice - President
Alice, Texas
Phone: 361-661-7000 Ext. 115
Email: Ed.Bickham@FescoInc.com

WELL SUMMARY

WELL INFORMATION

Company:	AB Resources, LLC
Well Name:	Cavenney No. 1-H
Field:	Wildcat
Location:	Marshall County, West Virginia

RESERVOIR INFORMATION

Formation:	Marcellus Shale
Perforations:	Horizontal Completion
Reservoir Datum:	Unavailable
Reservoir Temperature:	135 °F
Static Reservoir Pressure:	3900 psig
Flowing Reservoir Pressure:	Unavailable

SAMPLE INFORMATION

Sampling Date:	12/16/2009
Sampled By:	FESCO, Ltd. - Shinnston, West Virginia
Sample Type:	1st-Stage Separator Gas and Oil
Flowing Tubing Pressure:	1625 psig
1st Stage Separator Pressure:	183 psig
1st Stage Separator Temperature:	49 °F
2nd Stage Separator Pressure:	Not Present
2nd Stage Separator Temperature:	Not Present

PRODUCTION INFORMATION

Test Date:	12/16/2009
1st Stage Separator Gas Rate:	4500 Mcf/d
Stock Tank Oil Rate:	250.00 STB/d
Water Rate:	45.00 STB/d
Stock Tank Gas-Oil Ratio:	18000 Scf 1st Stage Gas / STB
Separator Gas-Oil Ratio:	12809 Scf 1st Stage Gas / Sep Bbl
Separator Oil Volume Factor:	1.40521 Sep Oil Vol / STO Vol

RESULTS SUMMARY

Company:	AB Resources, LLC
Well:	Cavenney No. 1-H
Type of Test:	Retrograde Gas PVT Fluid Study
Reservoir Fluid Type:	Undersaturated Gas
Saturation Conditions:	
Pressure (Retrograde Dew Point):	2981 psig
Temperature:	135 °F
Gas Deviation Factor (Z):	0.71982
Gas Expansion Factor:	1.36145 Mscf/Bbl
Reservoir Conditions:	
Pressure:	3900 psig
Temperature:	135 °F
Gas Deviation Factor (Z):	0.82737
Gas Expansion Factor:	1.54962 Mscf/Bbl
Report Date:	2/15/2010

SAMPLE SUMMARY

Company:	AB Resources, LLC
Well:	Cavenney No. 1-H
Sample Date:	12/16/09

Separator Conditions

Pressure:	183 psig
Temperature:	49 °F

Laboratory Quality Test

Separator Gas:	Pressure	Temperature
Cylinder ID No. W-1017*	182 psig	74 °F
Cylinder ID No. W-1006	182 psig	74 °F

Separator Liquid:	BP Pressure	Temperature
Cylinder ID No. W-1003*	213 psig	74 °F
Cylinder ID No. W-1001	211 psig	74 °F

Report Date: 2/15/2010

* Samples used in fluid study

AB Resources, LLC
Cavenney No. 1-H

TABLE 1-A

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{7+}

SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

	SEPARATOR GAS		SEPARATOR OIL		WELLSTREAM	
Component	Mole%	* GPM	Mole %	Liquid Volume %	Mole %	* GPM
Hydrogen Sulfide	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.452	0.000	0.021	0.006	0.420	0.000
Carbon Dioxide	0.160	0.000	0.017	0.007	0.149	0.000
Methane	71.877	0.000	5.379	2.282	66.896	0.000
Ethane	17.518	4.723	8.784	5.880	16.864	4.547
Propane	6.744	1.871	12.655	8.716	7.187	1.994
Iso-butane	0.688	0.227	3.269	2.676	0.881	0.291
N-butane	1.672	0.531	11.633	9.175	2.418	0.768
2-2 Dimethylpropane	0.010	0.004	0.067	0.065	0.014	0.006
Iso-pentane	0.263	0.097	4.857	4.448	0.607	0.224
N-pentane	0.323	0.118	7.835	7.104	0.886	0.323
2-2 Dimethylbutane	0.005	0.002	0.143	0.149	0.015	0.006
Cyclopentane	0.002	0.001	0.000	0.000	0.002	0.001
2-3 Dimethylbutane	0.007	0.003	0.368	0.378	0.034	0.014
2 Methylpentane	0.046	0.019	2.187	2.272	0.206	0.086
3 Methylpentane	0.026	0.011	1.429	1.460	0.131	0.054
Other Hexanes	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.065	0.027	4.457	4.587	0.394	0.163
Heptanes Plus	0.142	0.067	36.897	50.795	2.895	1.595
TOTAL	100.000	7.701	100.000	100.000	100.000	10.072

HEPTANES PLUS (C_{7+}) FRACTION CHARACTERISTICS

	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***
Gas	N/A	3.8011	110.090	21.105	5,870
Oil	51.918	0.7715	133.929	18.035	127,239
Wellstream	N/A	0.7703	132.848	18.155	N/A

TOTAL SAMPLE CHARACTERISTICS

	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value	
					Dry	Saturated
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***	***
Gas	N/A	0.7648	22.058	129.858	1,342	1,319
Oil	81.486	0.6644	83.781	24.828	N/A	112,792
Wellstream	N/A	0.9212	26.681	46.354	N/A	N/A

* GPM (gallons per Mscf) determined at 14.85 psia and 60 °F

** Gas specific gravity and wellstream specific gravity determined relative to air (SG=1.000).
Oil specific gravity determined relative to water (SG=1.000).

*** Gross Heating Value units for gas (real basis) and oil are BTU/Scf and BTU/Gal, respectively.

TABLE 1-B

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{11+}

SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

	SEPARATOR GAS		SEPARATOR OIL		WELLSTREAM	
Component	Mole%	* GPM	Mole %	Liquid Volume %	Mole %	* GPM
Hydrogen Sulfide	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.452	0.000	0.021	0.006	0.420	0.000
Carbon Dioxide	0.160	0.000	0.017	0.007	0.149	0.000
Methane	71.877	0.000	5.379	2.282	66.896	0.000
Ethane	17.518	4.723	8.784	5.880	16.864	4.547
Propane	6.744	1.871	12.655	8.716	7.187	1.994
Iso-butane	0.688	0.227	3.269	2.676	0.881	0.291
N-butane	1.672	0.531	11.633	9.175	2.418	0.768
2-2 Dimethylpropane	0.010	0.004	0.067	0.065	0.014	0.006
Iso-pentane	0.263	0.097	4.857	4.448	0.607	0.224
N-pentane	0.323	0.118	7.835	7.104	0.886	0.323
2-2 Dimethylbutane	0.005	0.002	0.143	0.149	0.015	0.006
Cyclopentane	0.002	0.001	0.000	0.000	0.002	0.001
2-3 Dimethylbutane	0.007	0.003	0.368	0.378	0.034	0.014
2 Methylpentane	0.046	0.019	2.187	2.272	0.206	0.086
3 Methylpentane	0.026	0.011	1.429	1.460	0.131	0.054
Other Hexanes	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.065	0.027	4.457	4.587	0.394	0.163
Methylcyclopentane	0.006	0.002	0.404	0.358	0.036	0.013
Benzene	0.001	0.000	0.064	0.045	0.006	0.002
Cyclohexane	0.007	0.002	0.680	0.579	0.057	0.020
2-Methylhexane	0.011	0.005	1.419	1.651	0.116	0.055
3-Methylhexane	0.010	0.005	1.527	1.754	0.124	0.057
2,2,4 Trimethylpentane	0.000	0.000	0.000	0.000	0.000	0.000
Other Heptanes	0.009	0.004	1.202	1.309	0.098	0.043
n-Heptane	0.016	0.007	3.178	3.669	0.253	0.118
Methylcyclohexane	0.009	0.004	1.666	1.676	0.133	0.054
Toluene	0.002	0.001	0.318	0.267	0.026	0.009
Other C-8's	0.018	0.009	4.694	5.507	0.368	0.174
n-Octane	0.008	0.004	2.037	2.611	0.160	0.083
Ethylbenzene	0.001	0.000	0.291	0.281	0.023	0.009
M&P-Xylene	0.003	0.001	0.279	0.271	0.024	0.009
O-Xylene	0.001	0.000	0.602	0.573	0.046	0.018
Other C-9's	0.017	0.009	2.861	3.749	0.230	0.121
n-Nonane	0.006	0.003	1.268	1.786	0.101	0.057
Other C10's	0.012	0.007	2.882	4.150	0.227	0.132
n-Decane	0.002	0.001	0.797	1.224	0.062	0.038
Undecanes Plus	0.003	0.002	10.728	19.334	0.806	0.585
TOTAL	100.000	7.701	100.000	100.000	100.000	10.072

TABLE 1-B

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{11+}

SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

UNDECANES PLUS (C_{11+}) FRACTION CHARACTERISTICS					
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***
Gas	N/A	0.8250	156.000	16.558	8,400
Oil	40.935	0.8206	186.500	13.776	129,700
Wellstream	N/A	0.8206	186.396	13.784	N/A

TOTAL SAMPLE CHARACTERISTICS						
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value	
					Dry	Saturated
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***	***
Gas	N/A	0.7648	22.058	129.858	1,342	1,319
Oil	81.486	0.6644	83.781	24.828	N/A	112,792
Wellstream	N/A	0.9212	26.681	46.354	N/A	N/A

* GPM (gallons per Mscf) determined at 14.85 psia and 60 °F

** Gas specific gravity and wellstream specific gravity determined relative to air (SG=1.000).
Oil specific gravity determined relative to water (SG=1.000).

*** Gross Heating Value units for gas (real basis) and oil are BTU/Scf and BTU/Gal, respectively.

TABLE 1-C

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{31+}

SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

	SEPARATOR GAS		SEPARATOR OIL		WELLSTREAM	
Component	Mole%	* GPM	Mole %	Liquid Volume %	Mole %	* GPM
Hydrogen Sulfide	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.452	0.000	0.021	0.006	0.420	0.000
Carbon Dioxide	0.160	0.000	0.017	0.007	0.149	0.000
Methane	71.877	0.000	5.379	2.281	66.896	0.000
Ethane	17.518	4.723	8.784	5.880	16.864	4.547
Propane	6.744	1.871	12.655	8.715	7.187	1.994
Iso-butane	0.688	0.227	3.269	2.675	0.881	0.291
N-butane	1.672	0.531	11.633	9.174	2.418	0.768
2-2 Dimethylpropane	0.010	0.004	0.067	0.065	0.014	0.006
Iso-pentane	0.263	0.097	4.857	4.448	0.607	0.224
N-pentane	0.323	0.118	7.835	7.104	0.886	0.323
2-2 Dimethylbutane	0.005	0.002	0.143	0.149	0.015	0.006
Cyclopentane	0.002	0.001	0.000	0.000	0.002	0.001
2-3 Dimethylbutane	0.007	0.003	0.368	0.378	0.034	0.014
2 Methylpentane	0.046	0.019	2.187	2.272	0.206	0.086
3 Methylpentane	0.026	0.011	1.429	1.460	0.131	0.054
Other Hexanes	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.065	0.027	4.457	4.587	0.394	0.163
Methylcyclopentane	0.006	0.002	0.404	0.358	0.036	0.013
Benzene	0.001	0.000	0.064	0.045	0.006	0.002
Cyclohexane	0.007	0.002	0.680	0.579	0.057	0.020
2-Methylhexane	0.011	0.005	1.419	1.650	0.116	0.055
3-Methylhexane	0.010	0.005	1.527	1.754	0.124	0.057
2,2,4 Trimethylpentane	0.000	0.000	0.000	0.000	0.000	0.000
Other Heptanes	0.009	0.004	1.202	1.309	0.098	0.043
n-Heptane	0.016	0.007	3.178	3.669	0.253	0.118
Methylcyclohexane	0.009	0.004	1.666	1.676	0.133	0.054
Toluene	0.002	0.001	0.318	0.267	0.026	0.009
Other C-8's	0.018	0.009	4.694	5.507	0.368	0.174
n-Octane	0.008	0.004	2.037	2.611	0.160	0.083
Ethylbenzene	0.001	0.000	0.291	0.281	0.023	0.009
M&P-Xylene	0.003	0.001	0.279	0.271	0.024	0.009
O-Xylene	0.001	0.000	0.602	0.573	0.046	0.018
Other C-9's	0.017	0.009	2.861	3.748	0.230	0.121
n-Nonane	0.006	0.003	1.268	1.786	0.101	0.057
Other C10's	0.012	0.007	2.882	4.149	0.227	0.132
n-Decane	0.002	0.001	0.797	1.224	0.062	0.038
Undecanes	0.000	0.000	2.793	4.125	0.209	0.124
Dodecanes	0.000	0.000	2.024	3.230	0.152	0.097
Tridecanes	0.000	0.000	1.575	2.695	0.118	0.081

TABLE 1-C

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{31+}

SEPARATOR GOR.....: 12809 Scf/Sep Bbl
SEPARATOR PRESSURE.....: 183 psig
SEPARATOR TEMPERATURE.....: 49 °F

	SEPARATOR GAS		SEPARATOR OIL		WELLSTREAM	
Component	Mole%	* GPM	Mole %	Liquid Volume %	Mole %	* GPM
Tetradecanes	0.003	0.002	1.170	2.145	0.090	0.067
Pentadecanes	0.000	0.000	0.866	1.701	0.065	0.051
Hexadecanes	0.000	0.000	0.620	1.300	0.046	0.039
Heptadecanes	0.000	0.000	0.465	1.031	0.035	0.031
Octadecanes	0.000	0.000	0.342	0.800	0.026	0.024
Nonadecanes	0.000	0.000	0.261	0.636	0.020	0.019
Eicosanes	0.000	0.000	0.184	0.465	0.014	0.014
Heneicosanes	0.000	0.000	0.138	0.368	0.010	0.011
Docosanes	0.000	0.000	0.102	0.283	0.008	0.009
Tricosanes	0.000	0.000	0.068	0.195	0.005	0.006
Tetracosanes	0.000	0.000	0.049	0.146	0.004	0.004
Pentacosanes	0.000	0.000	0.033	0.101	0.002	0.003
Hexacosanes	0.000	0.000	0.021	0.066	0.002	0.002
Heptacosanes	0.000	0.000	0.010	0.032	0.001	0.001
Octacosanes	0.000	0.000	0.003	0.011	0.000	0.000
Nonacosanes	0.000	0.000	0.002	0.006	0.000	0.000
Triacontanes	0.000	0.000	0.001	0.003	0.000	0.000
Hentriacontanes Plus	0.000	0.000	0.002	0.007	0.000	0.000
TOTALS	100.000	7.701	100.000	100.000	100.000	10.072

TOTAL SAMPLE CHARACTERISTICS						
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value	
					Dry	Saturated
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***	***
Gas	N/A	0.7648	22.058	129.858	1,342	1,319
Oil	81.486	0.6644	83.781	24.828	N/A	112,792
Wellstream	N/A	0.9212	26.681	46.354	N/A	N/A

* GPM (gallons per Mscf) determined at 14.85 psia and 60 °F

** Gas specific gravity and wellstream specific gravity determined relative to air (SG=1.000).
Oil specific gravity determined relative to water (SG=1.000).

*** Gross Heating Value units for gas (real basis) and oil are BTU/Scf and BTU/Gal, respectively.

AB Resources, LLC
Cavenney No. 1-H

HOFFMAN PLOT

EQUILIBRIUM CHECK of SEPARATOR LIQUID and GAS COMPOSITIONAL ANALYSES

Separator Pressure = 183 psig
Separator Temperature = 49 °F

Components	Gas (X) Mole %	Oil (Y) Mole %	Equil. Ratio (K=Y/X)	K*Psep (psiA)	Normal BP (NBP) °R	$T_{NBP}^{-1} - T_{SEP}^{-1}$	Critical Pressure (Pc) psiA	Critical Temperature (Tc) °R	B-Factor	Graph Results	
										B(1/Tb-1/Tsp)	Log(K*Psep)
N2	0.452	0.021	21.591	4271.85	139	0.005213	493	227	548	2.859	3.631
CO2	0.160	0.017	9.339	1847.75	350	0.000888	1071	548	1806	1.603	3.267
C1	71.877	5.379	13.363	2643.95	201	0.003009	668	343	803	2.415	3.422
C2	17.518	8.784	1.994	394.56	332	0.001044	708	550	1408	1.470	2.596
C3	6.744	12.655	0.533	105.44	416	0.000438	616	666	1793	0.785	2.023
IC4	0.688	3.269	0.210	41.64	471	0.000159	529	735	2030	0.323	1.620
NC4	1.672	11.633	0.144	28.44	491	0.000071	551	765	2150	0.153	1.454
IC5	0.273	4.924	0.055	10.97	542	-0.000120	490	829	2373	-0.285	1.040
NC5	0.323	7.835	0.041	8.16	557	-0.000169	489	845	2474	-0.418	0.911
C6	0.151	8.585	0.018	3.48	615	-0.000341	437	913	2773	-0.945	0.542
C7+	0.142	36.897	0.004	0.76	763	-0.000656	332	1070	3592	-2.355	-0.118
Total	100.000	100.000									

(Note: C7+ Critical Properties as C9. The C6 composition includes iso-hexanes.)

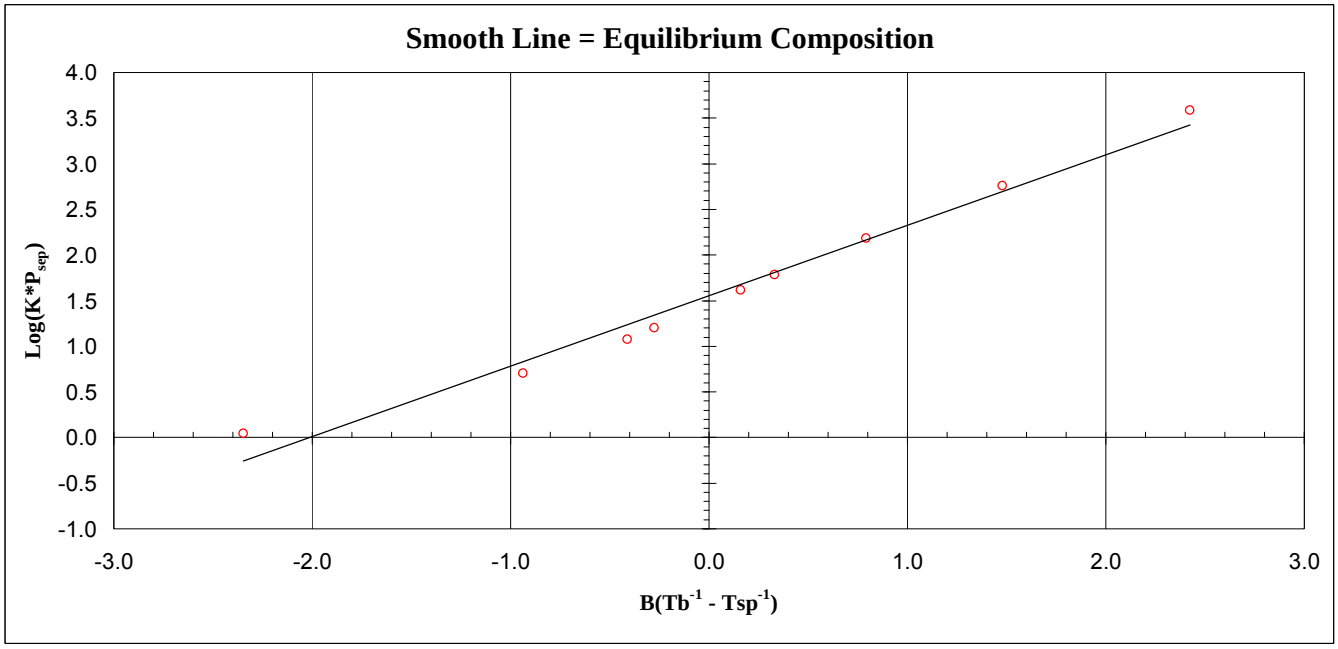


TABLE 2

FLASH LIBERATION OF 1st-STAGE SEPARATOR LIQUID

SEPARATOR CONDITIONS and FLUID PROPERTIES						
Conditions	**Pressure psia**	**Temperature °F**	**GOR (1)**	**Separator Oil Volume Factor (2)**	**Oil Specific Gravity (3)**	**Gas Specific Gravity (4)**
1st Stage Separator	198	49	N/A	1.4052	0.6644	0.7648
Ambient Lab Conditions	14.66	72	599	1.0079	0.7271	1.5557
Stock Tank	14.85	60	0	1.0000	0.7325	1.5557
TOTALS	-----	-----	599		-----	-----

Stock Tank Oil Gravity: 61.67 °API at 60 °F

(1) Gas-Oil Ratio (GOR) is the cubic feet of gas at standard conditions per barrel of stock tank oil.
(2) Barrels of oil at indicated separator conditions per barrel of stock tank oil.
(3) Water = 1.000
(4) Air = 1.000

TABLE 3

PRESSURE-VOLUME RELATION OF A 12809 Scf/Sep Bbl RESERVOIR FLUID AT 135 °F (Constant Composition Expansion)

Pressure, (psig)		Relative Volume	Density, (g/cc)	Y-Function (1)	Retrograde Liquid Volume		Gas Deviation Factor, Z	Gas Expansion Factor, (4)
					% of HC Pore Volume (2)	Bbls / MMscf (3)		
7000		0.73253	0.38172	N/A	N/A	N/A	1.23466	1.86386
6000		0.76244	0.36674	N/A	N/A	N/A	1.10188	1.79010
5500		0.78155	0.35777	N/A	N/A	N/A	1.03560	1.74594
5000		0.80470	0.34748	N/A	N/A	N/A	0.96960	1.69526
4500		0.83347	0.33549	N/A	N/A	N/A	0.90413	1.63622
3900	Pres	0.87960	0.31789	N/A	N/A	N/A	0.82737	1.54962
3500		0.92162	0.30340	N/A	N/A	N/A	0.77832	1.47832
2981	Psat	1.00000	0.27962	N/A	0.00%	0.000	0.71982	1.36145
2857		1.02540	N/A	1.69980	0.82%	5.949	N/A	N/A
2778		1.04372	N/A	1.66249	1.31%	9.529	N/A	N/A
2644		1.08087	N/A	1.56722	2.16%	15.738	N/A	N/A
2436		1.15641	N/A	1.42176	3.22%	23.534	N/A	N/A
2277		1.23289	N/A	1.31899	3.89%	28.356	N/A	N/A
2147		1.30992	N/A	1.24476	4.46%	32.572	N/A	N/A
1896		1.50408	N/A	1.12644	5.24%	38.261	N/A	N/A
1710		1.69953	N/A	1.05338	5.57%	40.629	N/A	N/A
1440		2.09247	N/A	0.96956	5.67%	41.380	N/A	N/A
1249		2.48698	N/A	0.92161	5.52%	40.253	N/A	N/A
1105		2.88245	N/A	0.88992	5.36%	39.127	N/A	N/A
992		3.27851	N/A	0.86700	5.24%	38.261	N/A	N/A
901		3.67504	N/A	0.84900	5.12%	37.337	N/A	N/A
825		4.07185	N/A	0.83569	5.04%	36.788	N/A	N/A

(1) Y - Function = Dimensionless Compressibility = $(P_{sat} - P_i) * [P_i * (RV_i - 1)]^{-1}$

(2) Retrograde liquid volume at the indicated pressure and reservoir temperature as a percent of the hydrocarbon pore volume at the dew point pressure and reservoir temperature.

(3) Retrograde liquid volume at the indicated pressure and reservoir temperature (Bbls) per volume of gas (MMscf) at the dew point pressure and reservoir temperature.

(4) Gas Expansion Factor = the volume of surface gas at standard conditions (Mscf) produced from one barrel of undersaturated gas at the indicated pressure and reservoir temperature.

Relative Volume = volume at indicated pressure per volume at the saturation pressure.

Psat = Saturation (Retrograde Dew Point) pressure at reservoir temperature.

Pres = Current static reservoir pressure.

FIGURE 1
Relative Volume vs Pressure

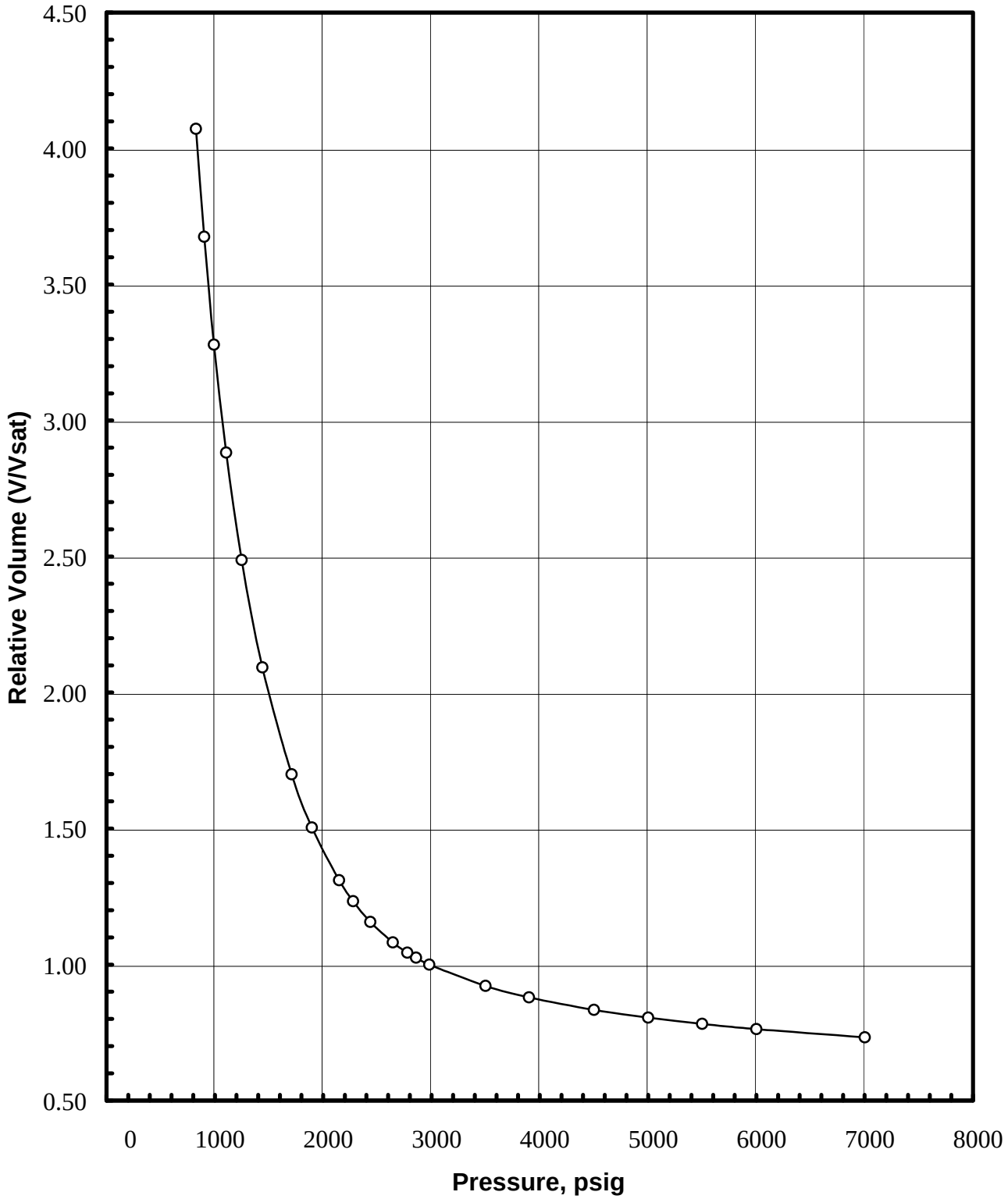


FIGURE 2
Density vs Pressure

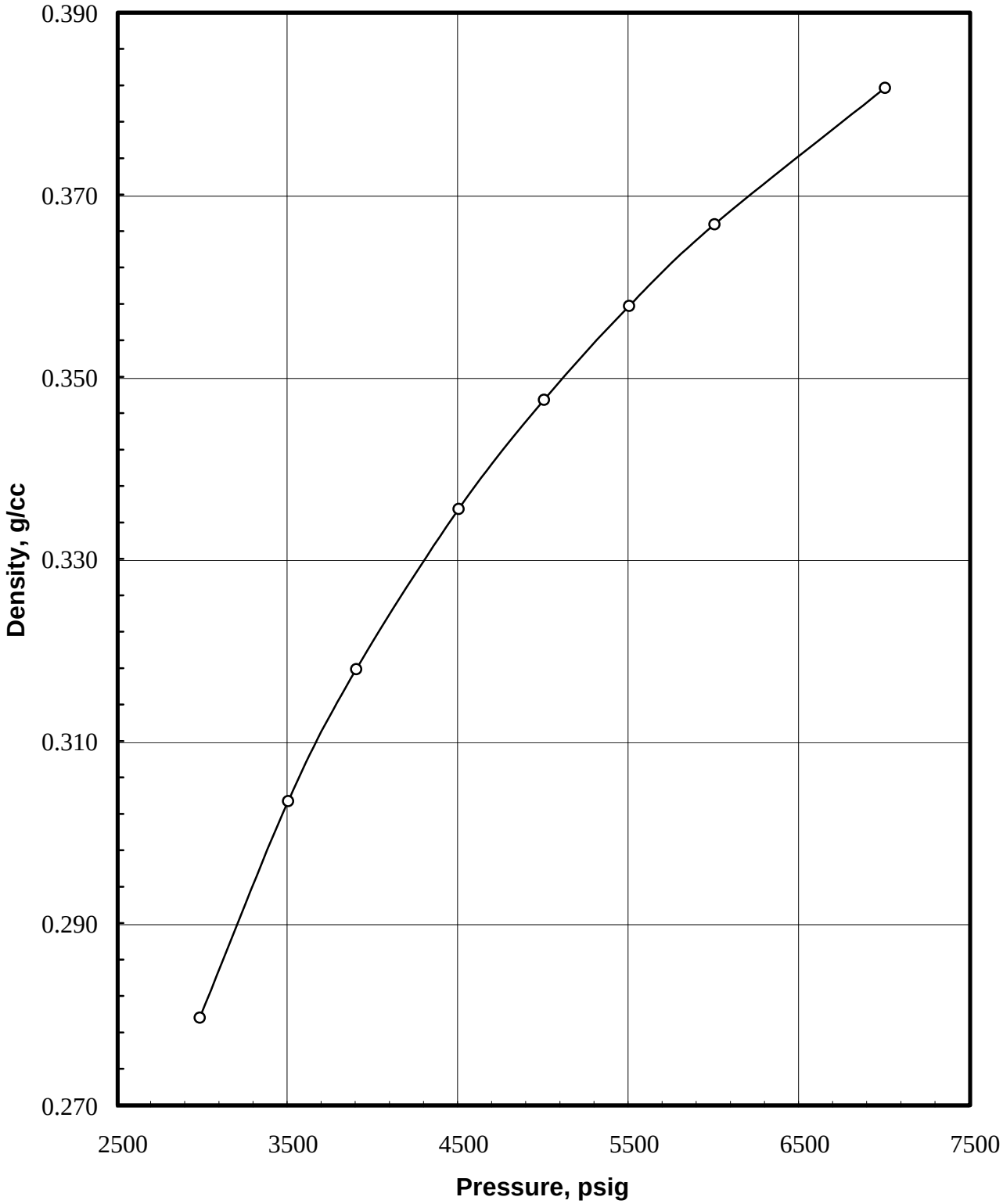


FIGURE 3
Y-Function vs Pressure

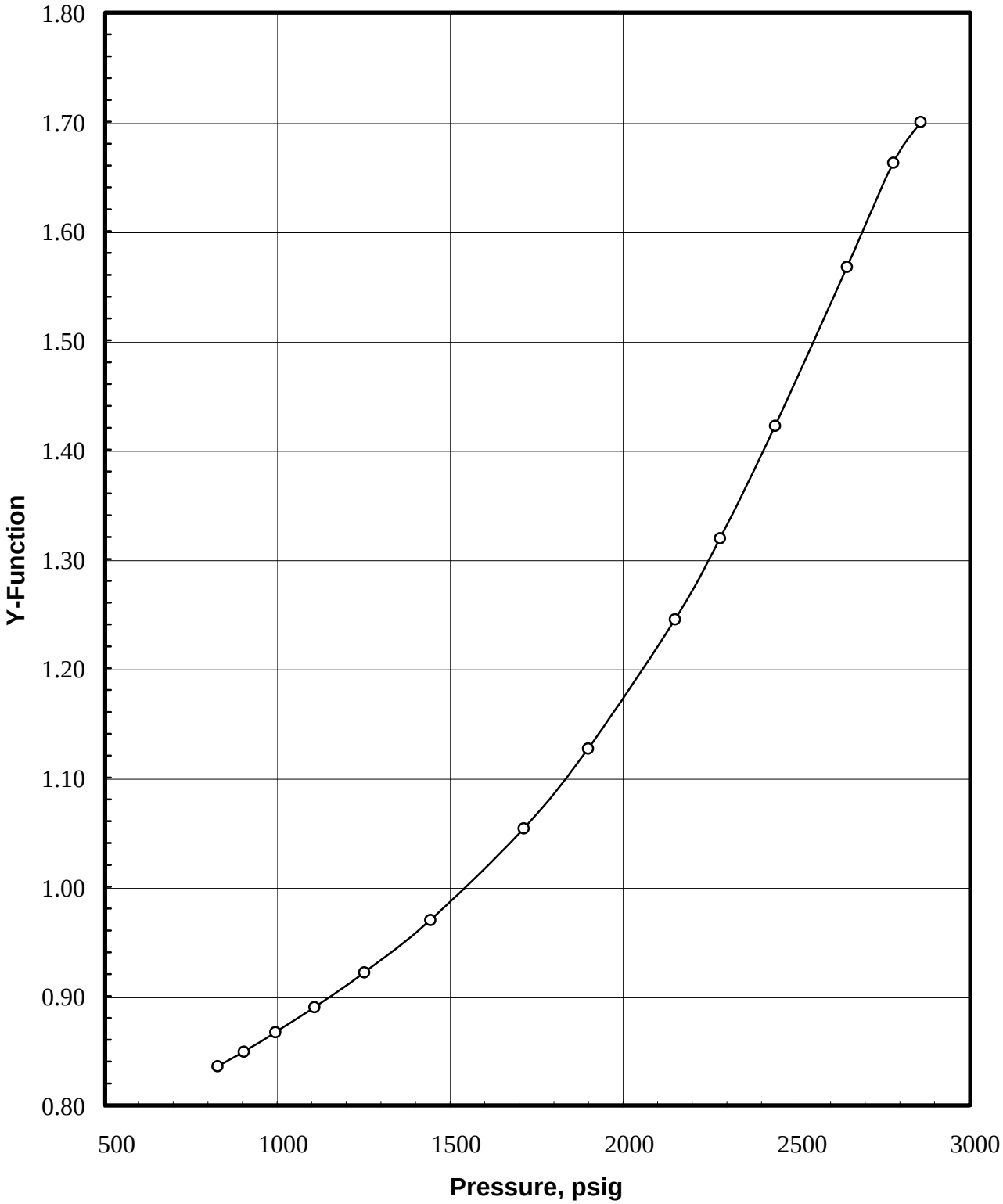


FIGURE 4
Retrograde Liquid Volume vs Pressure

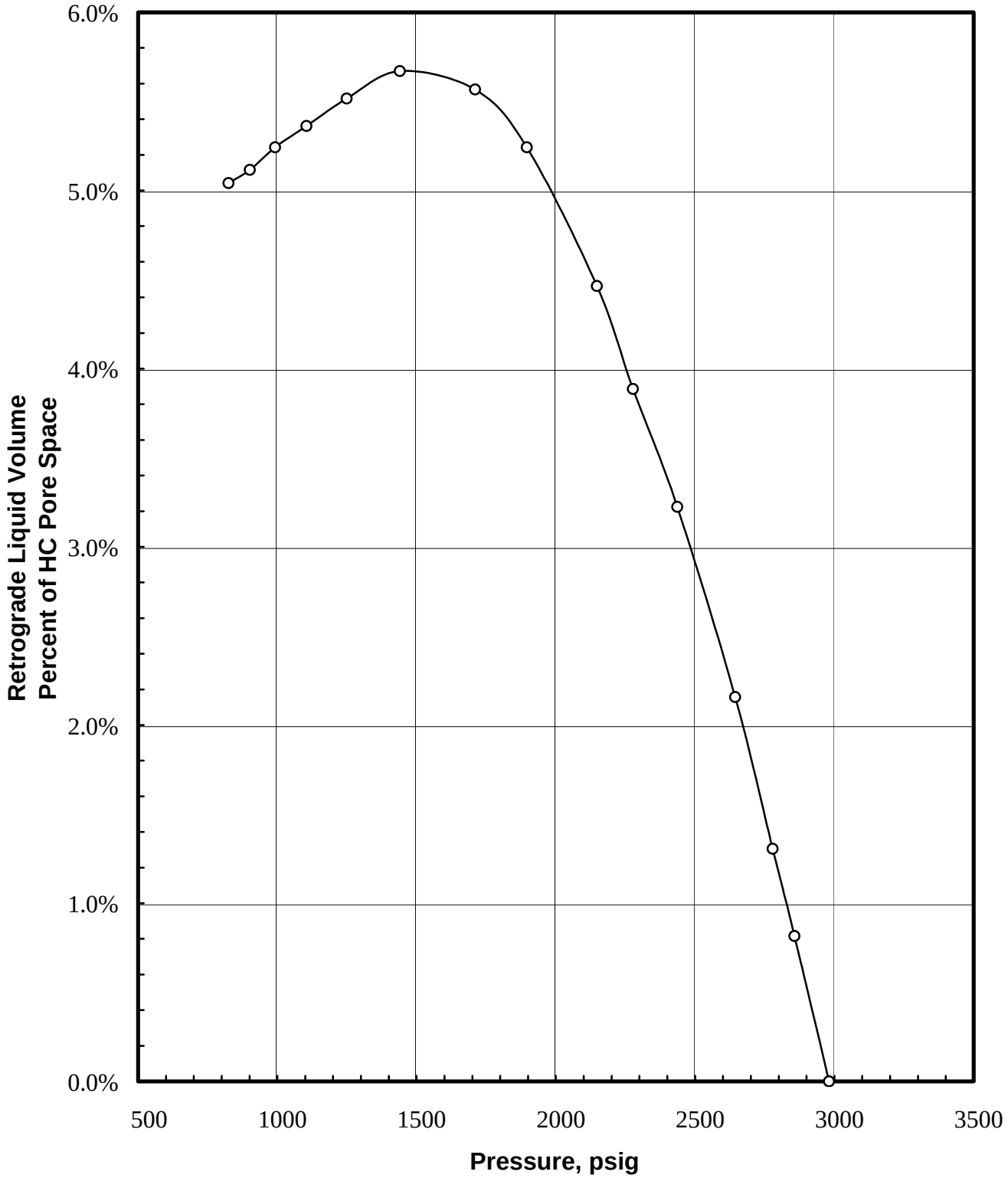


FIGURE 5
Retrograde Liquid Volume vs Pressure

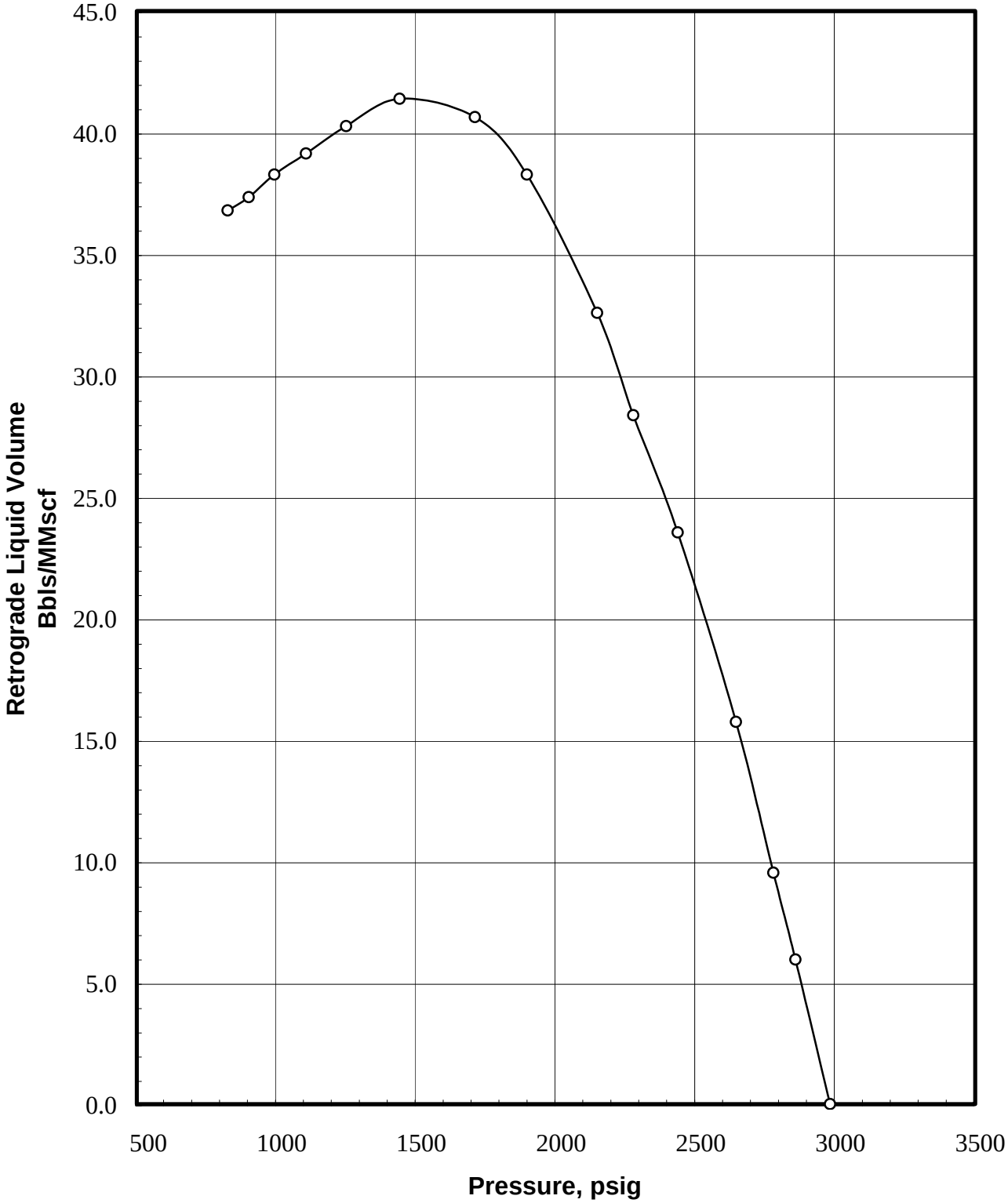


FIGURE 6
Gas Deviation Factor (Z) vs Pressure

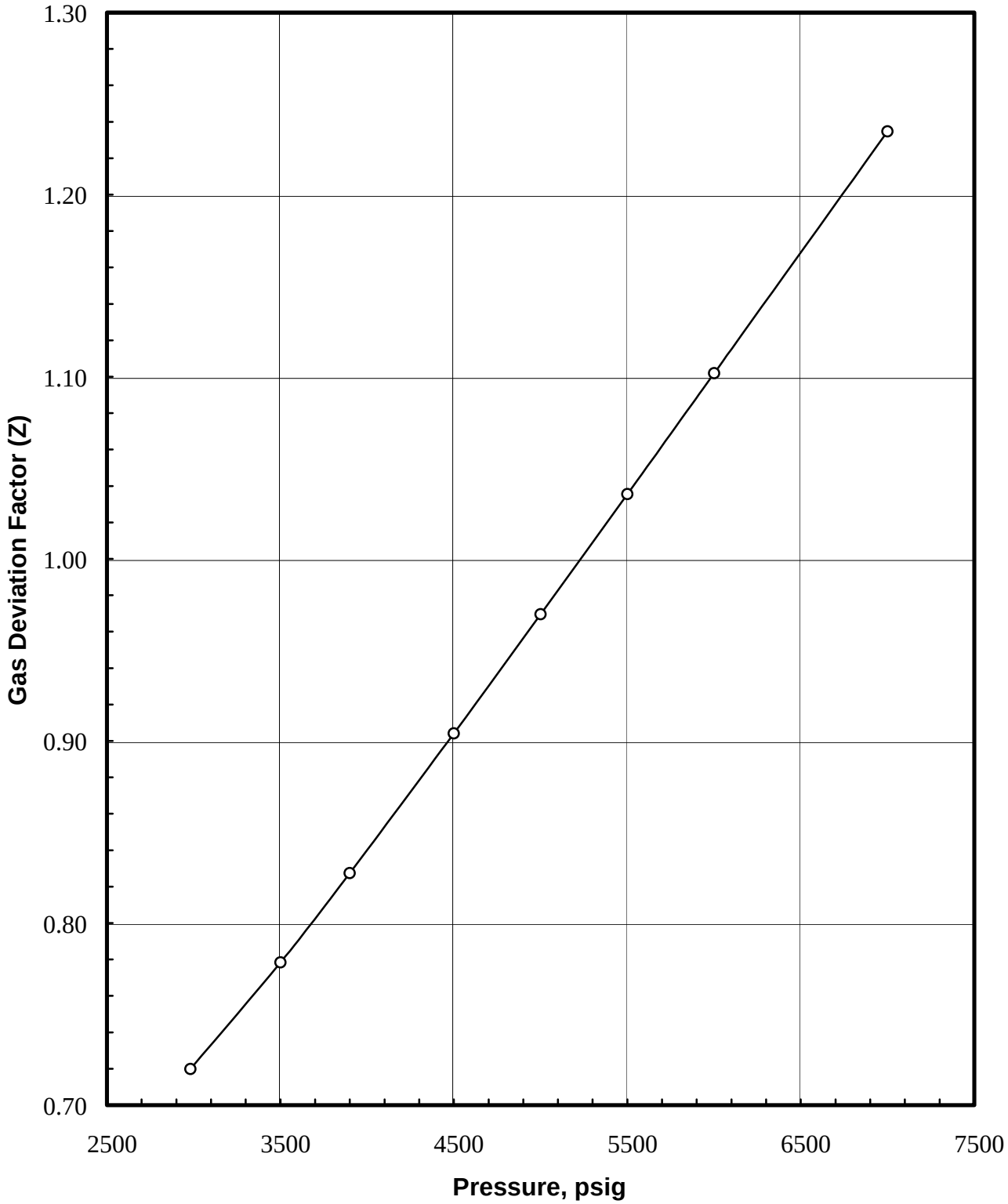


FIGURE 7
Gas Expansion Factor vs Pressure

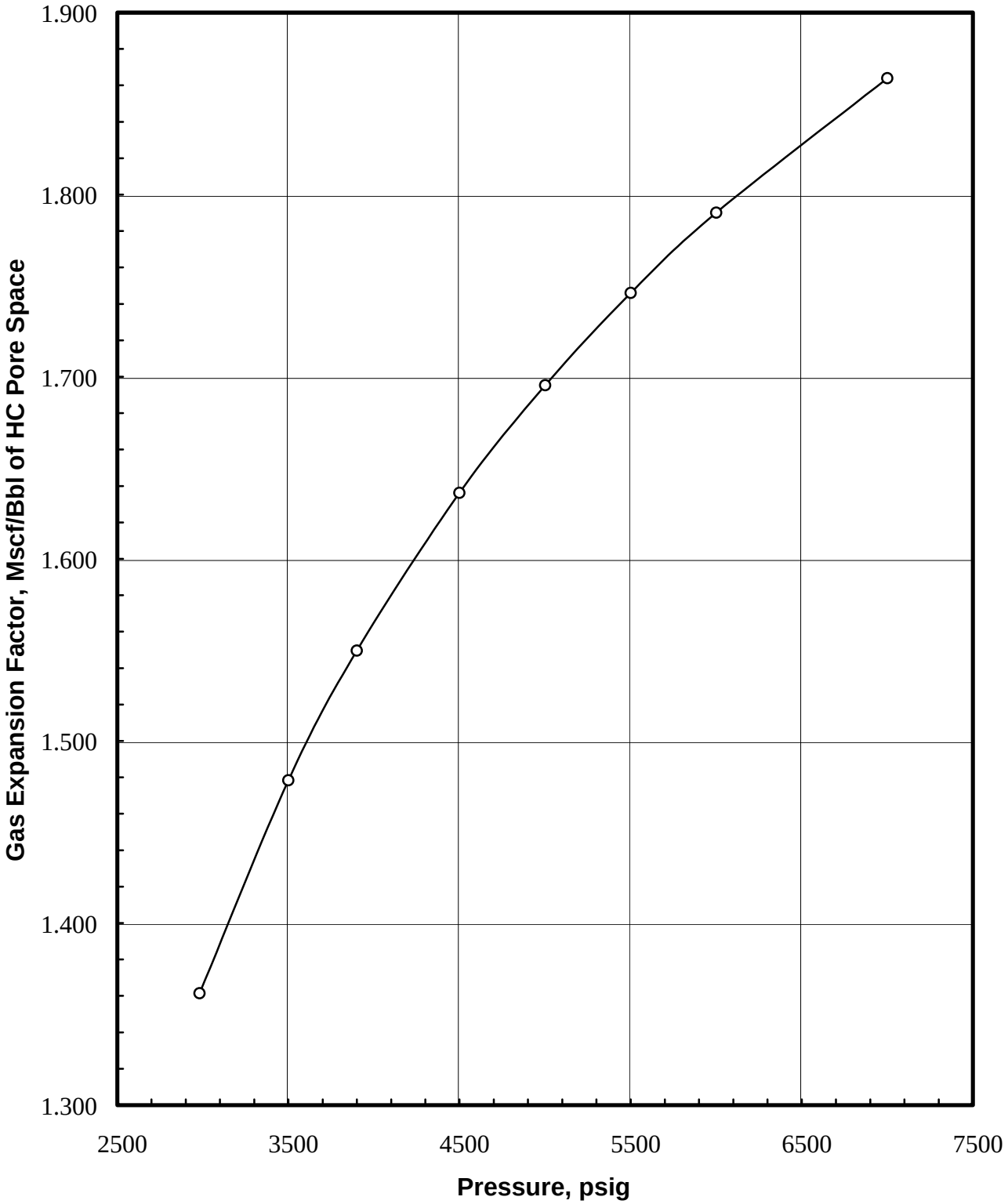


TABLE 4

RESERVOIR GAS DEPLETION STUDY AT 135 °F

Reservoir Pressure, psig	(D.P.) **2981**	**2500**	**2000**	**1500**	**1000**	**500**	**0**
Wellstream Components	mole %	mole %	mole %	mole %	mole %	mole %	mole %
Hydrogen Sulfide	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.420	0.422	0.428	0.437	0.438	0.423	0.378
Carbon Dioxide	0.149	0.149	0.150	0.152	0.153	0.152	0.141
Methane	66.896	67.528	68.339	69.106	69.840	68.644	61.473
Ethane	16.864	16.911	16.943	17.061	17.098	17.219	16.181
Propane	7.187	7.031	6.966	6.902	6.839	7.278	8.492
Iso-butane	0.881	0.880	0.803	0.760	0.738	0.824	1.349
N-butane	2.418	2.350	2.208	2.018	1.950	2.133	4.064
Iso-pentane	0.621	0.594	0.545	0.498	0.452	0.507	1.069
N-pentane	0.886	0.845	0.740	0.635	0.586	0.664	1.687
Hexanes	0.783	0.760	0.689	0.590	0.476	0.516	1.117
Heptanes Plus	2.895	2.530	2.190	1.840	1.430	1.640	4.050
TOTALS	100.000	100.000	100.000	100.000	100.000	100.000	100.000

HEPTANES PLUS (C_{7+}) FRACTION CHARACTERISTICS							
Molecular Weight	132.848	127.868	121.231	115.960	113.762	113.112	120.620
Specific Gravity	0.7703	0.7642	0.7554	0.7479	0.7446	0.7436	1.0228

CONDENSED RETROGRADE LIQUID VOLUME							
HC Pore Volume %	0.000	2.880	4.704	5.155	4.807	3.798	2.200
Bbls/MMscf of DP Gas	0.000	21.022	34.334	37.626	35.085	27.721	16.055

GAS DEVIATION FACTOR							
Equilibrium Gas	0.7198	0.6798	0.6859	0.7461	0.8273	0.8981	N/A
Two-Phase	0.7198	0.6835	0.6847	0.7114	0.7452	0.7737	N/A

CUMULATIVE PRODUCED WELLSTREAM VOLUME							
Vol % of Initial DP Gas	0.000	11.595	29.301	48.835	67.280	84.012	98.799

GPM FROM CVD WELLSTREAM COMPOSITIONS							
Propane plus (C_{3+})	5.525	5.182	4.778	4.378	4.036	4.409	7.629
Butanes plus (C_{4+})	3.531	3.232	2.845	2.463	2.139	2.390	5.273
Pentanes plus (C_{5+})	2.472	2.195	1.879	1.571	1.276	1.440	3.537

FIGURE 8
Equilibrium Gas Deviation (Z) Factor vs Pressure

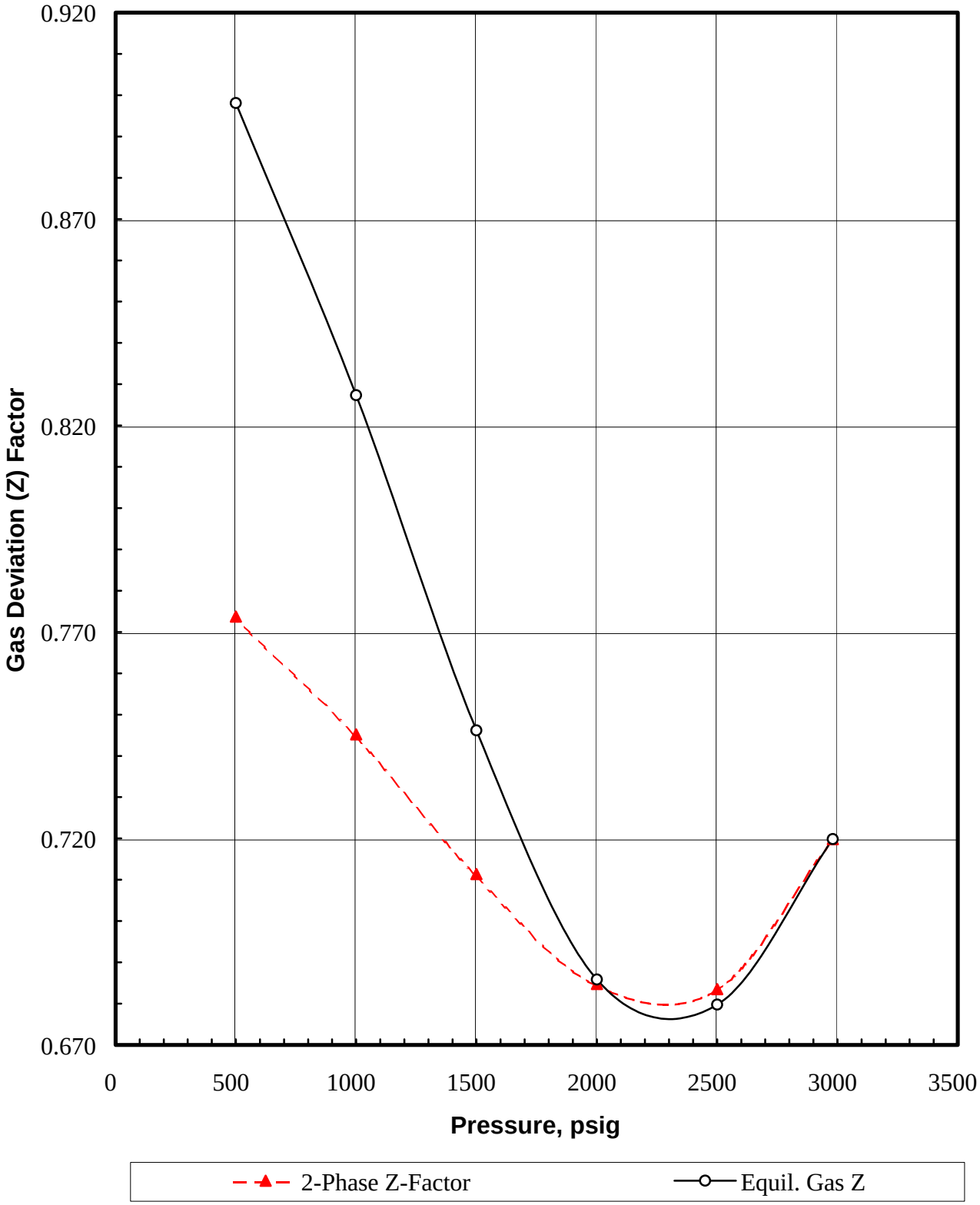


FIGURE 9
P / Z vs Cumulative Produced Wellstream %

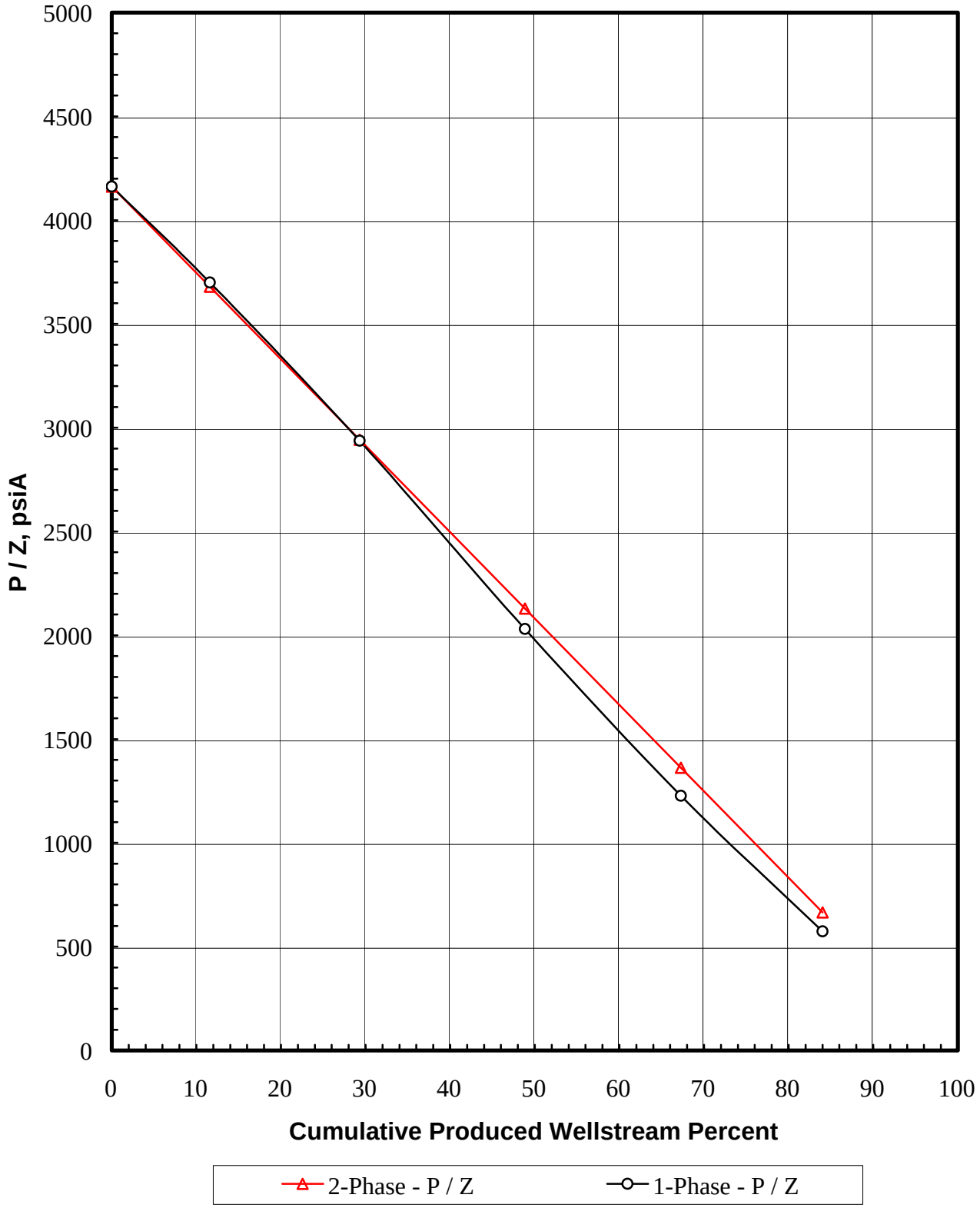


FIGURE 10
Cumulative Produced Wellstream Volume vs Pressure

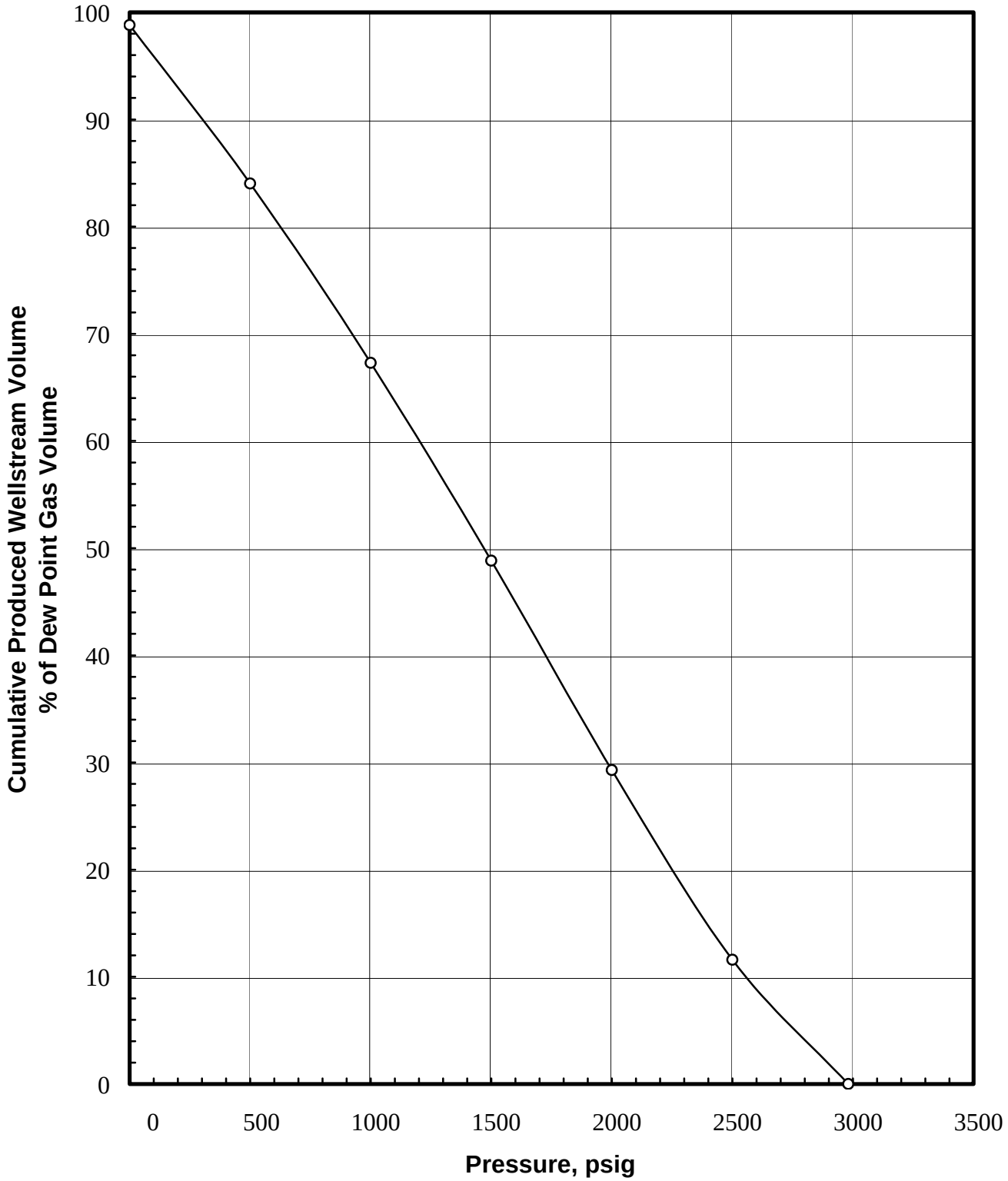


FIGURE 11
C3+, C4+ and C5+ GPM vs Pressure

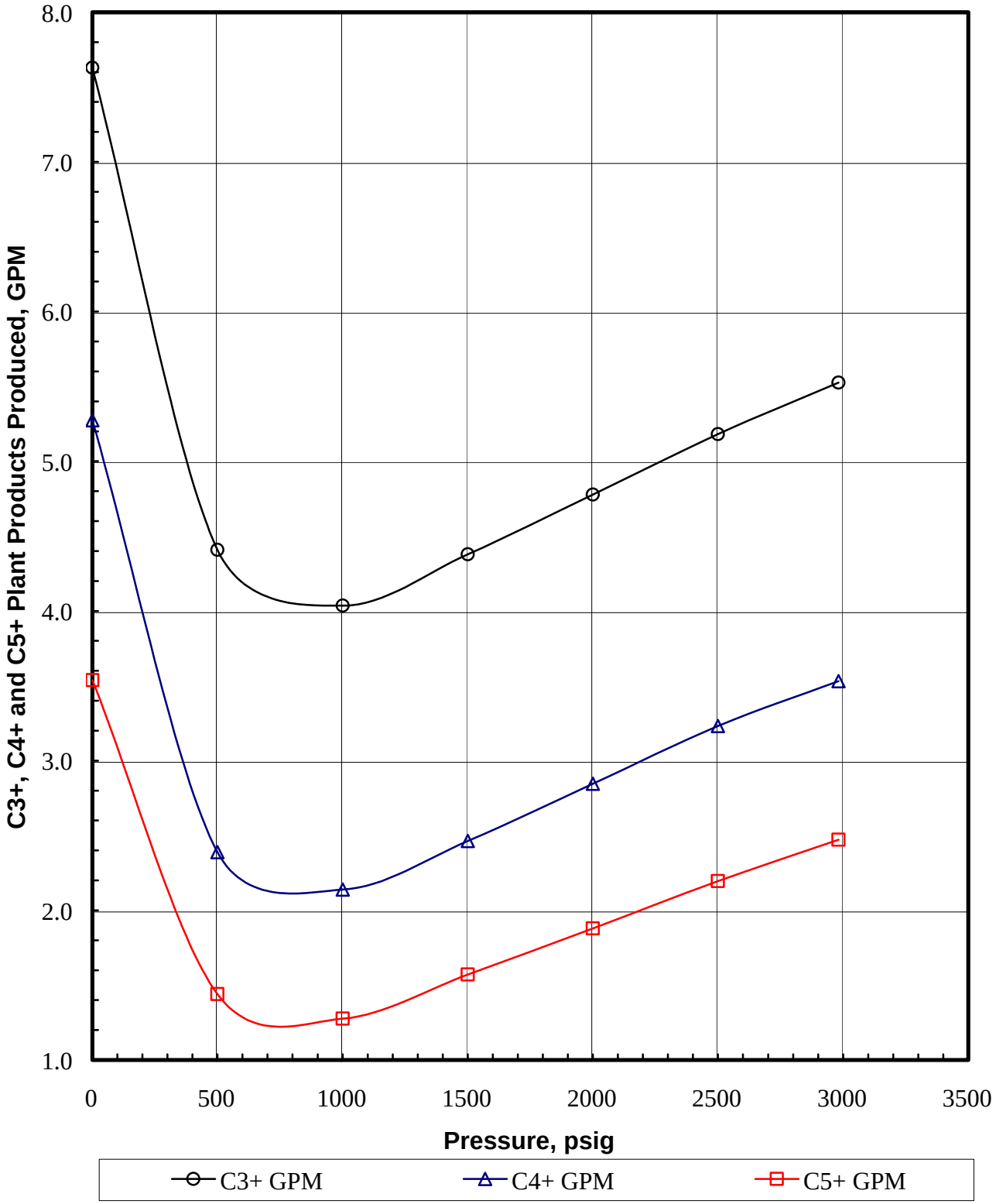


TABLE 5

CALCULATED CUMULATIVE RECOVERY DURING DEPLETION AT 135 °F

Cumulative Fluid Recovery per MMScf of Original Dew Point Gas	Initial Gas in Place	Reservoir Pressure - psig (D.P.) 2981	2500	2000	1500	1000	500
Well Stream (Mcf)	1000.00	0.00	115.95	293.01	488.35	672.80	840.12
*** Normal Temperature Separation**							
Stock Tank Liquid (Bbls)	54.40	0.00	5.40	12.14	17.55	22.06	26.66
Primary Separator Gas (Mcf)	928.15	0.00	108.47	275.71	462.63	640.68	801.02
Second Stage Gas (Mcf)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stock Tank Gas (Mcf)	23.10	0.00	2.52	5.96	9.18	11.31	13.79
Cumulative Total GOR (Scf/STB)	17487	0	20539	23210	26890	29549	30563
Instantaneous Total GOR (Scf/STB)	17487	0	20539	25353	35145	39873	35435
Total Gallons of Ethane Plus (C_{2+}) Plant Products Produced in:							
Well Stream	10071.57	0.00	1129.56	2784.32	4538.13	6132.87	7647.35
Primary Separator Gas	7189.11	0.00	834.71	2114.80	3556.83	4911.19	6165.94
Second Stage Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stock Tank Gas	599.38	0.00	64.89	153.61	237.75	292.75	357.63

* Recovery Basis: 1st Stage Separation at 183 psig and 49 °F
2nd Stage Separation: Not Present
Stock Tank Conditions at 14.85 psig and 70 °F
Standard Conditions at 14.85 psig and 60 °F

TABLE 6

RETROGRADE CONDENSATION DURING GAS DEPLETION AT 135 °F

Pressure psig	Condensed Retrograde Liquid Volume	
	(1)	(2)
2981	0.000	0.00
2500	2.880	21.02
2000	4.704	34.33
1500	5.155	37.63
1000	4.807	35.08
500	3.798	27.72
0	2.200	16.06

(1) Retrograde liquid volume condensed at the indicated pressure and reservoir temperature as a percent of the hydrocarbon pore volume at the dew point pressure and reservoir temperature.

(2) Retrograde liquid volume (Bbls) condensed at the indicated pressure and reservoir temperature per volume of gas (MMscf) at the dew point pressure and reservoir temperature.

FIGURE 12
Retrograde Liquid Volume vs Pressure

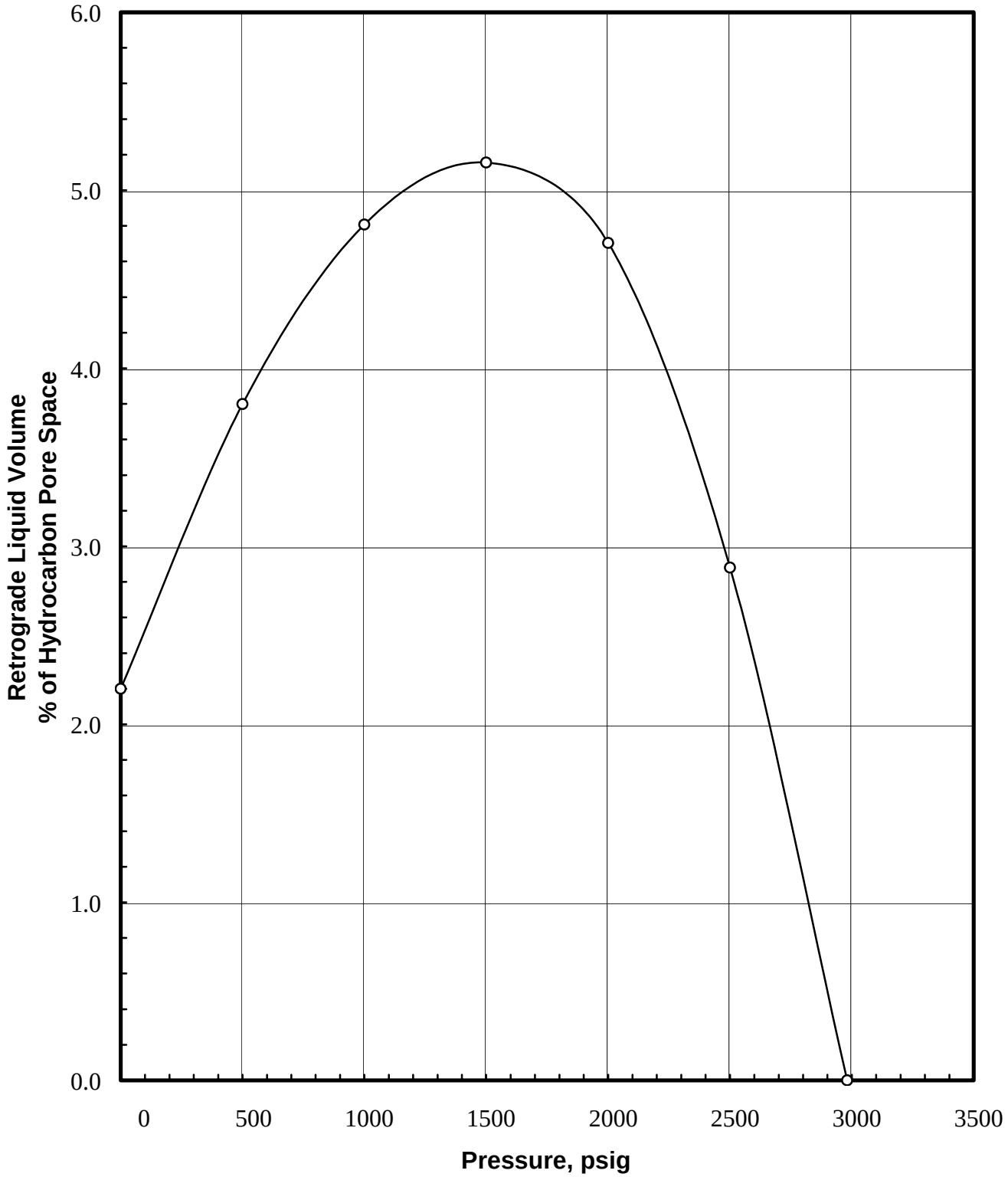
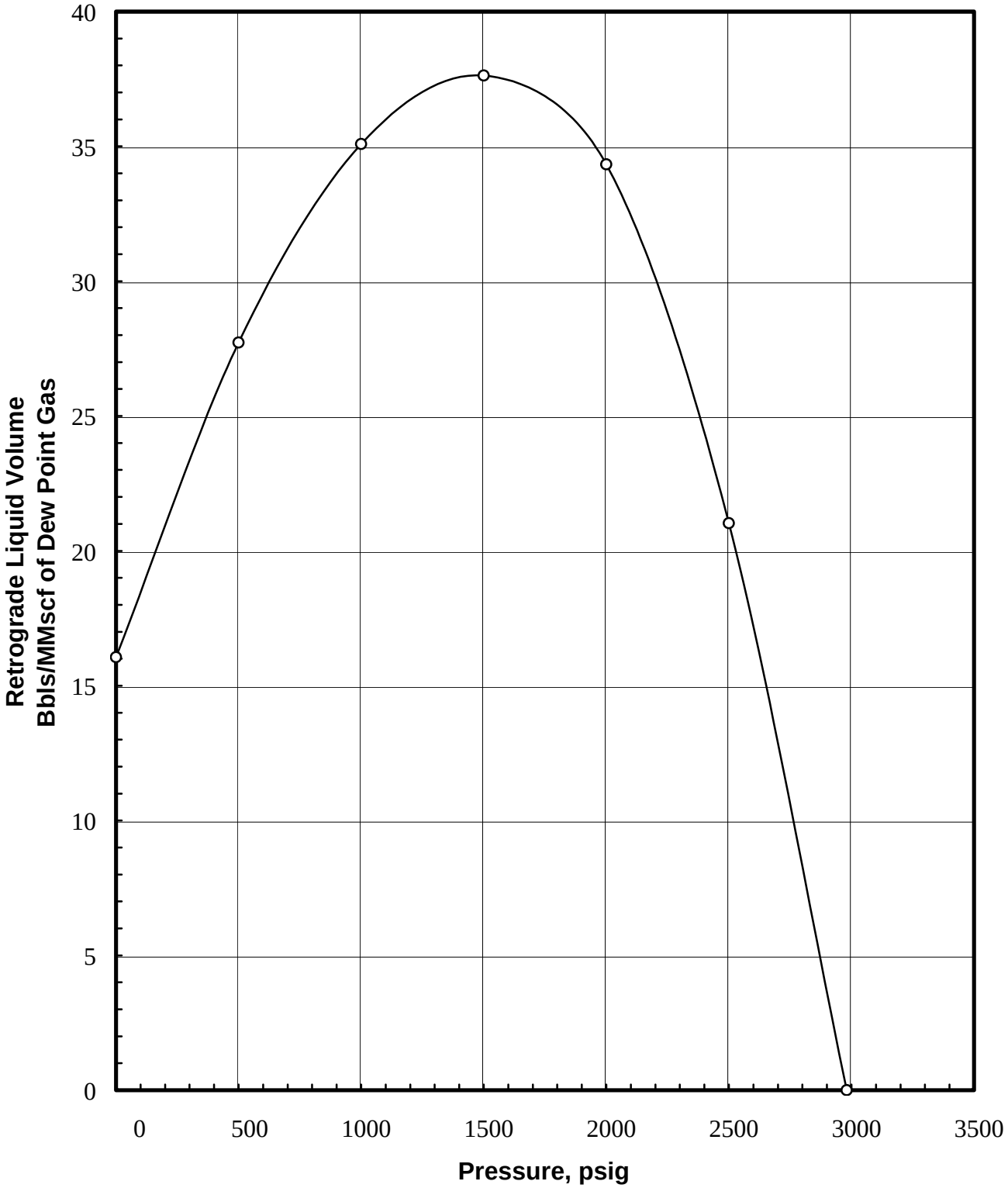


FIGURE 13
Retrograde Liquid Volume vs Pressure



APPENDIX

December 26, 2009

FESCO, Ltd.
1100 FESCO Ave. - Alice, TX 78332

For: AB Resources, LLC
6802 W. Snowville Road, Suite E
Brecksville, Ohio 44141

County: Marshall, West Virginia

Sample: Cavenney No. 1-H
Type: Separator Water
Depth (Ft): N/A

Date: 12/16/2009
Time: 12:30

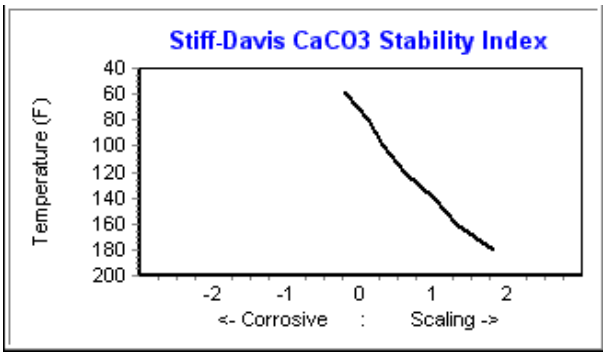
REPORT OF WATER ANALYSIS

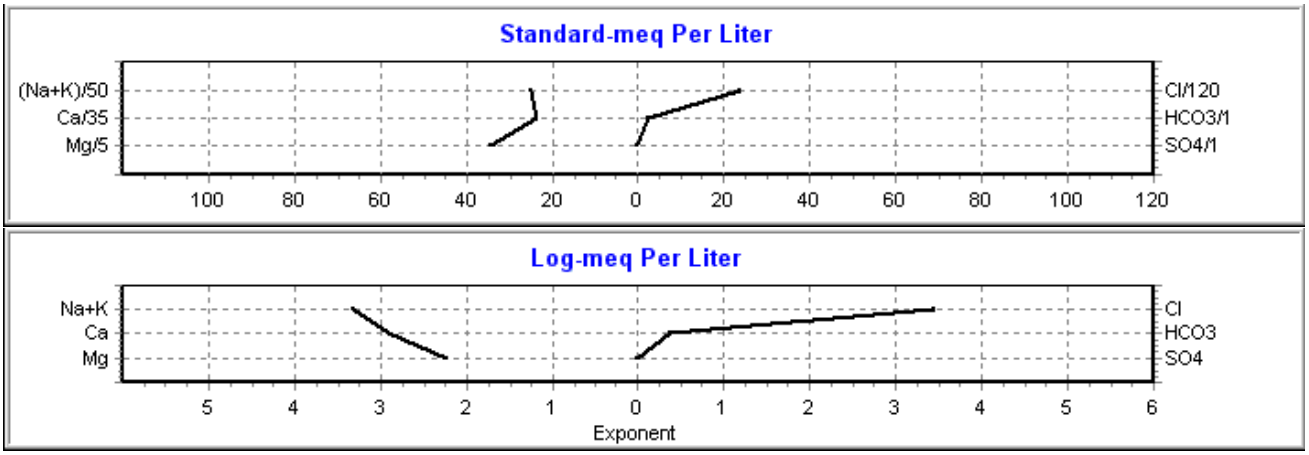
********** Dissolved Solids **********

	mg/L	meq/L
Sodium (Na)	28528.20	1240.90
Calcium (Ca)	16485.90	822.65
Magnesium (Mg)	2078.80	170.95
Barium (Ba)	67.97	0.99
Potassium (K)	324.35	8.30
Iron (Fe)	22.51	---
Chloride (Cl)	100000.00	2820.87
Sulfate (SO4)	0.00	0.00
Carbonate (CO3)	0.00	0.00
Bicarbonate(HCO3)	142.00	2.33
Hydroxide (OH)	0.00	0.00
Sulfide (H2S)	0.00	
Total Solids	147650	
Total Alkalinity (CaCO3)	117	
Total Hardness (CaCO3)	49762	

********** Other Properties **********

pH	6.05
Specific Gravity @ 60/60 °F	1.115
Resistivity (Ohm-meters @ 77.0 °F)	0.057





Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

Job Number: 95943 . 2264

February 16, 2010

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: AB Resources, LLC
6802 W. Snowville Road, Suite E
Brecksville, Ohio 44141

Sample: Cavenney No. 1-H
CVD Residual Oil
Sampled @ 0 psig & 70° F

Date Sampled: 12/16/2009 Job Number: 95943.005

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.001	0.000	0.000
Ethane	0.005	0.003	0.001
Propane	0.183	0.098	0.066
Isobutane	0.320	0.203	0.152
n-Butane	2.031	1.243	0.962
2,2 Dimethylpropane	0.014	0.011	0.008
Isopentane	2.545	1.807	1.497
n-Pentane	4.978	3.504	2.928
2,2 Dimethylbutane	0.162	0.131	0.114
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.423	0.336	0.297
2 Methylpentane	2.840	2.288	1.995
3 Methylpentane	1.912	1.515	1.343
n-Hexane	6.280	5.013	4.411
Heptanes Plus	78.307	83.847	86.227
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7762	(Water=1)
°API Gravity	50.80	@ 60°F
Molecular Weight	135.1	
Vapor Volume	18.24	CF/Gal
Weight	6.47	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.7548	(Water=1)
°API Gravity	55.97	@ 60°F
Molecular Weight	122.7	
Vapor Volume	19.53	CF/Gal
Weight	6.29	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: LAW
Processor: AR
Cylinder ID: Vial

David Dannhaus 361-661-7015

TOTAL EXTENDED REPORT

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.000
Methane	0.001	0.000	0.000
Ethane	0.005	0.003	0.001
Propane	0.183	0.098	0.066
Isobutane	0.320	0.203	0.152
n-Butane	2.031	1.243	0.962
2,2 Dimethylpropane	0.014	0.011	0.008
Isopentane	2.545	1.807	1.497
n-Pentane	4.978	3.504	2.928
2,2 Dimethylbutane	0.162	0.131	0.114
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.423	0.336	0.297
2 Methylpentane	2.840	2.288	1.995
3 Methylpentane	1.912	1.515	1.343
n-Hexane	6.280	5.013	4.411
Methylcyclopentane	0.608	0.418	0.417
Benzene	1.058	0.575	0.674
Cyclohexane	3.149	2.081	2.160
2-Methylhexane	2.650	2.392	2.165
3-Methylhexane	0.389	0.347	0.318
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.504	1.270	1.216
n-Heptane	5.787	5.183	4.727
Methylcyclohexane	3.094	2.415	2.476
Toluene	0.622	0.404	0.467
Other C-8's	9.545	8.679	8.575
n-Octane	4.345	4.321	4.045
E-Benzene	0.618	0.463	0.535
M & P Xylenes	1.299	0.978	1.124
O-Xylene	0.258	0.191	0.224
Other C-9's	6.745	6.851	6.941
n-Nonane	2.928	3.199	3.061
Other C-10's	6.688	7.464	7.701
n-decane	1.900	2.264	2.203
Undecanes(11)	6.603	7.561	7.912
Dodecanes(12)	4.925	6.092	6.464
Tridecanes(13)	4.063	5.389	5.796
Tetradecanes(14)	3.012	4.279	4.665
Pentadecanes(15)	2.191	3.334	3.679
Hexadecanes(16)	1.445	2.350	2.615
Heptadecanes(17)	1.042	1.792	2.013
Octadecanes(18)	0.709	1.283	1.450
Nonadecanes(19)	0.476	0.898	1.021
Eicosanes(20)	0.280	0.550	0.629
Heneicosanes(21)	0.163	0.336	0.386
Docosanes(22)	0.079	0.170	0.196
Tricosanes(23)	0.035	0.078	0.090
Tetracosanes(24)	0.028	0.064	0.074
Pentacosanes(25)	0.023	0.056	0.066
Hexacosanes(26)	0.017	0.042	0.049
Heptacosanes(27)	0.009	0.023	0.028
Octacosanes(28)	0.007	0.020	0.023
Nonacosanes(29)	0.004	0.012	0.015
Triacontanes(30)	0.002	0.005	0.006
Hentriacontanes Plus(31+)	0.005	0.017	0.021
Total	100.000	100.000	100.000

May 19, 2015

Dennis Matto
Exterran
4477 Gleason Road
Lakewood, NY 14750

Exterran
QHSE and Operations Services
16666 Northchase Drive
Houston, Texas 77060 U.S.A.

Main 281.836.7000
Fax 281.836.8161
www.exterran.com

Re: Engine Pedigree for Exterran Compressor Unit 76411, Engine Serial Number 72B01055

In order to better assist your company with any of its state and federal permitting needs, Exterran submits the following information in regards to the engine of the above-referenced compressor unit, which Exterran is currently utilizing to provide your company contract compression services. This letter should provide information necessary to answer questions pertaining to, but not limited to, the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines, Subpart JJJJ. This information is current as of May 19, 2015.

Engine Make:	CATERPILLAR
Engine Model:	G379TA
Engine Serial Number:	72B01055
Engine Type:	4 Stroke RB
Engine Category:	Existing
Engine Subcategory:	Non Certified
Engine NSPS Status*:	Exempt
Exemption Justification*:	Overhauls since 6/12/06 have not triggered recon./modif.
Engine Speed:	1200.00
OEM Rated HP:	415.00
Engine Manufacture Date:	Pre June 12, 2006
Customer:	N/A
Business Unit:	N/A
Exterran Unit Number:	76411
Customer Lease Name:	N/A

Please contact Kyle Poycker with any questions at or kyle.poycker@exterran.com.

* The "Engine NSPS Status" and "Exemption Justification" entries herein are based on Exterran's present knowledge of the engine in question and its reading of U.S. EPA's regulations and guidance pursuant to 40 C.F.R. Part 60, Subpart JJJJ. Any change in law or in the federal, state, or local interpretation of existing law could result in this engine being subject to additional or different legal requirements. These conclusions are Exterran's and are not offered as legal opinions or advice to your company. Additionally, any reconstruction or modification respecting this engine (as those terms are defined in the applicable regulations) could result in the applicability of Subpart JJJJ or other legal requirements to this engine and create legal compliance responsibilities for your company.

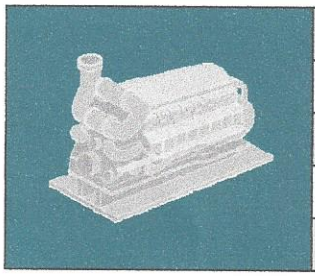
G379 EMISSIONS DATA

G379 EMISSIONS DATA @ STANDARD RATINGS

ENGINE	RATING (hp/rpm)	NOx	CO (gram/hp-hr)	HC	%02	A/FR vol/vol	Tstack deg F	EXH FLOW cfm	AIR FLOW kg/hr	BSFC Btu/hp-hr
NA HCR	330/1200									
	stand/catalyst	8.7	7.9	3.1	0.5	9.5	1086	1398	901	7814
NA HCR	275/1000									
	stand	18.3	0.8	1.2	2.0	10.5	1007	1172	801	7494
	catalyst	11.2	12.1	1.7	0.5	9.5	1012	1101	745	7704
NA LCR	300/1200									
	stand/catalyst	11.4	11.5	0.8	0.5	9.5	1174	1491	909	8843
NA LCR	245/1000									
	stand	15.1	0.8	0.8	2.0	10.5	1095	1238	798	8311
	catalyst	11.3	11.8	0.8	0.5	9.5	1136	1200	749	8622
TA LCR	415/1200									
	stand	20.9	0.8	0.8	2.0	10.5	1037	2270	1520	7600
	catalyst	9.8	10.7	0.8	0.5	9.5	1097	2225	1424	7867
TA LCR	370/1000									
	stand	19.7	0.9	0.9	2.0	10.5	1010	1912	1304	7514
	catalyst	10.0	9.7	0.9	0.5	9.5	1047	1794	1186	7552
TA LCR	465/1200									
	stand	18.9	0.8	1.0	2.0	—	1128	2140	1349	8061
TA HCR	465/1200									
	stand	15.4	1.1	0.9	2.0	10.5	1070	2689	1762	7365
	catalyst	10.7	11.1	1.9	0.5	9.5	1102	2533	1616	7464
TA LCR	405/1000									
	stand	17.6	0.9	1.2	2.0	—	1094	1799	1159	7952
TA HCR	405/1000									
	stand	15.1	0.8	1.1	2.0	10.5	1014	2234	1519	7307
	catalyst	9.2	9.3	1.5	0.5	9.5	1046	2119	1402	7453

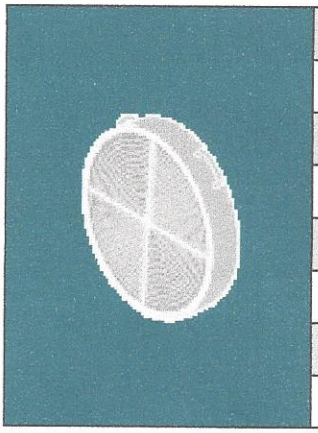
Emission Guarantee

ENGINE DATA



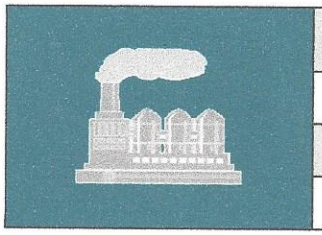
Engine Model	Caterpillar 379TA
Power	415 BHP
Fuel	PQNG
Exhaust Flow Rate	3266 lb/hr
Exhaust Temperature	1097 F

CATALYST DATA



Catalyst Model	2-DC50-8
Type	NSCR
# of Elements	2
Cell Density	300 cpsi
Approx. Dimensions	See Attached
Approx. Weight	See Attached
Approx. Pressure Drop	5.3" w.c.
Connection Size	8"

EMISSION REQUIREMENTS



Exhaust Component	Engine Output (g/bhp-hr)	Converter Output (g/bhp-hr)
NOx	12	.25
CO	12	.30
VOC	1	.20

The catalyst model selection is based upon the reduction requirements above. Any variance in these requirements may affect the price and model required.

DCL America Inc. 27603 Commerce Oaks Drive, Oak Ridge North, TX 77385
Toll free: 1-877-965-8989 **Fax:** 281-605-5858 **Email:** info@dcl-inc.com **www.dcl-inc.com**

Attachment J

Attachment J

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Chevron Appalachia, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit, for a natural gas production operation located at 5258 Fork Ridge Road, Moundsville, WV 26041 in Marshall County, West Virginia. The latitude and longitude coordinates are: 39.86879 and -80.69435. The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: 6.70 tons Nitrogen Oxides, 5.99 tons Carbon Monoxide, 48.42 tons Volatile Organic Compounds, 15.08 tons Particulate Matter, 0.04 tons Sulfur Dioxide, 1.88 tons of Hexane, 0.02 tons of Benzene, 0.06 tons of Toluene, 0.03 tons of Ethylbenzene, 0.07 tons of Xylenes, 0.75 tons of Formaldehyde, and 8,391.89 tons of Carbon Dioxide Equivalencies. Startup of operation is scheduled to begin the 1st day of December, 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the XXth day of May, 2015.

By: Chevron Appalachia, LLC
Blake Loke
Appalachia Area Manager for Chevron Appalachia, LLC
1550 Coraopolis Heights Road, 2nd Floor
Moon Township, PA 15108

Attachment K

Attachment K
G70-A General Permit Electronic Submittal

Chevron Appalachia, LLC has chosen not to submit this G70-A General Permit Application electronically. One (1) original hard copy and two (2) CD-ROMs of this application have been provided to the WVDEP Division of Air Quality.

Attachment L

Attachment L
G70-A General Permit Application Fee

An application fee of $4,000 is being submitted by Chevron Appalachia, LLC with this G70-A General Permit Application.

Attachment M

Attachment M
G70-A General Permit Siting Criteria Waiver

There are no dwellings within 300 feet of the proposed natural gas production facility.

Attachment N

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

NATURAL GAS - SWEET

Company Identification
Appalachian/Michigan Business Unit
Chevron North America Exploration and Production Company (a division of Chevron U.S.A. Inc.)
1550 Coraopolis Heights Road
Moon Township, PA 15108
United States of America

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
Product Information: (412) 865-3408

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Methane	74-82-8	< 88 %weight
Ethane	74-84-0	< 31 %weight
Propane	74-98-6	< 18 %weight
Butane	106-97-8	< 6 %weight
Carbon dioxide	124-38-9	< 6 %weight
Nitrogen	7727-37-9	< 3 %weight
Benzene	71-43-2	< 2.5 %weight

SECTION 3 HAZARDS IDENTIFICATION

****

EMERGENCY OVERVIEW

- FLAMMABLE GAS. MAY CAUSE FLASH FIRE
- CONTENTS UNDER PRESSURE
- NO ODORANT ADDED; DETECTION OF LEAK VIA SENSE OF SMELL MAY NOT BE POSSIBLE
- MAY CAUSE DIZZINESS, DROWSINESS AND REDUCED ALERTNESS
- MAY CAUSE CANCER
- CONTAINS MATERIAL THAT MAY CAUSE DAMAGE TO:
- BLOOD/BLOOD FORMING ORGANS

- REDUCES OXYGEN AVAILABLE FOR BREATHING
****

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Material is a gas and cannot usually be swallowed.
Inhalation: This material can act as a simple asphyxiant by displacement of air. Symptoms of asphyxiation may include rapid breathing, incoordination, rapid fatigue, excessive salivation, disorientation, headache, nausea, and vomiting. Convulsions, loss of consciousness, coma, and/or death may occur if exposure to high concentrations continues. Excessive or prolonged breathing of this material may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death. If this material is heated, fumes may be unpleasant and produce nausea and irritation of the eye and upper respiratory tract.

DELAYED OR OTHER HEALTH EFFECTS:
Reproduction and Birth Defects: This material is not expected to cause adverse reproductive effects based on animal data.This material is not expected to cause harm to the unborn child based on animal data.
Cancer: Prolonged or repeated exposure to this material may cause cancer. Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP) and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Target Organs: Contains material that may cause damage to the following organ(s) following repeated inhalation at concentrations above the recommended exposure limit: Blood/Blood Forming Organs
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required because this material is a gas.
Inhalation: During an emergency, wear an approved, positive pressure air-supplying respirator. Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

SECTION 5 FIRE FIGHTING MEASURES

SPECIAL NOTES: In case of fire do not extinguish. Stop flow of fuel and allow fire to burn out.

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Flammable gas.

NFPA RATINGS: Health: 1 Flammability: 4 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: -162 °C (-260 °F) (Typical)
Autoignition: 482 °C - 632 °C (900 °F - 1170 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 3.8 Upper: 17

EXTINGUISHING MEDIA: Allow gas to burn if flow cannot be shut off safely. Apply water from a safe distance to cool container, surrounding equipment and structures. Container areas exposed to direct flame contact should be cooled with large quantities of water (500 gallons water per minute flame impingement exposure) to prevent weakening of container structure.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: Do not extinguish. Stop flow of fuel and allow fire to burn out. If flames are accidentally extinguished, explosive reignition may occur. Eliminate ignition sources. Keep people away. Isolate fire area and deny unnecessary entry. Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of the container. For unignited vapor cloud, use water spray to knock down and control dispersion of vapors. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out and danger of reignition has passed. See Section 7 for proper handling and storage. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of released gas. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator. For large releases, warn public of downwind explosion hazard.
Spill Management: Stop the source of the release if you can do it without risk. Observe precautions in Exposure Controls/Personal Protection section of the MSDS. All equipment used when handling the product must be grounded. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Do not direct water at spill or source of leak. Prevent spreading of vapors through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: This material presents a fire hazard. Gas can catch fire and burn with explosive force. Invisible gas spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Gases are heavier than air and may travel along the ground or into drains to possible distant ignition sources that may cause an explosive flashback. Do not breathe gas. Wash thoroughly after handling.
Unusual Handling Hazards: This product does not contain an odorant. Detection of leak via sense of smell, therefore, may not be possible.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API)

Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use. When working with this material, the minimal oxygen content should be 19.5% by volume under normal atmospheric pressure.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits. Use in a well-ventilated area. Use explosion-proof ventilation equipment.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Nitrile Rubber, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Supplied-Air Respirator, or Air-Purifying Respirator for Organic Vapors.
Wear an approved positive pressure air-supplying respirator unless ventilation or other engineering controls are adequate to maintain a minimal oxygen content of 19.5% by volume under normal atmospheric pressure.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Benzene	ACGIH	.5 ppm (weight)	2.5 ppm (weight)	--	Skin A1 Skin
Benzene	CVX	1 ppm (weight)	5 ppm (weight)	--	--
Benzene	OSHA SRS	1 ppm (weight)	5 ppm (weight)	--	--
Benzene	OSHA Z-2	10 ppm (weight)	--	25 ppm (weight)	--
Butane	ACGIH	1000 ppm (weight)	--	--	--
Carbon dioxide	ACGIH	5000 ppm (weight)	30000 ppm (weight)	--	--
Carbon dioxide	OSHA Z-1	9000 mg/m3	--	--	--

Ethane	ACGIH	1000 ppm (weight)	--	--	--
Methane	ACGIH	1000 ppm (weight)	--	--	--
Nitrogen	ACGIH	--	--	--	Simple asphyxiant.
Propane	ACGIH	1000 ppm (weight)	--	--	--
Propane	OSHA Z-1	1800 mg/m3	--	--	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless
Physical State: Gas
Odor: Odorless
pH: Not Applicable
Vapor Pressure: 760 mmHg
Vapor Density (Air = 1): No data available
Boiling Point: -162°C (-259.6°F)
Solubility: Insoluble in water.
Freezing Point: No data available
Melting Point: -184°C (-299.2°F)
Specific Gravity: 0.57
Density: No data available
Viscosity: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: Carbon Dioxide (Elevated temperatures), Carbon Monoxide (Elevated temperatures)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains butane. An atmospheric concentration of 100,000 ppm (10%) butane is not noticeably irritating to the eyes, nose or respiratory tract, but will produce slight dizziness in a few minutes of exposure. No chronic systemic effect has been reported from occupational exposure.

This product contains benzene.
GENETIC TOXICITY/CANCER: Repeated or prolonged breathing of benzene vapor has been associated with the development of chromosomal damage in experimental animals and various blood diseases in humans ranging from aplastic anemia to leukemia (a form of cancer). All of these diseases can be fatal. In some individuals, benzene exposure can sensitize cardiac tissue to epinephrine which may precipitate fatal ventricular fibrillation.
REPRODUCTIVE/DEVELOPMENTAL TOXICITY: No birth defects have been shown to occur in pregnant laboratory animals exposed to doses not toxic to the mother. However, some evidence of fetal toxicity such as delayed physical development has been seen at such levels. The available information on the effects of benzene on human pregnancies is inadequate but it has been established that benzene can cross the human placenta.
OCCUPATIONAL: The OSHA Benzene Standard (29 CFR 1910.1028) contains detailed requirements for training, exposure monitoring, respiratory protection and medical surveillance triggered by the exposure level. Refer to the OSHA Standard before using this product.

This product may contain detectable but varying quantities of the naturally occurring radioactive substance radon 222. The amount in the gas itself is not hazardous, but since radon rapidly decays (t1/2 = 3.82days) to form other radioactive elements including lead 210, polonium 210, and bismuth 210, equipment may contain radioactivity. The radon decay products are solids and therefore may attach to dust particles or form films and sludges in equipment. Inhalation, ingestion or skin contact with radon decay products can lead to the deposit (or presence) of radioactive material in the respiratory tract, bone, blood forming organs, intestinal tract, and kidney, which may lead to certain cancers. The International Agency for Research on Cancer (IARC) has classified radon as a Group 1 carcinogen. Some studies of people occupationally exposed to radiation indicate an increased incidence of chromosomal aberrations; the clinical significance of this increase is unknown. Risks can be minimized by following good industrial and personal hygiene practices noted in the section on storage and handling.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
This material is not expected to be harmful to aquatic organisms. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE
Ready Biodegradability: This material is expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State

and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: UN1971, NATURAL GAS, COMPRESSED, 2.1 ADDITIONAL INFORMATION - RQ (BENZENE) FOR SINGLE PACKAGES CONTAINING GREATER THAN OR EQUAL TO 10 LBS AND CONCENTRATION OF 200 PPM

IMO/IMDG Shipping Description: UN1971, NATURAL GAS, COMPRESSED, 2.1

ICAO/IATA Shipping Description: UN1971, NATURAL GAS, COMPRESSED, 2.1

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:

1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: YES
4. Sudden Release of Pressure Hazard: YES
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

Benzene	01-1, 02, 04, 05, 06, 07
Butane	05, 06, 07
Carbon dioxide	05, 06, 07
Ethane	05, 06, 07
Methane	05, 06, 07
Nitrogen	05, 06, 07
Propane	05, 06, 07

CERCLA REPORTABLE QUANTITIES(RQ)/EPCRA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Benzene	10 lbs	None	400 lbs

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 1 Flammability: 4 Reactivity: 0

HMIS RATINGS: Health: 1* Flammability: 4 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 2, 3, 4, 5, 6, 7, 8, 12, 15
Revision Date: NOVEMBER 01, 2011

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Attachment O

Attachment O
G70-A EMISSIONSRY SHEET

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
CBA-0050	**Upward Vertical Stack**	**NA**	**NA**	**CBA-1050**	**NSCR**	**Total VOCs** **NO_x** **CO** **$PM_{Filterable}$** **$PM_{Condensable}$** **Total HAPs** **Formaldehyde** **CO_2** **CO_2e**	**0.73** **8.97** **9.79** **<0.01** **0.03** **0.18** **0.17** **74.57** **74.65**	**3.21** **39.27** **42.88** **<0.01** **0.13** **0.77** **0.75** **326.63** **326.96**	**0.18** **0.23** **0.27** **<0.01** **0.03** **0.18** **0.17** **74.57** **74.65**	**0.80** **1.00** **1.20** **<0.01** **0.13** **0.77** **0.75** **326.63** **326.96**	**Gas**	**AP-42, 40CFR98**
BAP-0210	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-0310	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-0410	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
BAP-0610	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-0710	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-0810	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-0910	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
BAP-1010	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-1110	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-1210	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
BAP-1310	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
BAP-0012	**Upward Vertical Stack**	**NA**	**NA**	**NA**	**NA**	**Total VOCs** **NO_x** **CO** **PM_{10}** **Total HAPs** **Hexane** **CO_2** **CH_4** **CO_2e**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**<0.01** **0.10** **0.08** **<0.01** **<0.01** **<0.01** **146.22** **<0.01** **146.37**	**0.02** **0.43** **0.36** **0.03** **0.01** **0.01** **640.45** **0.01** **641.11**	**Gas**	**AP-42, 40CFR98**
CBA-0050	**Upward Vertical Stack**	**ABJ-0011(A-E), ABJ-0014**	**Produced Water Tanks**	**CBA-0050**	**VRU**	**Total VOCs** **Total HAPs** **Hexane** **Benzene** **Toluene** **Ethylbenzene** **Xylenes** **CO_2** **CH_4** **CO_2e**	**202.53** **8.12** **7.60** **0.08** **0.20** **0.08** **0.19** **0.50** **46.18** **1,155.07**	**887.07** **35.57** **32.27** **0.33** **0.86** **0.34** **0.82** **2.20** **202.28** **5,059.20**	**10.13** **0.41** **0.38** **<0.01** **0.01** **<0.01** **0.01** **0.03** **2.31** **57.75**	**44.35** **1.78** **1.66** **0.02** **0.04** **0.02** **0.04** **0.11** **10.11** **252.96**	**Gas**	**ProMax, 40CFR98**
ZZZ-0011	**Upward Vertical Stack**	**ZZZ-0011, ABJ-0014**	**Loading Rack, Blowdowns**	**NA**	**NA**	**Total VOCs** **Total HAPs** **CO_2** **CH_4** **CO_2e**	**0.25** **<0.01** **0.07** **0.45** **11.24**	**1.12** **0.01** **0.31** **2.35** **59.07**	**0.25** **<0.01** **0.07** **0.45** **11.24**	**1.12** **0.01** **0.31** **2.35** **59.07**	**Gas**	**AP-42, 40CFR98**

The EMISSION SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSIONS SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases

[3] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; M = modeling; O = other (specify).

G70-A FUGITIVE EMISSIONS SUMMARY SHEET

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions **Paved Haul Roads**	**NA**	**--**	**--**	**--**	**--**	**--**
Unpaved Haul Roads	**PM** **PM-10** **PM-2.5**	**4.20** **1.07** **0.11**	**14.51** **3.70** **0.37**	**4.20** **1.07** **0.11**	**14.51** **3.70** **0.37**	**AP-42**
Equipment Leaks	**Total VOC** **Total HAPs** **Hexane** **Toluene** **Ethylbenzene** **Xylene** **CO_2** **CH_4** **CO_2e**	**0.42** **0.02** **0.02** **<0.01** **<0.01** **<0.01** **<0.01** **59.56** **0.54**	**1.83** **0.10** **0.07** **0.01** **0.01** **0.02** **0.02** **2.38** **59.56**	**0.42** **0.02** **0.02** **<0.01** **<0.01** **<0.01** **<0.01** **59.56** **0.54**	**1.83** **0.10** **0.07** **0.01** **0.01** **0.02** **0.02** **2.38** **59.56**	**40CFR98**
Other	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; M = modeling; O = other (specify).