SE TECHNOLOGIES
98 VANADIUM ROAD
BUILDING D, 2nd FLOOR
BRIDGEVILLE, PA 15017
(412) 221-1100
(412) 257-6103 (FAX)
http://www.se-env.com

January 18, 2016

West Virginia Dept. of Environmental Protection
Division of Air Quality – Permitting Section
601 57th Street, SE
Charleston, WV 25304

**RE: Application for NSR Construction Permit
Big Moses Liquid Management Facility
Icon Midstream Pipeline, LLC
Tyler County, West Virginia**

To Whom It May Concern:

On behalf of our client, Icon Midstream Pipeline, we are pleased to submit on hard copy and two electronic copies of the Application for an NSR Construction Permit for its Big Moses Liquid Management Facility in Tyler County.

A fee in the amount of $2,000 ($1,000 Construction Permit Fee + $1,000 NSPS) was determined to be applicable. A check, payable to WVDEP – Division of Air Quality in the amount of $2,000 is included herein.

Icon is eager to begin operation of this equipment at the earliest practical date. Consequently, if there are any questions or concerns regarding this application, please contact me at 412/221-1100, x 1628 or rdhonau@se-env.com and we will provide any needed clarification or additional information immediately.

Sincerely,

SE TECHNOLOGIES, LLC

Roger A. Dhonau, PE, QEP
Principal

Enclosures
Cc: Icon Midstream Pipeline, LLC – Shane Dowell

ICON Midstream Pipeline, LLC

APPLICATION FOR
NSR CONSTRUCTION PERMIT

Big Moses Liquids Management Facility
Tyler County, West Virginia

TECHNOLOGIES

98 Vanadium Road
Bridgeville, PA 15017
(412) 221-1100

APPLICATION FOR NSR PERMIT
Icon Midstream Pipeline, LLC

Big Moses Liquids Management Facility

Tyler County, West Virginia

Table of Contents

SECTION I

Application Form

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.wvdep.org/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☒ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):* **Icon Midstream Pipeline, LLC**

2. Federal Employer ID No. ***(FEIN):*** **47-1115453**

3. Name of facility *(if different from above):* **Big Moses Liquids Management Facility**

4. The applicant is the: ☐ **OWNER** ☐**OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
75 Cross Winds Drive
Bridgeport, WV 26330

5B. Facility's present physical address:
None. Off of Big Moses Road near Alma, WV

6. **West Virginia 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 L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: **N/A**

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

– If **YES,** please explain: **Applicant has a lease agreement with the land owner for installation of the facility**
– If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): **Natural Gas Well Pad and Production Facility**

10. North American Industry Classification System **(NAICS)** code for the facility: **211111**

11A. DAQ Plant ID No. (for existing facilities only):

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):

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

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** 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 B**.

From Clarksburg, take US Route 50 west approximately 25 miles to Route 18 north (West Union Exist). Turn right on to Route 18 (north) and travel approximately 20 miles to the community of Alma. Pass through Alma. Continue on Route 18 approximately 1 mile to the intersection with County Route 1/3 (Indian Creek Road). Turn right onto Indian Creek Road and travel 2.9 miles. Turn right onto Big Moses Road. Bear right in 400 feet to entrance to the pad access road.

12.B. New site address (if applicable):	12C. Nearest city or town: **Alma**	12D. County: **Tyler**
12.E. UTM Northing (KM): **4364.529**	12F. UTM Easting (KM): **518.180**	12G. UTM Zone: **17**

13. Briefly describe the proposed change(s) at the facility: **Installation of natural gas and liquids management facility.**

14A. Provide the date of anticipated installation or change: **Upon Approval** – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: **Upon Approval**

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day **24** Days Per Week **7** Weeks Per Year **52**

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

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

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

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
   - Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**
27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**
28. Check all applicable **Emissions Unit Data Sheets** listed below: ☒ Bulk Liquid Transfer Operations ☐ Chemical Processes* ☐ Concrete Batch Plant ☐ Grey Iron and Steel Foundry ☐ Dehydration *****Leak Source Data Sheet Only ☒ Haul Road Emissions ☐ Hot Mix Asphalt Plant ☐ Incinerator ☒ Natural Gas Compressors ☐ Quarry ☐ Solid Materials Sizing, Handling and Storage Facilities ☒ Storage Tanks Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**
29. Check all applicable **Air Pollution Control Device Sheets** listed below:
☐ Absorption Systems ☐ Adsorption Systems ☐ Afterburner ☐ Baghouse ☐ Condenser ☐ Electrostatic Precipitator ☒ Flare ☐ Mechanical Collector ☐ Wet Collecting System
☒ Other Collectors, specify: **Catalyst and Vapor Recovery Unit** Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**
30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.
31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.** ➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.
32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.
33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)? ☐ **YES** ☒ **NO** ➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below: ☐ Authority of Corporation or Other Business Entity ☐ Authority of Partnership ☐ Authority of Governmental Agency ☐ Authority of Limited Partnership Submit completed and signed **Authority Form** as **Attachment R.**
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE [signature] *(Please use blue ink)* DATE: 1-14-2016 *(Please use blue ink)*

35B. Printed name of signee: Shane Dowell		35C. Title: Operations Manager
35D. E-mail: **iconmidstream@gmail.com**	36E. Phone: **304/904-1700**	36F. FAX: **304/628-3111**
36A. Printed name of contact person (if different from above):		36B. Title:
36C. E-mail:	36D. Phone:	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☒ **Attachment B: Map(s)**
- ☒ **Attachment C: Installation and Start Up Schedule**
- ☒ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☐ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☒ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims**
- ☐ **Attachment R: Authority Forms**
- ☐ **Attachment S: Title V Permit Revision Information**
- ☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
- ☐ ***For Title V Administrative Amendments:***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
- ☐ ***For Title V Minor Modifications:***
  - ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
- ☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  - ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  - ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  - ☐ ***EPA has 45 day review period of a draft permit.***

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

SECTION II

Attachments

ATTACHMENT A

Business Registration

State of West Virginia

Certificate

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

Icon Midstream Pipeline, LLC

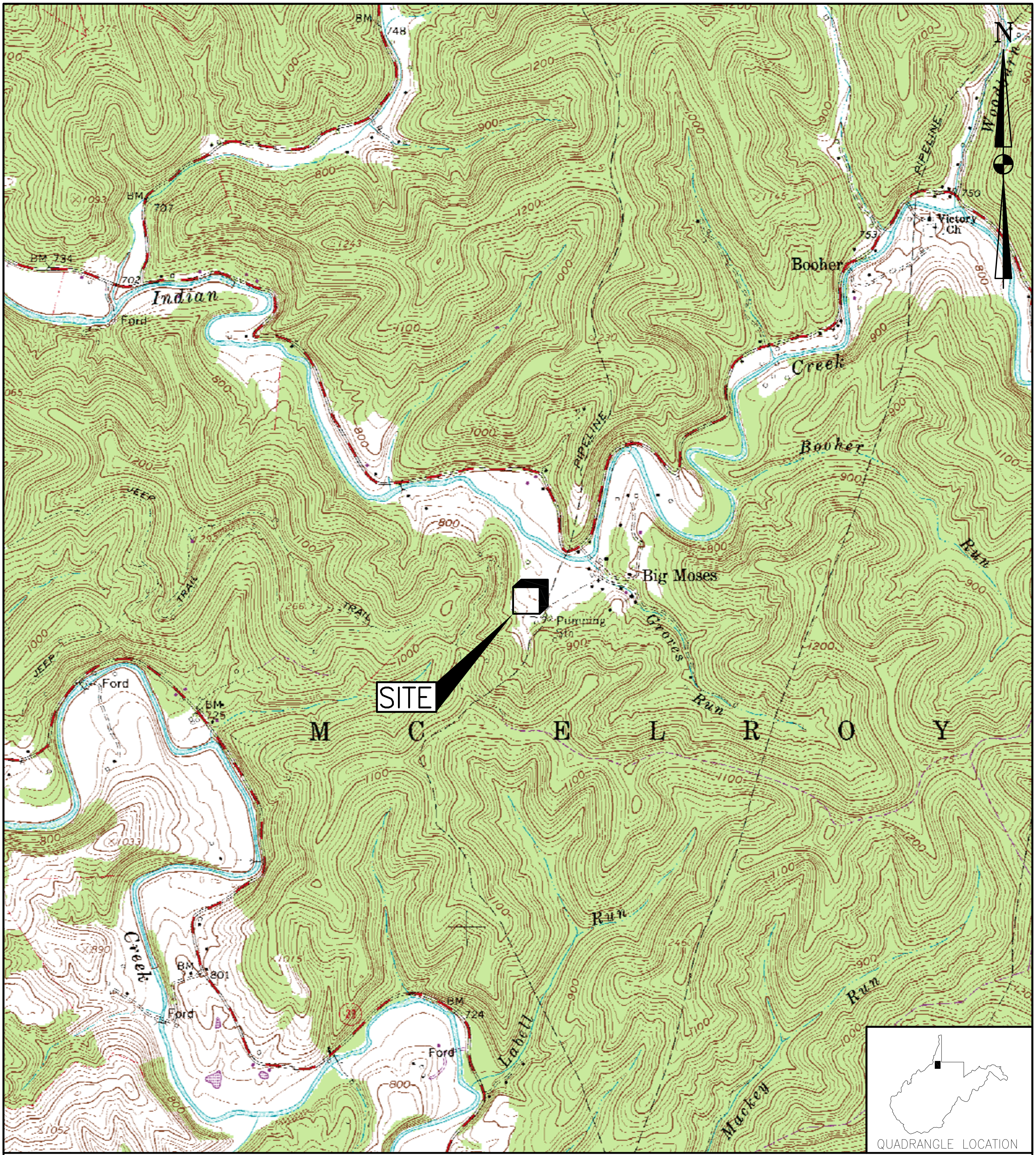
has filed the appropriate registration documents in my office according to the provisions of the West Virginia Code and hereby declare the organization listed above as duly registered with the Secretary of State's Office.

Given under my hand and
the Great Seal of West Virginia
on this day of
March 13, 2015

Secretary of State

ATTACHMENT B

Site Location Map



REFERENCE: USGS 7.5' QUADRANGLE MAP OF: SHIRLEY, WEST VIRGINIA; DATED 1961, PHOTOREVISED 1989.

DRAWN BY DJF	SE TECHNOLOGIES	ICON MIDSTREAM, LLC
DATE 1/5/16	98 Vanadium Road Bridgeville, PA 15017 (412) 221-1100	BIG MOSES LIQUIDS MANAGEMENT FACILITY TYLER COUNTY, WEST VIRGINIA SITE LOCATION MAP
CHECKED BY RAD		DRAWING NO. FIGURE 1
SET JOB NO. 215095		REV. 0
SET DWG FILE BIG MOSES LIQ MANAGEm01.dwg		
DRAWING SCALE 1"=2000'		

Plot: env045 01/05/2016 13:09 G:\ICON MIDSTREAM, LLC\215095\BIG MOSES LIQ MANAGEm01.dwg

ATTACHMENT C

Construction Schedule

Icon Midstream Pipeline, LLC
Big Moses Liquids Management Facility
Attachment C – Construction Schedule

Icon seeks approval to install a natural gas and liquids management facility in Big Moses. Upon receipt of approval of this application, Icon will install the equipment and connect to existing gathering lines. It is anticipated that all work can be completed within 30 days of receipt of approval.

ATTACHMENT D

Regulatory Analysis

Icon Midstream Pipeline, LLC

Big Moses Liquids Management Facility
Attachment D – Regulatory Analysis

Both State and Federal environmental regulations governing air emissions apply to the planned Big Moses Station. The West Virginia Department of Environmental Protection (WVDEP) has been delegated the authority to implement certain federal air quality requirements for the state. Air quality regulations that potentially affect the modification are discussed herein.

1.1 PSD and NSR

The facility will be a minor source with respect to Prevention of Significant Deterioration (PSD) regulations as it will not have the potential to emit more than the annual emission thresholds of any PSD regulated pollutant with the voluntary restrictions (e.g., catalytic converters on engines).

The facility is within an area designated as attainment. Consequently, the facility is not subject to the New Source Review (NSR) regulations.

1.2 Title V Operating Permit Program

West Virginia has incorporated provisions of the federal Title V operating permit program. Thresholds for inclusion under the Title V program are 10 tpy of any single Hazardous Air Pollutant (HAP) or 25 tons of any combination of HAP and/or 100 tpy of all other regulated pollutants. Additionally, facilities regulated under certain New Source Performance Standards (NSPS) require facilities to have Title V permits.

The facility will be a minor source. Additionally, the NSPS regulating this facility does not trigger a Title V permit. Hence, a Title V permit will not be required for Icon Midstream's Big Moses Liquids Management Facility.

1.3 Aggregation

Source aggregation determinations are typically made based on the following criteria:

- Whether the facilities are under common control,
- Whether the facilities belong to the same Major Group (i.e. the first two digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement;
- Whether the facilities are located on one or more contiguous or adjacent properties; and the distance between all pollutant emitting activities,
- Whether the facilities can operate independently

<u>Only if all criteria are met does a permitting authority aggregate the facilities into a single source.</u>

The Icon Midstream facility will receive produced liquids and natural gas from area well pads via pipeline. After separation of liquids from the gas, a small fraction of the gas is taken for powering facility equipment with the vast majority being metered and routed to the contiguous Big Moses Station owned and operated by Jay-Bee Oil & Gas. The received liquids are separated into produced water, condensate and NGL prior to off-site shipment via truck transportation.

There are no liquids or gas routed to or received from any other Icon Midstream facility. Hence, no other Icon Midstream facilities in the area should be aggregated with this new facility. Additionally, gas and liquids generated by the well pads this facility will serve can be routed to other locations, such as is currently the situation. Hence, there is no interdependency between the well pads this Icon Midstream facility will serve and the Icon Midstream facility. Thus, the planned Icon Midstream facility should not be aggregated with the well pads it will serve. Additionally, this Icon Midstream facility is approximately 1.3 miles from the nearest well pad it serves.

The contiguous Big Moses Station, while under the same general SIC Code, has completely separate ownership (Jay-Bee Oil & Gas) and there is no sharing of staff. Although the two facilities are contiguous, there is no interdependency between the two facilities. Liquids received by the Icon Midstream facility are managed separately from the gas and liquids received and managed at the contiguous Jay-Bee facility. Additionally, gas routed from the Icon facility to Big Moses Station represents only a portion of the gas managed by Big Moses Station. Hence, it is not dependent upon gas received by Icon for continued operation. Conversely, the Icon facility can route the gas it receives to other compressor stations, albiet at a lower flow rate. Hence, the Icon facility is not dependent upon the Jay-Bee Big Moses Station. Thus, there is no dependency relationship. Therefore, emissions from the Big Moses Liquids Management Facility should not be aggregated with Jay-Bee's Big Moses Station to determine major source status.

1.4 New Source Performance Standards

New Source Performance Standards (NSPS) regulations promulgated under 40 CFR 60 require new and reconstructed facilities to control emissions to the level achievable by Best-Available Control Technology (BACT). Specific NSPS requirements potentially applicable to the proposed modification to the Big Moses Station are as follows:

- 40 CFR 60, Subpart K/Ka/Kb – Storage Vessels for Petroleum Liquids/Volatile Organic Liquids
- 40 CFR 60, Subpart Dc—Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
- 40 CFR 60, Subpart KKK – Equipment Leaks of VOC from Onshore Natural Gas Processing Stations
- 40 CFR 60, Subpart IIII – Stationary Compression Ignition Internal Combustion Engines
- 40 CFR 60, Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines

- 40 CFR 60, Subpart OOOO **-** Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

1.4.1 Subpart K/Ka/Kb

These three subparts apply to volatile organic liquid storage tanks of specific sizes constructed in certain timeframes. Their consideration is appropriate due to the presence of the condensate tanks. Subpart K applies to tanks constructed or modified between 1973 and 1978 while Subpart Ka applies to tanks constructed between 1978 and 1984. Subpart Kb applies to storage tanks constructed or modified after 1984. The condensate tanks planned for this facility were constructed after 1984. Thus, Subparts K and Ka are not applicable, but Subpart Kb is tentatively applicable. However, the capacity of these tank (16,800 gallons or 400 BBL) is less than the threshold for this regulation (19,800 gallons or 75 cubic meters). Hence, the rule does not apply. [40 CFR 60.111(a)(1), 40 CFR 60.111a(a)(1) and 40 CFR 60.110b(d)(2)]

1.4.2 Subpart Dc

This subpart limits SO2 and PM emissions from boilers and heaters fired by various fuels. While the primary thrust of this set of regulations it to control SOx and PM emissions from coal and oil-fired boilers and heaters, natural gas fired units are also covered under this rule. The planned heaters are well below the threshold of coverage for this rule (10 MMBTU/Hr). Thus, this rule does not apply.

1.4.3 Subpart KKK

This subpart limits VOC emissions from equipment at a natural gas processing station. In accordance with 40 CFR 60.631, a "*Natural gas processing plant* (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both." Although the planned facility will separate received liquids into NGL and condensate, this operation does not rise to the definition of fractionation into products. Hence, the planned facility does not meet the definition of a processing station under this rule and this rule does not apply.

1.4.4 Subpart IIII

This subpart governs emissions from new compression ignition internal combustion engines CI ICE) manufactured after July 11, 2005. There are currently no compression ignition engines (e.g. diesel-fired emergency generator) at this station. The proposed modification will include only the addition of a single Spark Ignition Internal Combustion Engine. Hence, this rule does not apply.

1.4.5 Subpart JJJJ

This subpart governs emissions from new stationary spark ignition internal combustion engines (SI ICE) manufactured after July 1, 2007. The drivers for the VRU and Flash Gas Compressors presented in this application will be SI ICE units manufactured after this date. Accordingly, this rule applies to those engines. In accordance with 40 CFR 60.4233(d), the 47 Hp Flash Gas

Compressor must meet the requirements of 40 CFR 1048.101(c). In accordance with this rule, the HC + NO_X standard is 3.8 g/kW-hr and the CO standard is 6.5 g/kW-hr. The engine will meet this requirement. Thus, the engine is compliant with Subpart JJJJ.

1.4.6 Subpart OOOO

This subpart governs emissions from a broad spectrum of operations in the oil and natural gas industries, including operations at processing and fractionation plants. The potentially applicable sections of this rule set restrictions on pneumatic controllers present and set requirements for storage vessels with potential VOC emissions greater than 6 tons per year. This rule applies to the planned Icon Midstream facility.

One of the key components to this rule [40 CFR 60.5390(b)] is the requirement that all pneumatic controllers located between the well head and a processing plant must have a bleed rate of less than 6 scfh. All pneumatic controllers to be installed at the new station will meet these criteria.

This rule also stipulates that storage vessels with VOC emissions equal to or greater than 6 tpy must control those emissions by 95% by October 15, 2013. The condensate tanks will have estimated uncontrolled VOC emissions in excess of this amount. Hence this element of the rule applies to the planned facility. Icon Midstream will meet this requirement through installation of a vapor recovery unit. This device will collect organic vapors emitted by the condensate, compress it and routed to the inlet side of the adjacent Jay-Bee Big Moses facility. This system is anticipated to be close to 100 percent effective during operation. While there will be anticipated maintenance outages on the VRU system, its overall annual effectiveness is conservatively projected to be greater than 95%. For permitting purposes only a 95% control is claimed.

1.5 National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAPs) promulgated under 40 CFR 63 regulate the emission of Hazardous Air Pollutants (HAPs) from certain industrial processes. In general, these rules apply to major sources of HAPs with a major source being defined as having the potential to emit more than 10 tpy of any individual HAP or 25 tpy of total HAPs. Emissions standards under these rules have been established as the Maximum Achievable Control Technology (MACT) for each source category. The following NESHAP source category standards are potentially applicable to the planned modification to the Big Moses Liquids Management Facility:

- 40 CFR 63, Subpart HH – NESHAP from Oil and Natural Gas Production Facilities
- 40 CFR 63, Subpart ZZZZ – NESHAP from Stationary Reciprocating Internal Combustion Engines
- 40 CFR 63, Subpart DDDDD – NESHAP for Industrial, Commercial and Institutional Boilers and Process Heaters

1.5.1 Subpart HH

This Subpart contains MACT standards for major and area source dehydration units located at natural gas production facilities. The proposed equipment for this Icon Midstream facility does not contain a dehydration operation. Hence, this rule does not apply.

1.5.2 Subpart ZZZZ

This Subpart governs emissions from a stationary reciprocating internal combustion engine (RICE) located both at major and area source of HAPs. The facility is not be a major source of HAPs, but is considered an area source of HAPs. Hence, this rule is potentially applicable to the facility. In accordance with 40 CFR 63.6590(a)(2)(iii), the driver for the proposed emergency generator will not be considered an Existing Stationary RICE. It will be considered "new" engines. Thus, the engine will meet the requirements of this rule by meeting the requirements of NSPS, Subpart JJJJ as described above.

1.5.3 Subpart DDDDD

This Subpart applies to industrial process heaters of various sizes and fuel types located at facilities that are classified as a major source of HAPs. As the planned facility is not a major source of HAPs, this rule does not apply.

1.6 Chemical Accident Prevention

Subparts B-D of 40 CFR 68 present the requirements for the assessment and subsequent preparation of a Risk Management Plan (RMP) for a facility that stores more than a threshold quantity of a regulated substance listed in 40 CFR 68.130. If a facility stores, handles or processes one or more regulated substances in an amount greater than its corresponding threshold, the facility must prepare and implement an RMP. The Big Moses Liquids Management Facility does potentially store more than 10,000 lbs of a flammable mixture containing several of the substances listed in Table 3 in 40 CFR 68.130. However, an RMP is not required as this facility qualifies for the exclusion provided for remote oil and gas production facilities (40 CFR 68.115). The addition of an emergency generator does not change the status of the facility with respect to RMP.

1.7 West Virginia State Requirements

1.7.1 45 CSR 2

The facility is subject to the opacity requirement of 45 CSR 2. Emissions from the facility cannot exceed 10% over any six minute period.

1.7.2 45 CSR 4

This regulation prohibits the emission of objectionable odors. Icon Midstream is obligated to run the station in a manner that does not produce objectionable odors.

1.7.3 45 CSR 10

This regulation limits emissions of sulfur oxides. As the sulfur content of the Inlet Gas contains no measurable sulfur, emissions of sulfur oxides is negligible. Thus, while parts of this rule are applicable to the facility, no actions are required on the part of Icon Midstream to attain compliance. The various non-engine combustion units have a design heat input less than 10 MMBTU/Hr and are therefore exempt from the requirements of this rule. Additionally, other fuel-burning units at the expanded facility (e.g. engines) are not subject to 45 CSR 10, Section 3 as they do not produce power by indirect heat transfer and are therefore not considered “fuel burning units”. The fuel sulfur content is sufficiently low that the proposed engines will easily meet the requirements of this rule.

1.7.4 45 CSR 13

The state regulations applicable to the permitting of the proposed construction are in Title 45 Series 13 of the Code of State Regulations. The proposed modification to Big Moses Liquids Management Facility has the potential to emit several regulated pollutants in excess of the thresholds that define a Stationary Source. This modification will not materially change the facility’s potential to emit. It will remain less than the thresholds that would classify the facility as a Major Source under 45 CSR 14.

1.7.5 45 CSR 16

This series of regulations is an incorporation, by reference, of the New Source Performance Standards codified under 40 CFR 60. As discussed under the federal regulations, the Big Moses Liquids Management Facility is subject to the emission limitations, monitoring, testing and recordkeeping of Subpart JJJJ.

1.7.6 45 CSR 30

The state regulations applicable to Title V operating permits are in Title 45 Series 30. The planned Big Moses Liquids Management Facility, as noted above, does not have the potential to emit any regulated pollutant about the threshold that would define it as a major facility. The installation of an emergency generator does not trigger the need for a Title V permit.

1.7.7 Other Applicable Requirements

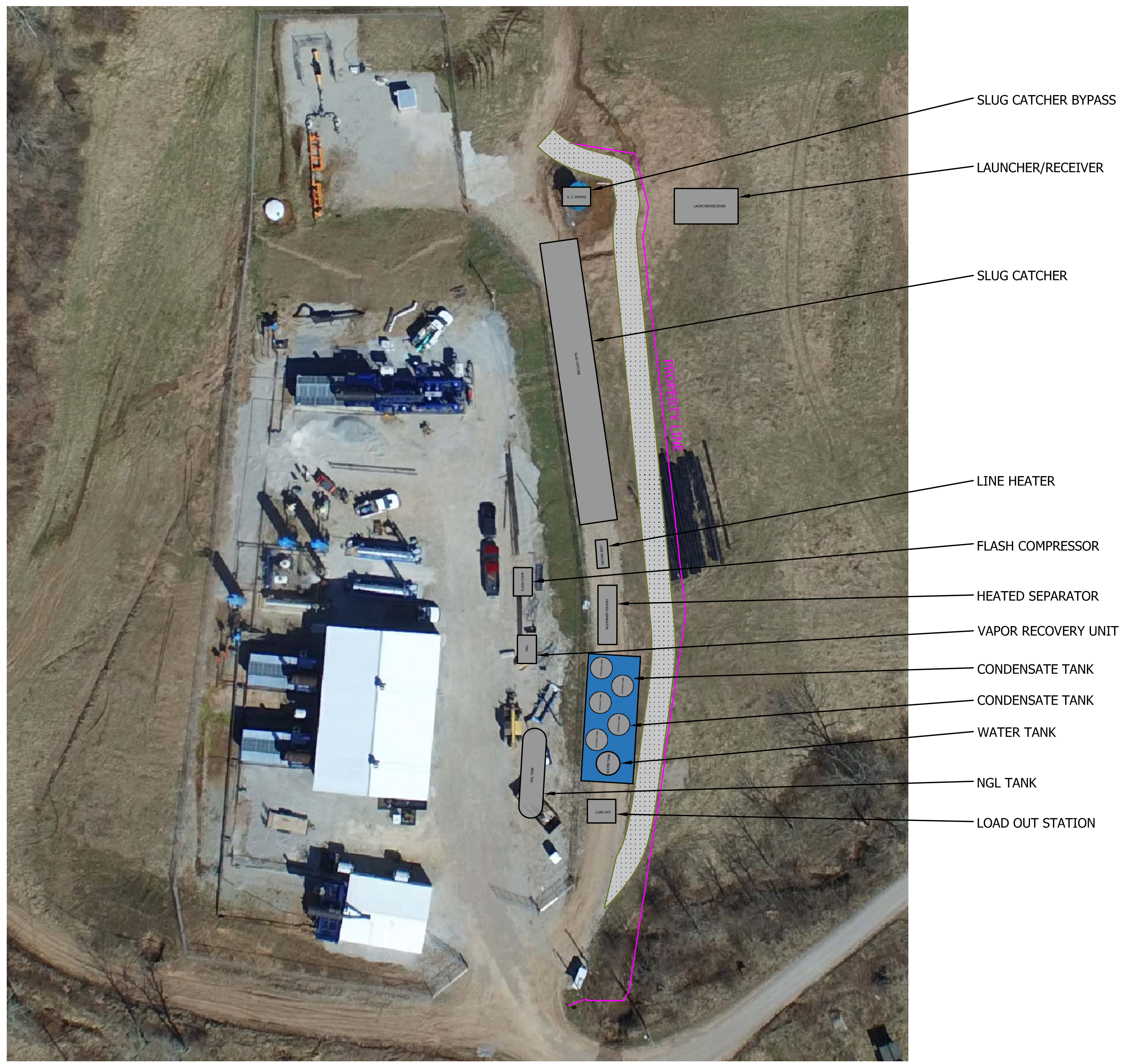
Through Series 34, WVDEP has adopted the National Emission Standards for Hazardous Air Pollutants for Source Categories. Both of these topics have been addressed above.

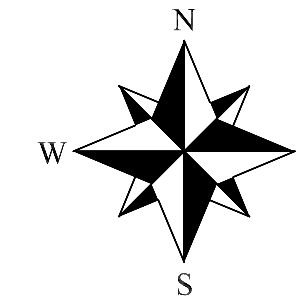
ATTACHMENT E

Site Layout Diagram

NOTES:
1) FACILITY LAYOUT PER CLIENT FIELD MEETING ON 08/18/2015
2) EQUIPMENT ARRANGED BY GOVAN ENGINEERING
3) PROPERTY LINE PROVIDED BY CLIENT
4) NO SURVEY OR GEOTECH HAS BEEN COMPLETED

PLAN VIEW





REV	DATE	REV	DATE
0	8-21-2015		

ICON MIDSTREAM

GOVAN ENGINEERING
By Industry we Prosper

GOVAN ENGINEERING, LLC IS NOT RESPONSIBLE FOR LOCATING UNDERGROUND UTILITIES, LAND SURVEY OR DETERMINATION OF PLOT PLAN BOUNDARY REGARDING PIPING OR EQUIPMENT PLACEMENT. CONTRACTOR WILL VERIFY AUTHORIZED LAND USE WITH UTILITIES AND LAND OWNERS, THEN SURVEY AND STAKE ACCORDINGLY. CONTRACTOR WILL CALL 811 AT LEAST (2) DAYS BEFORE ACTUAL EXCAVATION. CONTRACTOR SHALL ALSO EXERCISE EXTREME CARE IN ALL ITS OPERATIONS TO AVOID DAMAGING EXISTING PIPELINES AND OTHER FACILITIES AND SHALL FURNISH THE NECESSARY MATERIALS, LABOR AND EQUIPMENT AND SHALL REPAIR, AT ITS SOLE COST ANY DAMAGED FACILITIES WHEREIN DAMAGE IS ATTRIBUTABLE TO CONTRACTOR'S OPERATIONS. PERMITS FOR ROAD CROSSINGS AND TEMPORARY ROAD ACCESS ARE COORDINATED VIA **COLDWATER CONSULTING, LLC | CINCINNATI, OHIO | PHONE: 513-221-2981**

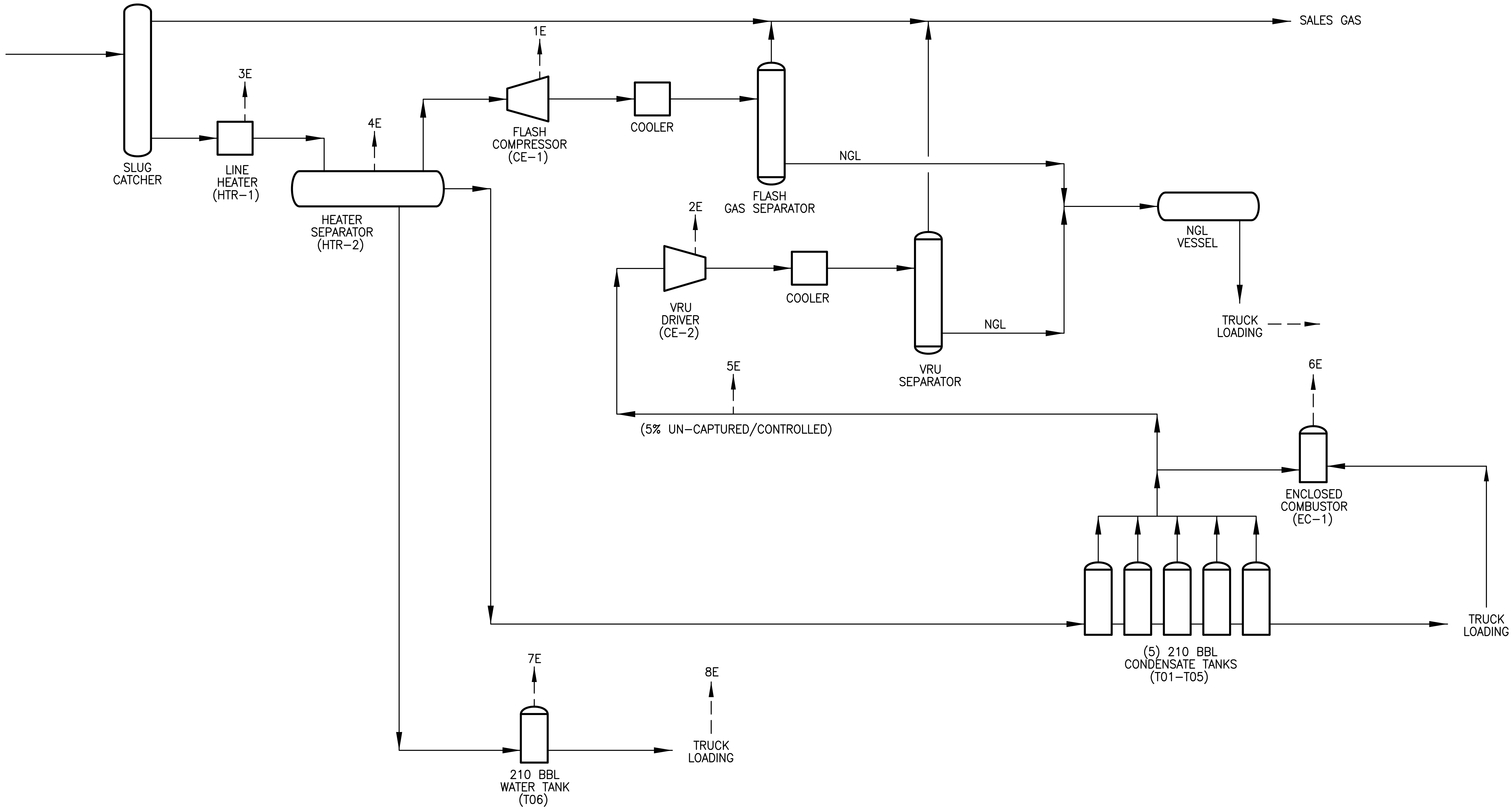
TITLE: BIG MOSES EQUIPMENT GENERAL ARRANGEMENT

CUSTOMER: ICON MIDSTREAM

DRAWN: RMG	DATE: 08-21-2015	
SCALE: DO NOT SCALE		
DRAWING NO. 100102-D032	SHEET 1 OF 1	REV. 0

ATTACHMENT F

Process Flow Diagram



LEGEND:

— — ► EMISSION POINT

DRAWN BY	DJF
DATE	1/13/16
CHECKED BY	RAD
SET JOB NO.	215095
SET DWG FILE	BIG MOSES FDb01.dwg
DRAWING SCALE	N.T.S.

SE TECHNOLOGIES
98 Vanadium Road Bridgeville, PA 15017 (412) 221–1100

ICON MIDSTREAM, LLC

BIG MOSES FACILITY
ALMA, WEST VIRGINIA
PROCESS FLOW DIAGRAM

DRAWING NAME: FIGURE 2

REV. 0

Plot: env045 01/15/2016 11:49 G:\ICON MIDSTREAM, LLC\215095\BIG MOSES FDb01.dwg

ATTACHMENT G

Process Description

Icon Midstream Pipeline, LLC
Big Moses Liquids Management Facility
Attachment G – Process Description

Icon Midstream plans to install its Big Moses Liquids Management Facility contiguous with the Jay-Bee Oil & Gas Big Moses Station in Tyler County. (See Site Location Map). The Station will receive and manage natural gas and produced fluids (primarily raw condensate) from area production well pads owned and operated by others. At the station inlet, gas and produced fluids will be passed through a slug catcher where liquids will be separated from the gas. The gas will be routed to the inlet of the adjacent Jay-Bee Oil & Gas Big Moses station to be compressed, dehydrated and injected into pipelines for transportation to facilities owned by others for further processing. A portion of the gas will be used as fuel for Icon's equipment.

Liquids exiting the Slug Catcher will pass through a line heater and then enter a heated separator. In the heated separator, the liquids are first separated into Condensate and Produced Water (Brine). As the pressure is reduced, lighter components of the condensate is flashed off. The stabilized condensate is routed to a series of five 210 BBL aboveground storage tanks prior to transportation (via truck) to a processing facility owned and operated by others. The separated water is routed to a single 210 BBL aboveground storage tank prior to off-site transportation by others for re-use or disposal. The flash gas coming off of the heated separator will be routed to a flash gas compressor and passed through an air cooler. A fraction of the flash gas condenses during the pressurization and cooling process. This liquid (Natural Gas Liquids or NGL) will then be accumulated in a pressure vessel (approximately 120 psia) and transported via a pressurized tanker truck to a fractionation facility owned by others for further processing.

Vapors emitted by the stabilized condensate storage tanks will be captured by a hard piping system that will route the vapors to a Vapor Recovery Unit (VRU). This unit will compress the vapors and inject the gas into the sales line. Any liquids condensing during this pressurization and cooling process are routed to the NGL tank.

Any vapors not handled by the VRU or Flash Gas compressor will be controlled by enclosed combustors if/when one or both of the VRU or Flash Gas compressor are down for maintenance or other mechanical reasons. Vapors associated with produced water and condensate truck loading will also be routed to the enclosed combustor. As NGL truck loading will be via vapor balance between the pressurized storage vessels and the pressurized tanker truck, there will only be emissions associated with the connection/disconnection of the transfer lines.

In summary, emission sources at this facility will include the following:

- One Flash Gas Compressor Engine – Arrow VR 260 47 Hp
- One VRU Gas Compressor Engine – Cummins G8.3 118 Hp
- One 250 MBTU/Hr Line Heater
- One 1.0 MMBTU/Hr Separator Heater
- Five 210 BBL Stabilized Condensate Tanks
- One 210 BBL Produced Water Tank
- Stabilized Condensate/Produced water truck loading
- NGL truck loading
- Fugitive Emissions – Facility Roadways
- Fugitive Emissions – Component Leaks

ATTACHMENT I

Emission Unit Table

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]
CE-1	1E	Flash Gas Compressor Engine (Arrow VR 260)	Upon Receipt of Permit	47 Hp	**NEW**	1C (NSCR)
CE-2	2E	VRU Compressor Engine (Cummins G8.3)	Upon Receipt of Permit	118 Hp	**NEW**	2C (NSCR)
HTR-1	3E	Line Heater	Upon Receipt of Permit	0.25 MMBTU/Hr	**NEW**	None
HTR-2	4E	Separator Heater	Upon Receipt of Permit	1.0 MMBTU/Hr	**NEW**	None
T01	5E/6E	Condensate Tank	Upon Receipt of Permit	210 BBL	**NEW**	VRU-1/EC-1
T02	5E/6E	Condensate Tank	Upon Receipt of Permit	210 BBL	**NEW**	VRU-1/EC-1
T03	5E/6E	Condensate Tank	Upon Receipt of Permit	210 BBL	**NEW**	VRU-1/EC-1
T04	5E/6E	Condensate Tank	Upon Receipt of Permit	210 BBL	**NEW**	VRU-1/EC-1
T05	5E/6E	Condensate Tank	Upon Receipt of Permit	210 BBL	**NEW**	VRU-1/EC-1
EC-1	6E	Enclosed Combustor	Upon Receipt of Permit	62 MMBTU/Hr	**NEW**	N/A
T06	7E	Produced Water Tank	Upon Receipt of Permit	210 BBL	**NEW**	None
TL-1	6E	Condensate Truck Loading	Upon Receipt of Permit	1,050,000 Gallons/Yr.	**NEW**	EC-1
TL-2	8E	Produced Water Truck Loading	Upon Receipt of Permit	58,800 Gallons/Yr.	**NEW**	None
---	---	Fugitive VOC Emissions – Fittings and Connections	Upon Receipt of Permit	N/A	**NEW**	None
---	---	Haul Roads	Upon Receipt of Permit	1 Truck per day max.	**NEW**	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheets

ATTACHMENT J
Emission Points Data Summary Sheet
New Equipment Only

Table 1: Emissions Data

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)* ID No.	Emission Unit Vented Through This Point Source	Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)* ID No.	Air Pollution Control Device Type	Vent Time for Emission Unit *(chemical processes only)* Short Term[2]	Vent Time for Emission Unit Max (hr/yr)	All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4] lb/hr	Maximum Potential Uncontrolled Emissions[4] ton/yr	Maximum Potential Controlled Emissions[5] lb/hr	Maximum Potential Controlled Emissions[5] ton/yr	Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m[4])
1E	Upward Vertical Stack	CE-1	Flash Comp. Driver Engine	1C	NSCR	C	8760	NO_x	1.33	5.81	0.21	0.91	GAS	EE	
								CO	0.53	2.31	0.41	1.81	GAS	EE	
								VOC	0.01	0.06	0.01	0.06	GAS	EE	
								SO_2	<0.01	<0.01	<0.01	<0.01	GAS	EE	
								PM/PM10	<0.01	<0.01	<0.01	0.01	Solid	EE	
								Formaldehyde	0.01	0.04	0.01	0.04	Gas	EE	
								CO2e	54	238	54	238	Gas	EE	
2E	Upward Vertical Stack	CE-2	VRU Driver Engine	2C	NSCR	C	8760	NO_x	3.88	14.81	0.26	1.14	GAS	EE	
								CO	2.24	9.80	0.52	2.28	GAS	EE	
								VOC	0.03	0.13	0.03	0.13	GAS	EE	
								SO_2	<0.01	<0.01	<0.01	<0.01	GAS	EE	
								PM/PM10	0.05	0.22	0.05	0.22	Solid	EE	
								Formaldehyde	0.02	0.09	0.02	0.09	Gas	EE	
								CO2e	124	542	124	542	Gas	EE	

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)*		Vent Time for Emission Unit *(chemical processes only)*		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]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
3E	Upward Vertical Vent	HTR-1	Line Heater		None	C	8760	NO_x	0.02	0.09	0.02	0.09	GAS	EE	
								CO	0.02	0.07	0.02	0.07	GAS	EE	
								VOC	<0.01	<0.01	<0.01	<0.01	GAS	EE	
								PM/PM10	<0.01	0.01	<0.01	0.01	Solid	EE	
								Benzene	<0.01	<0.01	<0.01	<0.01	Gas	EE	
								Formaldehyde	<0.01	<0.01	<0.01	<0.01	Gas	EE	
								CO2e	25	107	25	107	Gas	EE	
4E	Upward Vertical Vent	HTR-2	Separator Heater		None	C	8760	NO_x	0.08	0.36	0.08	0.36	GAS	EE	
								CO	0.07	0.30	0.07	0.30	GAS	EE	
								VOC	<0.01	0.02	<0.01	0.02	GAS	EE	
								PM/PM10	0.01	0.03	0.01	0.03	Solid	EE	
								Benzene	<0.01	<0.01	<0.01	<0.01	Gas	EE	
								Formaldehyde	<0.01	<0.01	<0.01	<0.01	Gas	EE	
								CO2e	98	430	98	430	Gas	EE	

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)*		Vent Time for Emission Unit *(chemical processes only)*		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]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
5E	Upward Vertical Vent	T01-T05	Cond. Tanks + Water Tank Un-captured emissions	VRU-1	Vapor Recovery Unit	C	8760	NO_x					GAS	EE	
								CO					GAS	EE	
								VOC	111.26	487.3	5.50	24.37	GAS	EE	
								PM/PM10					Solid	EE	
								Benzene					Gas	EE	
								n-Hexane	3.33	14.6	0.17	0.73	Gas	EE	
								CO2e					Gas	EE	
6E	Upward Vertical Vent	EC-1	Cond. Tanks + Truck Loading	EC-1	Enclosed Combustor	S	500	NO_x			0.30	0.06	GAS	EE	
								CO			1.65	0.32	GAS	EE	
								VOC			3.40	0.63	GAS	EE	
								PM/PM10			<0.01	<0.01	Solid	EE	
								Benzene			<0.01	<0.01	Gas	EE	
								n-Hexane			0.07	0.02	Gas	EE	
								CO2e					Gas	EE	

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)*		Vent Time for Emission Unit *(chemical processes only)*		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]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
7E	Upward Vertical Vent	T06	Produced Water Tank		None			NO_x					GAS	EE	
								CO					GAS	EE	
								VOC		0.16		0.16	GAS	EE	
								PM/PM10					Solid	EE	
								Benzene		<0.01		<0.01	Gas	EE	
								n-Hexane		<0.01		<0.01	Gas	EE	
								CO2e					Gas	EE	
8E	Upward Vertical Vent	TL-21	Produced Water Truck Loading		None			NO_x					GAS	EE	
								CO					GAS	EE	
								VOC	0.13	<0.01	0.13	0.13	GAS	EE	
								PM/PM10					GAS	EE	
								Benzene					Solid	EE	
								Formaldehyde					Gas	EE	
								CO2e					Gas	EE	

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that un-captured 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 EMISSION POINTS DATA 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., un-captured 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. Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
3. List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, etc. **DO NOT LIST** CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.
4. 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).
5. 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).
6. Indicate method used to determine emission rate as follows:
   MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT J

Emission Points Data Summary Sheet
New Equipment

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^oF)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
1E	0.5	1050	310	45	750	8		
2E	0.5	1127	528	45	750	8		
3E	0.25	1100	Est 200	1	750	8		
4E	0.33	1100	Est. 300	<1	750	8		
5E	N/A (Fugitive)	N/A (Fugitive)	N/A (Fugitive)		750			
6E	2.0	1100	Est. 300		750	12		
7E	0.5	Ambient	<10	<1	750	15		
8E	0.5	Ambient	3-4	<1	750	10		

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Summary Sheet

Icon Midstream Pipeline, LLC
Big Moses Liquids Management Facility
Attachment K – Fugitive Emissions Data

Equipment Fugitive Emissions

As noted in the process description, Icon Midstream Pipeline plans to install various equipment at its Big Moses Liquids Management Facility. This equipment will contain a variety of piping containing natural gas and separated liquids under pressure. During the normal course of operation minor leaks from valves, pressure release devices and various fittings associated with this piping may occur. The number of valves, flanges, etc. has been estimated to reflect the equipment that will be installed with this permit. A potential emission rate of 1.67 tpy of VOCs and 8.25 tpy CO_2e has been estimated.

Estimates of these emissions are included in the calculations (Attachment N) and summarized on the form included in this section. These calculations are based on emission factors accepted by the American Petroleum Institute and EPA.

Pigging Emission Estimates

There will be launching and receiving operations at this facility. The interior volume of both the receiver and launcher is approximately 64 cubic feet. Thus, as shown in the calculations in Attachment N, each launching and receiving event will release 4930 cubic feet of gas. With a density of 0.058 lb/cubic foot, each event will release approximately 286 pounds of gas. VOCs comprise 18.3% (by weight) of this gas. Thus, each event releases 52.3 pounds of VOCs. Additionally, with methane comprising 60.7% (by weight) of this gas, each event releases 173.6 lbs of methane or 2.17 tons CO_{2e}. It is anticipated that there will be a maximum of 150 launching and receiving events each per year. Thus, annual pigging and receiving emissions will be 7.85 tons of VOCs and 651 tons of CO_{2e}.

Facility Blowdown Emission Estimates

There will be two small gas compressors associated with emissions control equipment that will require blowdowns to allow for routine maintenance. As shown in the attached spreadsheets, the blowdown volume associated with the VGR260 driver is 89 scf and for the G8.3 is 433 scf. There will be a maximum of 36 blow downs per compressor per year. Thus, there is a potential for 18,792 cubic feet of gas emitted from blow downs [(89+433)x36].

The density of this gas at STP is 0.058 lb/scf (see the Inlet Gas spreadsheet in the calculations). Thus, the mass of gas released is 1090 pounds (18,792 x 0.058). As the percentage of VOCs in the gas (by weight) is 18.3 percent (see Inlet Gas spreadsheet in the calculations), the VOC emissions from pigging operations are estimated at approximately 199.5 lbs or 0.10 tons per year.

As the methane concentration in this gas is 60.7 % (by weight), methane emissions will be 662 pounds (1090 x 0.607) per year. Using a GHG factor of 25, methane emissions from blowdowns in CO_{2e} will be 8.3 tons CO_2e (166.1 x 25[GHG factor] /2000).

Storage Tank and Haul Road Fugitive Emissions

Water and condensate this facility will be accumulated in atmospheric tanks prior to off-site shipment In addition to flash, working and breathing losses from these tanks (presented in Attachment N), there will be emissions associated with the loading of the condensate tanks and fugitive dust emissions from the tank trucks entering and exiting the site. There will be a projected maximum of one condensate, NGL and/or water truck trips per day. Emissions from these sources are summarized in the attached form and the calculations are presented in Attachment N.

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA 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).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No ☒ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No ☒ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☒ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered “NO” to all of the items above, it is not necessary to complete the following table, “Fugitive Emissions Summary.”

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						
Unpaved Haul Roads	PM	10.6	0.41	10.6	0.41	EE
Storage Pile Emissions						
Loading/Unloading Operations **(Uncaptured Emissions Only)**	VOCs	17.9	1.12	17.9	1.12	EE
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	Inlet Natural Gas(VOCs)	0.38	1.67	0.38	1.67	EE
General Clean-up VOC Emissions						
Other: Blow Downs	Inlet Natural Gas(VOCs)	N/A	0.1	N/A	0.01	EE

[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; O = other (specify).

ATTACHMENT L

Emission Unit Data Sheets

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-1		CE-2			
Engine Manufacturer and Model		Arrow VRG260		Cummins G8.3			
Manufacturer's Rated bhp/rpm		47/1800		118/1800			
Source Status[2]		**NS**		**NS**			
Date Installed/Modified/Removed[3]		Upon Receipt of Permit		Upon Receipt of Permit			
Engine Manufactured/Reconstruction Date[4]		5/12/2010		10/01/2013			
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No		No			
Engine, Fuel and Combustion Data	Engine Type[6]	RB4S		RB4S			
	APCD Type[7]	NSCR		NSCR			
	Fuel Type[8]	RG		RG			
	H_2S (gr/100 scf)	<1		<1			
	Operating bhp/rpm	47/1800		118/1800			
	BSFC (Btu/bhp-hr)	9889		8032			
	Fuel throughput (ft^3/hr)	361		750			
	Fuel throughput ($MMft^3$/yr)	3.16		6.57			
	Operation (hrs/yr)	8760		8760			
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
AP	NO_X	0.21	0.91	0.26	1.14		
AP	CO	0.41	1.81	0.52	2.28		
AP	VOC	0.01	0.06	0.03	0.13		
AP	SO_2	<0.01	<0.01	0.00	0.00		
AP	PM_{10}	0.01	0.04	0.05	0.22		
AP	Formaldehyde	0.01	0.04	0.02	0.09		
AP	Total HAPs	0.02	0.07	0.03	0.14		
AP	CO2e	54	238	124	542		

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

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

4. Enter the date that the engine was manufactured, modified or reconstructed.

5. 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.

6. Enter the Engine Type designation(s) using the following codes:

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

7. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*.

MD	Manufacturer's Data	AP	AP-42
GR	GRI-HAPCalc™	OT	Other __________________ (please list)

10. 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*.

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Source ID #[1]	Status[2]	Design Heat Input (mmBtu/hr)[3]	Hours of Operation (hrs/yr)[4]	Fuel Heating Value (Btu/scf)[5]	
HTR-1	NEW	0.25 MMBTU/Hr	8760	1287 BTU/scf (HHV)	
HTR-2	NEW	1.0 MMBTU/Hr	8760	1287 BTU/scf (HHV)	

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit Reboiler Vent data on the *Glycol Dehydration Unit Data Sheet*.
2. Enter the Status for each boiler or line heater using the following:

   EXIST Existing Equipment — NEW Installation of New Equipment
   REM Equipment Removed
3. Enter boiler or line heater design heat input in mmBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

STORAGE TANK DATA SHEET

Source ID #[1]	Status[2]	Content[3]	Volume[4]	Dia[5]	Throughput[6]	Orientation[7]	Liquid Height[8]
T01	NEW	Condensate	210 BBL	10.0	210,000 gallons/yr	VERT	8 feet
T02	NEW	Condensate	210 BBL	10.0	210,000 gallons/yr	VERT	8 feet
T03	NEW	Condensate	210 BBL	10.0	210,000 gallons/yr	VERT	8 feet
T04	NEW	Condensate	210 BBL	10.0	210,000 gallons/yr	VERT	8 feet
T05	NEW	Condensate	210 BBL	10.0	210,000 gallons/yr	VERT	8 feet
T06	NEW	Produced Water	210 BBL	10.0	58,800 gallons/yr	VERT	8 feet

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:

   EXIST Existing Equipment — NEW Installation of New Equipment
   REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:

   VERT Vertical Tank — HORZ Horizontal Tank
8. Enter storage tank average liquid height in feet.

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **Big Moses Tank Farm**	2. Tank Name **T01-T05**
3. Emission Unit ID number **Vapors to VRU or combustor emission points 5E/6E**	4. Emission Point ID number **5E/6E**
5. Date Installed or Modified *(for existing tanks)* **Upon Receipt of Permit**	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 1,050,000 gallons of condensate per year for Tanks T01 through T05 combined.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. **210 BBL**	
9A. Tank Internal Diameter (ft.) **10**	9B. Tank Internal Height (ft.)**15**
10A. Maximum Liquid Height (ft.)**14**	10B. Average Liquid Height (ft.) **8**
11A. Maximum Vapor Space Height (ft.) **14.5**	11B. Average Vapor Space Height (ft.) **7**
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as “working volume. **190 BBL**	
13A. Maximum annual throughput (gal/yr) **210,000/tank**	13B. Maximum daily throughput (gal/day) **3000**
14. Number of tank turnovers per year **27(max)**	15. Maximum tank fill rate (gal/min) **50**
16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
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 AND OPERATION INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☒	Refer to enclosed TANKS Summary Sheets
☐	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply ☐ Rupture Disc (psig)
☐ Carbon Adsorption[1] ☐ Inert Gas Blanket of _____________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1] ☐ Conservation Vent (psig
☐ Other[1] (describe) Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[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 and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
VOCs	**110.4**	**483.56**	**0.26**	**1.13**	**0.60**	**2.61**	**111.26**	**487.30**	Based off of actual
(Un-controlled)									Flash gas Measurement
Tanks T01-T05 Combined									
Emissions									
Controlled Emissions:									
VOC							**5.56**	**24.37**	Tanks Emissions
n-Hexane							**0.16**	**0.72**	Controlled 95%
Total HAPs							**0.18**	**0.80**	

[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 and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

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

20A. Shell Color: **Blue**	20B. Roof Color: **Blue**	20C. Year Last Painted:

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, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐No	24A. If yes, for dome roof provide radius (ft): **N/A**	24B. If yes, for cone roof, provide slop (ft/ft)

25. Complete item 25 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:			
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 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):		34B. Maximum (°F**):**
35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):		35B. Maximum (psig):
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			

39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From: To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name **Big Moses Tank Farm**	2. Tank Name **Tank T06**
3. Emission Unit ID number **T06**	4. Emission Point ID number **7E**
5. Date Installed or Modified *(for existing tanks)* **2015**	6. Type of change: ☐ New construction ☐ New stored material ☒ Other
7A. Description of Tank Modification *(if applicable)*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) **A maximum of 1400 BBL per year throughput for Tank T06.**	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons)*. Use the internal cross-sectional area multiplied by internal height. **210 BBL**	
9A. Tank Internal Diameter (ft.) **10**	9B. Tank Internal Height (ft.)**15**
10A. Maximum Liquid Height (ft.)**14**	10B. Average Liquid Height (ft.) **8**
11A. Maximum Vapor Space Height (ft.) **14.5**	11B. Average Vapor Space Height (ft.) **7**
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume. **190 BBL**	
13A. Maximum annual throughput (gal/yr) 5**8,800**	13B. Maximum daily throughput (gal/day) **210**
14. Number of tank turnovers per year **8 (max)**	15. Maximum tank fill rate (gal/min) **20**
16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
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 AND OPERATION INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☐ Refer to enclosed TANKS Summary Sheets
☒ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☐	Refer to enclosed TANKS Summary Sheets
☒	Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Rupture Disc (psig)
☐ Carbon Adsorption[1]
☐ Inert Gas Blanket of _____________
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Conservation Vent (psig
Vacuum Setting   Pressure Setting
☒ Other[1] (describe)
VRU
☐ Emergency Relief Valve (psig)

[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 and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method**[1]
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
VOCs	0.037	0.16					0.037	0.16	W&B losses from
(Un-controlled)									Water tanks is
									negligible.

[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 and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

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

20A. Shell Color: **Blue**	20B. Roof Color: **Blue**	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, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig): **Less than 0.3 psig**

24. Is the tank a **Vertical Fixed Roof Tank**? ☒ Yes ☐No	24A. If yes, for dome roof provide radius (ft): **N/A**	24B. If yes, for cone roof, provide slop (ft/ft) **N/A**

25. Complete item 25 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:			
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 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: **N/A for flash emissions only**			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): **60**	34A. Minimum (°F): **50**		34B. Maximum (°F): **70**
35. Avg. operating pressure range of tank (psig): **0-0.3 psig**	35A. Minimum (psig): **0 psig**		35B. Maximum (psig): **0.3 psig**
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:	**Produced Water**		
39B. CAS number:	N/A		
39C. Liquid density (lb/gal):	**8.347**		
39D. Liquid molecular weight (lb/lb-mole):	**18.04**		
39E. Vapor molecular weight (lb/lb-mole):	**30.68**		
39F. Maximum true vapor pressure (psia):	**N/A**		
39G. Maxim Reid vapor pressure (psia):	**N/A**		
39H. Months Storage per year. From: To:	**Continuous**		

Attachment L
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*): **TL-1 and TL-2**	
1. Loading Area Name: **Tank Truck Loading Area**	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): ☐ Drums ☐ Marine Vessels ☐Rail Tank Cars ☒ Tank Trucks	
3. Loading Rack or Transfer Point Data:	
Number of pumps	**3 (on truck)**
Number of liquids loaded	**3**
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: **None**	
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	**3**	**3**	**3**	**3**
days/month	**30**	**30**	**30**	**30**
days/year	**340**	**340**	**340**	**340**

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.		**N/A**	**N/A**	**N/A**			
Liquid Name		**Produced Water**	**Conden-sate**	**NGL**			
Max. daily throughput (1000 gal/day)		**3.36**	**8.4**	**9.24**			
Max. annual throughput (1000 gal/yr)		**58.8**	**1050**	**672**			
Loading Method [1]		**SP**	**BF**	**BF**			
Max. Fill Rate (gal/min)		**60**	**70**	**80**			
Average Fill Time (min/loading)		**56**	**60**	**60**			
Max. Bulk Liquid Temperature (^{o}F)		**70**	**70**	**70**			
True Vapor Pressure [2]		**0.3 psia**	**7.45 psia**	**92 psia**			
Cargo Vessel Condition [3]		**U**	**U**	**U**			
Control Equipment or Method [4]		**TO**	**TO**	**VB**			
Minimum control efficiency (%)		**68.6**	**68.6**	**99+**			
Maximum Emission Rate	Loading (lb/hr)	**0.13**	**17.9**	**N/A**			
	Annual (lb/yr)	**2.27**	**2237**	**N/A**			
Estimation Method [5]		**AP-42**	**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 AdsorptionCO = 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
Truck load-outs per month and volume of liquid removed each load-out	**Truck load-outs per month and volume of liquid removed each load-out**
REPORTING	TESTING
Truck load-outs per month and volume of liquid removed each load-out	**None**

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

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 **N/A**

ATTACHMENT M

Air Pollution Control Device Sheets

USA COMPRESSION

Emissions Report

10/08/2015

USA Compression Unit 5302 VR260/MHGF108

Engine Serial Number :	4B081005142	Engine Manufactured Date :	05/12/2010
Max HP :	47	Max RPM :	1800
Number of Engine Cylinders :	4	Total Displacement (in3) :	253
Combustion Type & Setting :	4 Stroke Rich Burn	Fuel Delivery Method:	Carburetor
Compression Ratio :	8:01	Combustion Air Treatment :	Naturally Aspirated
Engine Modified/Reconstructed? :			
Compressor Frame Serial # :	5609x78	Unit Packaged Date :	12/28/2009
Compressor Frame Max RPM :	1800	# of Compressor Throws :	0

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Marion WV

NSPS JJJJ	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr		
Ozone Non-Attainment / General Permit	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr	CH2O	g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : 9,889 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	12.80		1.326	5.808
Carbon Monoxide (CO) :	5.10		0.528	2.313
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0.04		0.004	0.018
Formaldehyde (CH2O) :	0.09		0.009	0.039
Particulate Matter (PM) Filterable+Condensable :		0.0194	0.009	0.040
Sulfur Dioxide (SO2) :		0.0006	0.000	0.001

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :		110	51.13	203.11
Methane (CH4) :		0.23	0.11	0.43

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	VXC-1408-04XCI
Catalyst Element Type:	3-Way
Number of Catalyst Elements currently in Housing:	1
Air/Fuel Ratio Control :	Yes
Other Engine Emissions Control Equipment :	

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	0	1.326	5.808
Carbon Monoxide (CO) :	0	0.528	2.313
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0	0.004	0.018
Formaldehyde (CH2O) :	0	0.009	0.039
Particulate Matter (PM) Filterable+Condensable :	0	0.009	0.040
Sulfur Dioxide (SO2) :	0	0.000	0.001

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0		
Methane (CH4) :	0	0.11	0.43

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

MIRATECH

Proposal Number: TJ-13-2071 Rev(2)

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Air Compression
Engine Manufacturer:	Arrow
Model Number:	VRG 260
Power Output:	47 bhp
Power Output:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	310 acfm (cfm)
Exhaust Temperature:	1230 F

System Details

Housing Model Number:	VXC-1408-04-HSG
Element Model Number:	VX-RE-08XC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	2.0 inches of WC (Clean)
Sound Attenuation:	28-32 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	VXC-1408-04-XC1
Material:	Carbon Steel
Inlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	53 inches
Weight Without Catalyst:	152 lbs
Weight Including Catalyst:	162 lbs
Instrumentation Ports:	1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/bhp-hr)	Reduction (%)	Warranted Converter Ouputs (g/bhp-hr)	Requested Emissions Targets
CH_2O	0.09			
CO	5.1	21.6	4	4 g/bhp-hr
NMHC*	0.04	0	1	1 g/bhp-hr
NO_x**	12.8	84.4	2	2 g/bhp-hr
O2	0.5%			
H2O	18.5%			

† MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

*MW referenced as CH_4 **MW referenced as NO_2

Estimated Exhaust Emissions Based on Pipeline Quality Natural Gas

ENGINE MODEL:	K-6	C-46	C-66	C-96	C-101	C-106	C-255	L-795	A-42 (VRG 260)	A-54 (VRG 330)	A-54 CF (VRG 330 CF)	A-62 (VRG 380)	A-62 TA (VRG 380 TA)	A32	A90
Rich/Lean Burn	Rich	Rich	Rich	Rich	Rich	Rich	Rich	Lean	Rich	Rich	Rich	Rich	Rich	Rich	Rich
2 or 4 Cycle	4	4	4	4	4	4	4	2	4	4	4	4	4	4	4
Bore	4.00	5.00	5.25	7.00	7.50	7.50	7.50	7.50	4.134	3.875	3.875	4.134	4.134	4.134	4.65
Stroke	4.50	6.25	7.50	8.50	8.50	8.50	7.50	9.00	4.724	4.665	4.665	4.724	4.724	4.724	5.32
Displacement (CI.)	56.5	122.7	195	327	376	376	660	795	253	330	330	380.8	380.8	190	537
No. Cylinders	1	1	1	1	1	1	2	2	4	6	6	6	6	3	6
RPM Max/Min.	800/400	800/400	700/350	600/300	800/400	800/400	750/400	600/300	1800/1000	1800/1000	1800/1000	1800/1000	1800/1000	1200/1000	1800/1000
Max HP (cont.)	4.8	9	13	19	24.5	32	55	65	47	68	72	80	115	24.7	109
BMEP	84	73	75	77	65	84	88	54	82	91	96	92	133	86	89
BSFC (BTU/HP-HR)	14950	11640	11450	13000	13050	10350	11900	13500	8900	9000	8800	8268	8580	12000	8200
Exhaust Stack															
NPT Dia. (in.)	1 1/4"	1 1/2"	2"	2 1/2"	2 1/2"	2 1/2"	4"	4"	2"	2 1/2"	2 1/2"	*3"	*3"	2"	3"
Height (in.) **	©28.5"	^{n}5.5"	^{n}7.5"	^{n}11"	^{n}11"	^{n}11"	©20"	©7"	27"	28"	27 1/4"	28"	29 1/2"		
Temp. (Deg. F)	1260	1300	1300	1300	1275	1302	1300	900	1230	1238	1238	1230	1350	1180	1250
Flow (acfm)	31	70	97	139	210	213	350	625	310	406	406	466	600	210	600
Emissions (g/hp-hr)															
Pre-Cat Nox	N/A	N/A	N/A	N/A	N/A	14	IP	1.89	12.8	14.4	12.3	14.7	15.5	N/A	9.0
Pre-Cat CO	N/A	N/A	N/A	N/A	N/A	11.5	IP	2.58	5.1	16.3	11	5.8	11.15	N/A	12.76
Pre-Cat VOC	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.04	0.04	0.04	0.04	0.10	N/A	0.05
Pre-Cat HCHO	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.09	0.09	0.09	0.09	0.09	N/A	0.09
Post Cat Nox	*6Ⓟ	*6Ⓟ	*6Ⓟ	*6Ⓟ	*6Ⓟ	*2.8	*2.8	*2.8	*2.8	*2.8	*2.8	*2.8	*1.0	*6	*1.0
Post Cat CO	*455Ⓟ	*455Ⓟ	*455Ⓟ	*455Ⓟ	*455Ⓟ	*4.8	*4.8	*4.8	*4.8	*4.8	*4.8	*4.8	*2.0	*455	*2.0
Post Cat VOC	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.02	0.05	0.02	0.02	.06/*0.7	N/A	.06/*.07
Post Cat HCHO	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0	0	0	0	0	N/A	0
Max. Exhaust Back Pressure ("W.C.)	20	20	20	20	20	20	20	TE	20	20	20	20	20	20	20
Weight (lb.)Dry	670	1360	1640	2580	2690	2690	3980	4510	1234	1000	1000	1851	1900	1350	3450

* = EPA emission regulation limits as of March 1, 2011.
Check with your local DEQ, as they maybe lower than the EPA requirements.
BSFC (BTU/HP-HR) @ max rated RPM
** = Stack height is from the base of the mounting feet to the exhaust manifold outlet.
*= Catalyst equiped engines.
© = Center of exhaust outlet
^{n} = MUF-1 standard muffler outlet height.
N/A = Not available at this time.
TE = Tuned Exhaust.
Ⓟ = Does not require a catalyst to meet the current requirements
IP = In Process
Emissions vary depending on AFR set point and emission equipment from engine to engine.
This information is for reference only - Not to be used for permitting, field testing is required

USA COMPRESSION

Emissions Report

10/08/2015

USA Compression Unit 6208 G8.3/JGP2

Engine Serial Number :	73592519	Engine Manufactured Date :	11/01/2013
Max HP :	118	Max RPM :	1800
Number of Engine Cylinders :	6	Total Displacement (in3) :	505
Combustion Type & Setting :		Fuel Delivery Method:	Carburetor
Compression Ratio :	10.5:1	Combustion Air Treatment :	Naturally Aspirated
Engine Modified/Reconstructed? :			
Compressor Frame Serial # :	F43775	Unit Packaged Date :	01/13/2014
Compressor Frame Max RPM :	1800	# of Compressor Throws :	2

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Marion WV

NSPS JJJJ	NOx	1.00	g/hp-hr	CO	2.0	g/hp-hr	VOC	0.7	g/hp-hr			
Ozone Non-Attainment / General Permit	NOx		g/hp-hr	CO		g/hp-hr	VOC		g/hp-hr	CH2O		g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : 8,924 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	13.00		3.382	14.813
Carbon Monoxide (CO) :	8.60		2.237	9.798
Volatile Organic Compounds (NMNEHC excluding CH2O) :		0.03		
Formaldehyde (CH2O) :		0.02		
Particulate Matter (PM) Filterable+Condensable :		0.0483	0.051	0.223
Sulfur Dioxide (SO2) :		0.0006	0.001	0.003

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	452.00		117.58	467.14
Methane (CH4) :		0.23		

CONTROLLED EMISSIONS

Catalytic Converter Make and Model: VXC-1480-04-HSG

Catalyst Element Type:

Number of Catalyst Elements currently in Housing: 1

Air/Fuel Ratio Control : Yes

Other Engine Emissions Control Equipment :

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	92	0.260	1.139
Carbon Monoxide (CO) :	77	0.520	2.279
Volatile Organic Compounds (NMNEHC excluding CH2O) :			
Formaldehyde (CH2O) :	0		
Particulate Matter (PM) Filterable+Condensable :	0	0.051	0.223
Sulfur Dioxide (SO2) :	0	0.001	0.003

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0	117.58	467.14
Methane (CH4) :	0		

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

ATTACHMENT N

Supporting Calculations

Icon Midstream Pipeline ,LLC

Big Moses
Tyler County, WV

POTENTIAL EMISSIONS SUMMARY

Source	Description	NOx lb/hr	CO lb/hr	CO2e lb/Hr	VOC lb/hr	SO2 lb/hr	PM lb/hr	n-Hexane tpy	benzene lb/hr	formaldehyde lb/hr	Total HAPs lb/hr
HTR-1	Line Heater	0.02	0.02	25	0.00	0.00	0.00				
CE-1	Flash Compressor	0.21	0.41	54	0.01	0.00	0.01		0.0007	0.010	0.0149
CE-2	VRU Compressor Engine	0.26	0.52	124	0.03	0.00	0.05		0.0140	0.021	0.1125
HTR-2	Separator Heater	0.08	0.07	98	0.00	0.00	0.01			0.000	0.000
T01-T06	Condensate and Water Tank (Flash+Breathing+Working)[1]				5.60			0.17	0.00	0.000	0.180
	Fugitive VOC Emissions			2	0.38						
	Flash Gas Compressor Blowdowns			N/A	N/A						
	Haul Road Fugitive Dust						4.43				
	Pigging Emissions			N/A	N/A						
TL-2	Water Truck Loading				0.13						
	NGL Truck Loading				0.90						
TL-1	Condensate Truck Loading (Uncaptured)[2]				0.78						0.05
EC-1	Captured/Controlled Tank and Truck Loading Emissions[3]	0.30	1.65	593	3.40	0.00	0.00	0.07	0.00	0.0000	0.07
	Total	**0.87**	**2.67**	**895**	**11.24**	**0.00**	**4.50**	**0.24**	**0.01**	**0.03**	**0.42**

Source		NOx tpy	CO tpy	CO2e tpy	VOC tpy	SO2 tpy	PM tpy	n-Hexane tpy	benzene tpy	formaldehyde tpy	Total HAPs tpy
HTR-1	Line Heater	0.09	0.07	107	0.00	0.00	0.01			0.00	
CE-1	Flash Compressor	0.91	1.81	238	0.06	0.00	0.04		0.00	0.04	0.07
CE-2	VRU Compressor Engine	1.14	2.28	542	0.13	0.00	0.22		0.01	0.09	0.49
HTR-2	Separator Heater	0.36	0.30	430	0.02	0.00	0.03			0.00	0.00
T01-T06	Condensate and Water Tank (Flash+Breathing+Working)[1]				24.53			0.73	0.01	0.00	0.80
	Fugitive VOC Emissions			8	1.67						
	Flash Gas Compressor Blowdowns			8	0.10						
	Haul Road Fugitive Dust						2.33				
	Pigging Emissions			651	7.85						
TL-2	Water Truck Loading				0.01						
	NGL Truck Loading				0.04						
TL-1	Condensate Truck Loading (Uncaptured)[2]				0.05						0.01
EC-1	Captured/Controlled Tank and Truck Loading Emissions[3]	0.06	0.32	116	0.63	0.00	0.00	0.02	0.01	0.00	0.03
	Total	**2.55**	**4.78**	**2,101**	**35.09**	**0.01**	**2.63**	**0.75**	**0.04**	**0.13**	**1.39**

[1] Condensate tank emissions are captured are routed to VRU with Combustor as backup.
Per WVDEP Guidance on VRUs, a capture efficiency of 95% is claimed. This represents uncaptured.
[2] Truck loading VOC emissions captured at 98.7% per AP-42 Chapter 5.2.2.1.1 for NSPS-certified trucks. This entry represents the 1.3% not captured.
[3]98.7% captured truck loading emissions routed to combustor EC-1

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Controlled Emission Rates

Source CE-2

Engine Data:							
Engine Manufacturer	Cummins						
Engine Model	G8.3						
Type (Rich-burn or Low Emission)	Rich Burn						
Aspiration (Natural or Turbocharged)	Natural						
Manufacturer Rating	118	hp					
Speed at Above Rating	1,800	rpm					
Configeration (In-line or Vee)	In-line						
Number of Cylinders	6						
Engine Bore	4.490	inches					
Engine Stroke	5.320	inches					
Engine Displacement	505	cu. in.					
Engine BMEP	103	psi					
Fuel Consumption (HHV)	8,924	Btu/bhp-hr					

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokerich lb/mmbtu	Comment
Oxides of Nitrogen, NOx	1.000	0.26	1.14	118	6.24		453.59 grams = 1 pound
Carbon Monoxide CO	2.000	0.52	2.28	236	12.49		2,000 pounds = 1 ton
VOC (NMNEHC)	0.110	0.03	0.13	13	0.69		
CO2	452	118	515	53,336	2,822		
CO2e		124	542				
							0 ppmv H2S
Total Annual Hours of Operation	**8,760**						
SO2		0.0006	0.0028			0.0006	
PM (Condensable + Filterable)		0.0509	0.2228			0.0483	Per Mfg.
CH_4		0.1261	0.5524			0.0022	Factor From 40 CFR 98, Table C-2
N_2O		0.0115	0.0502			0.0002	Factor From 40 CFR 98, Table C-2
acrolein		0.0028	0.0121			0.00263	
acetaldehyde		0.0029	0.0129			0.00279	
formaldehyde	0.080	0.0208	0.0912				Per Mfg.
benzene		0.0017	0.0073			0.00158	
toluene		0.0006	0.0026			0.000558	
ethylbenzene		3E-05	0.0001			2.48E-05	
xylene s		0.0002	0.0009			0.000195	
methanol		0.0032	0.0141			0.00306	
total HAPs		0.0322	0.1411				

Exhaust Parameters:		
Exhaust Gas Temperature	1,127	deg. F
Exhaust Gas Mass Flow Rate		lb/hr
Exhaust Gas Mass Flow Rate	528	acfm
Exhaust Stack Height	137	inches
	8.67	feet
Exhaust Stack Inside Diameter	6	inches
	0.500	feet
Exhaust Stack Velocity	44.8	ft/sec
	2,689.1	ft/min

$$\frac{4 \times \text{acfm}}{3.1416 \times (\text{stack diameter})^2}$$

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Potential Emission Rates

Line Heater
Source HTR-1

Burner Duty Rating	250.0	Mbtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1256.0	Btu/scf
Total Gas Consumption	4,874.6	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0203	lbs/hr	0.089	TPY
CO	0.0171	lbs/hr	0.075	TPY
CO2e	25	lbs/hr	107	tpy
VOC	0.0011	lbs/hr	0.005	TPY
SO2	0.0001	lbs/hr	0.001	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0015	lbs/hr	0.007	TPY
CHOH	0.0000	lbs/hr	0.000	TPY

AP-42 Factors Used

NOx	**100**	**Lbs/MMCF**	
CO	**84**	**Lbs/MMCF**	
CO_2	**120,000**	**Lbs/MMCF**	**Global Warming Potential = 1**
VOC	**5.5**	**Lbs/MMCF**	
PM	**7.6**	**Lbs/MMCF**	
SO_2	**0.6**	**Lbs/MMCF**	
CH_4	**2.3**	**Lbs/MMCF**	**Global Warming Potential = 21**
N_2O	**2.2**	**Lbs/MMCF**	**Global Warming Potential =310**
HCOH	**0.075**	**Lbs/MMCF**	

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Controlled Emission Rates

Source CE-1

Engine Data:		
Engine Manufacturer	Arrow	
Engine Model	VGR260	
Type (Rich-burn or Low Emission)	Rich Burn	
Aspiration (Natural or Turbocharged)	Natural	
Manufacturer Rating	47.0	hp
Speed at Above Rating	1,800	rpm
Configeration (In-line or Vee)	In Line	
Number of Cylinders	4	
Engine Bore	4.134	inches
Engine Stroke	4.724	inches
Engine Displacement	254	cu. in.
Fuel Consumption	9,889	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokerich lb/mmbtu	
Oxides of Nitrogen, NOx	2.0	0.21	0.91	94	4.97		Comment
Carbon Monoxide CO	4.0	0.41	1.81	188	9.92		453.59 grams = 1 pound
VOC (NMNEHC)	0.1	0.01	0.06	6	0.32		2,000 pounds = 1 ton
CO2e		54	238	0	1,304		
Total Annual Hours of Operation	**8,760**						
SO2		0.0003	0.0012			0.0006	
PM (Condensable + Filterable)		0.009	0.0395			0.0194	MFG. Spec
CO2		51.126	223.9324			110	
$CH_{4\ CO2e}$		2.6725	11.7056			0.23	**MFG. Spec**
$N_2O\ CO_{2e}$		0.5518	2.4169			0.0001	Factor From 40 CFR 98, Table C-2
acrolein		0.0012	0.0054			0.00263	
acetaldehyde		0.0013	0.0057			0.00279	
formaldehyde	0.095	0.01	0.0431				**MFG. Spec**
benzene		0.0007	0.0032			0.00158	
toluene		0.0002	0.0010			0.000508	
ethylbenzene		1E-05	0.0001			2.48E-05	
xylene s		9E-05	0.0004			0.000195	
methanol		0.0014	0.0062			0.00306	
total HAPs		0.0149	0.0651				

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Controlled Emission Rates

Source CE-1
Un-Controlled

Engine Data:

Engine Manufacturer	FORD	
Engine Model	VR260	
Type (Rich-burn or Low Emission)	Rich Burn	
Aspiration (Natural or Turbocharged)	Natural	
Manufacturer Rating	47.0	hp
Speed at Above Rating	1,800	rpm
Configeration (In-line or Vee)	In Line	
Number of Cylinders	4	
Engine Bore	4.134	inches
Engine Stroke	4.724	inches
Engine Displacement	254	cu. in.
Fuel Consumption	9,889	Btu/bhp-hr

Emission Rates:	g/bhp-hr	lb/hr	tons/year	g/hr	lb/day	AP-42 4strokerich lb/mmbtu	Comment
Oxides of Nitrogen, NOx	12.8	1.33	5.81	602	31.83		
Carbon Monoxide CO	5.1	0.53	2.31	240	12.68		453.59 grams = 1 pound
VOC (NMNEHC)	0.0	0.00	0.01	1	0.07		2,000 pounds = 1 ton
CO2e		54	238	0	1,304		
Total Annual Hours of Operation	**8,760**						
SO2		0.0003	0.0012			0.0006	
PM2.5		0.0044	0.0193			0.0095	
PM (Condensable)		0.0046	0.0202			0.00991	
CO2		51.126	223.9324			110	
CH_4 $_{CO2e}$		2.6725	11.7056			0.23	**MFG. Spec**
N_2O CO_{2e}		0.5518	2.4169			0.0001	Factor From 40 CFR 98, Table C-2
acrolein		0.0012	0.0054			0.00263	
acetaldehyde		0.0013	0.0057			0.00279	
formaldehyde	0.095	0.01	0.0431				**MFG. Spec**
benzene		0.0007	0.0032			0.00158	
toluene		0.0002	0.0010			0.000508	
ethylbenzene		1E-05	0.0001			2.48E-05	
xylene s		9E-05	0.0004			0.000195	
methanol		0.0014	0.0062			0.00306	
total HAPs		0.0149	0.0651				

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

tential Emission Ra

Source EC-1

Enclosed Combustor Pilot

Burner Duty Rating	58.5	Mbtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1256.0	Btu/scf
Total Gas Consumption	1140.6	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0059	lbs/hr	0.026	TPY
CO	0.0049	lbs/hr	0.022	TPY
CO2	7.0	lbs/hr	30.8	TPY
CO2e	7	lbs/hr	31	TPY
VOC	0.0003	lbs/hr	0.001	TPY
SO2	0.0000	lbs/hr	0.000	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0004	lbs/hr	0.002	TPY
CHOH	0.0000	lbs/hr	0.000	TPY
Benzene	0.0000	lbs/hr	0.000	TPY
N-Hezane	0.0001	lbs/hr	0.000	TPY
Toluene	0.0000	lbs/hr	0.000	TPY
Total HAPs	0.0001	lbs/hr	0.000	TPY

AP-42 Factors Used (Tables 1.4.1-1.4.3)

NOx	**100**	**Lbs/MMCF**	
CO	**84**	**Lbs/MMCF**	
CO_2	**120,000**	**Lbs/MMCF**	**Global Warming Potential = 1**
VOC	**5.5**	**Lbs/MMCF**	
PM	**7.6**	**Lbs/MMCF**	
SO_2	**0.6**	**Lbs/MMCF**	
CH_4	**2.3**	**Lbs/MMCF**	**Global Warming Potential = 25**
N_2O	**2.2**	**Lbs/MMCF**	**Global Warming Potential =298**
HCOH	**0.075**	**Lbs/MMCF**	
Benzene	**0.0021**	**Lbs/MMCF**	
n-Hexane	**1.8**	**Lbs/MMCF**	
Toluene	**0.0034**	**Lbs/MMCF**	

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Potential Emission Rates

Source EC-1

Enclosed Vapor Combustor

Destruction Efficiency	98.0	%		
Gas Heat Content (HHV)	2583.0	Btu/scf		
Max Flow to T-E	0.00173	MMSCFH	0.745	MMCF/Yr
Max BTUs to Flare	4.47	MMBTU/Hr	1,728	MMBTU/Yr

NOx	0.30	lbs/hr	0.06	tpy
CO	1.65	lbs/hr	0.32	tpy
CO2	522.33	lbs/hr	100.98	tpy
CO2e	592.65	lb/hr	116.36	tpy
VOC	3.40	lb/hr	0.63	tpy
CH4	0.01	lbs/hr	0.0019	tpy
N2O	0.0010	lbs/hr	0.0002	tpy
PM	0.0005	lb/hr	0.0028	tpy
Benzene	0.0000	lb/hr	0.0100	tpy
CHOH	0.0000	lb/hr	0.0000	tpy
n-Hexane	0.0670	lb/hr	0.0168	tpy
Toluene	0.0000	lb/hr	0.0000	tpy

Notes: Condensate Tank and Water Tank vapors to combustor as backup for VRU Only.
From Attached Work Sheet, max loading to the combustor is 33,900 scfd and 3.22 MMBTU/Hr

Assuming the VRU is down a maximum of 500 hrs/yr, max annual loading to the combustor is:
33,900 x (500/24) = 706,250 scf/yr
and 1,612 MMBTU/Yr

See Condensate Truck Loading Cacluation sheets for derivation of loading emission details.
Combined tanks and truck loading max loading to combustor is 1730. scfh and 39,727 scf/yr or 116 mmbtu/yr.
VOC emissions represent 2% of the captured emissions

Factors Used

AP-42 Table 13.5-1	**NOx**	**0.068**	**Lbs/MMBTU**
AP-42 Table 13.5-1	**CO**	**0.37**	**Lbs/MMBTU**
40 CFR 98 Table C-1	**CO2**	**116.89**	**Lbs/MMBTU**
40 CFR 98 Table C-2	**CH4**	**0.0022**	**Lbs/MMBTU**
40 CFR 98 Table C-2	**N2O**	**0.00022**	**Lbs/MMBTU**
AP-42 Table 1.4-2	**PM**	**7.6**	**lb/MMSCF**
AP-42 Table 1.4-3	**Benzene**	**0.0021**	**lb/MMSCF**
AP-42 Table 1.4-3	**Toluene**	**0.0034**	**lb/MMSCF**
AP-42 Table 1.4-3	**Hexane**	**1.8**	**lb/MMSCF**
AP-42 Table 1.4-3	**CHOH**	**0.075**	**lb/MMSCF**

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Potential Emission Rates

Separator Heater
Source HTR-2

Burner Duty Rating	1000.0	Mbtu/hr
Burner Efficiency	98.0	%
Gas Heat Content (HHV)	1256.0	Btu/scf
Total Gas Consumption	19498.2	scfd
H2S Concentration	0.000	Mole %
Hours of Operation	8760	

NOx	0.0812	lbs/hr	0.356	TPY
CO	0.0682	lbs/hr	0.299	TPY
CO2e	98	lbs/hr	430	tpy
VOC	0.0045	lbs/hr	0.020	TPY
SO2	0.0005	lbs/hr	0.002	TPY
H2S	0.0000	lbs/hr	0.000	TPY
PM10	0.0062	lbs/hr	0.027	TPY
CHOH	0.0001	lbs/hr	0.000	TPY

AP-42 Factors Used

NOx	**100**	**Lbs/MMCF**	
CO	**84**	**Lbs/MMCF**	
CO_2	**120,000**	**Lbs/MMCF**	**Global Warming Potential = 1**
VOC	**5.5**	**Lbs/MMCF**	
PM	**7.6**	**Lbs/MMCF**	
SO_2	**0.6**	**Lbs/MMCF**	
CH_4	**2.3**	**Lbs/MMCF**	**Global Warming Potential = 21**
N_2O	**2.2**	**Lbs/MMCF**	**Global Warming Potential =310**
HCOH	**0.075**	**Lbs/MMCF**	

Icon Midstream Pipeline, LLC

Big Moses
Tyler County, WV

Fugitive VOC Emissions

Volatile Organic Compounds, non-methane and non-ethane from gas analysis:	18.29	weight percent
Methane from gas analysis:	60.70	weight percent
Carbon Dioxide from gas analysis:	0.33	weight percent
Gas Density	0.0576	lb/scf

Emission Source:	Number	Oil & Gas Production*		VOC %	VOC, lb/hr	VOC TPY	CO2 lb/Hr	CO2 TPY	CH4 lb/hr	CH4 TPY	CO2e
Valves:											
Gas/Vapor:	35	0.02700	scf/hr	18.3	0.010	0.044	0.000	0.001	0.033	0.1448	3.621
Light Liquid:	39	0.05000	scf/hr	100.0	0.112	0.492					0.000
Heavy Liquid (Oil):	-	0.00050	scf/hr	100.0	0.000	0.000					0.000
Low Bleed Pneumatic	4	1.39000	scf/hr	18.3	0.059	0.257	0.195	0.852	0.195	0.8521	22.153
Relief Valves:	18	0.04000	scf/hr	18.3	0.008	0.033	0.000	0.001	0.025	0.1103	2.759
Open-ended Lines, gas:	-	0.06100	sfc/hr	18.3	0.000	0.000					0.000
Open-ended Lines, liquid:	-	0.05000	lb/hr	100.0	0.000	0.000					0.000
Pump Seals:											0.000
Gas:	-	0.00529	lb/hr	18.3	0.000	0.000	0.000	0.000	0.000	0.0000	0.000
Light Liquid:	-	0.02866	lb/hr	100.0	0.000	0.000					0.000
Heavy Liquid (Oil):	-	0.00133	lb/hr	100.0	0.000	0.000					0.000
Compressor Seals, Gas:	4	0.01940	lb/hr	18.3	0.014	0.062	0.000	0.001	0.003	0.0119	0.298
Connectors:											0.000
Gas:	77	0.00300	scf/hr	18.3	0.002	0.011	0.000	0.000	0.008	0.0354	0.885
Light Liquid:	31	0.00700	scf/hr	100.0	0.217	0.950					0.000
Heavy Liquid (Oil):	-	0.00030	scf/hr	100.0	0.000	0.000					0.000
Flanges:											0.000
Gas:	12	0.00086	lb/hr	18.3	0.002	0.008	0.000	0.000	0.006	0.0274	0.686
Light Liquid:	88	0.00300	scf/hr	100.0	0.015	0.067					0.000
Heavy Liquid:	0	0.0009	scf/hr	100.0	0.000	0.000					0.000

Fugitive Calculations:

	lb/hr	t/y
VOC	**0.381**	**1.667**
CH4	**0.075**	**0.330**
CO2	**0.001**	**0.003**
CO2e	**1.884**	**8.25**

Notes: *Factors are from 40 CFR 98, Table W-1A (scf/hr), where available. Remaining are API (lb/hr)

Icon Midstream Pipeline, CCL
GAS ANALYSIS INFORMATION

Big Moses
Tyler County, WV

Inlet Gas Composition Information

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	
Nitrogen, N2	0.3920	0.110	0.004	0.530			-		0.0039	
Carbon Dioxide, CO2	0.1540	0.068	0.002	0.327			-		0.0015	
Hydrogen Sulfide, H2S		-	-	-			-		-	
Helium, He		-	-	-			-		-	
Oxygen, O2		-	-	-			-		-	
Methane, CH4	78.3670	12.572	0.434	60.699	712.7	791.5	7.468		0.7821	
Ethane, C2H6	13.8830	4.175	0.144	20.155	224.7	245.7	2.316		0.1377	
Propane	4.4580	1.966	0.068	9.491	103.2	112.2	1.062	9.491	0.0438	
Iso-Butane	0.5830	0.339	0.012	1.636	17.5	19.0	0.181	1.636	0.0057	
Normal Butane	1.1450	0.666	0.023	3.213	34.5	37.4	0.355	3.213	0.0111	
Iso Pentane	0.2970	0.214	0.007	1.035	11.0	11.9	0.113	1.035	0.0030	
Normal Pentane	0.2960	0.214	0.007	1.031	11.0	11.9	0.113	1.031	0.0030	
Hexanes	0.2550	0.220	0.008	1.061	11.2	12.1	0.115	1.061	0.0025	
Heptane +	0.1700	0.170	0.006	0.822	8.7	9.4	0.089	0.822	0.0017	
	100.000	20.713	0.715		1,134.4	1,250.9	11.812	18.289	0.9959	-

Gas Density (STP) = 0.058

Ideal Gross (HHV)	1,250.9
Ideal Gross (sat'd)	1,229.9
	-
Real Gross (HHV)	1,256.0
Real Net (LHV)	1,139.1

Icon Midstream, LLC
GAS ANALYSIS INFORMATION

Big Moses
Tyler County, WV

Condenstate Tank Breathing Vapor

	Fuel Gas mole %	Fuel M.W. lb/lb-mole	Fuel S.G.	Fuel Wt. %	LHV, dry Btu/scf	HHV, dry Btu/scf	AFR vol/vol	VOC NM / NE	Z Factor	
Nitrogen, N2	0.185	0.052	0.002	0.078			-		0.0018	
Carbon Dioxide, CO2	0.018	0.008	0.000	0.012			-		0.0002	
Hydrogen Sulfide, H2S	-	-	-	-			-		-	
Water	-	-	-	-			-		-	
Oxygen, O2	-	-	-	-			-		-	
Methane, CH4	-	-	-	-			-		-	
Ethane, C2H6	0.202	0.061	0.002	0.091	3.3	3.6	0.034		0.0020	
Propane	10.137	4.470	0.154	6.703	234.7	255.1	2.415	6.703	0.0996	
Iso-Butane	8.852	5.145	0.178	7.716	265.6	287.9	2.741	7.716	0.0860	
Normal Butane	30.537	17.749	0.613	26.617	919.4	996.2	9.457	26.617	0.2952	
Iso Pentane	15.123	10.911	0.377	16.363	559.4	605.1	5.763	16.363	0.1512	
Normal Pentane	17.412	12.563	0.434	18.840	645.4	698.0	6.636	18.840	0.1741	
Hexanes	13.160	11.341	0.392	17.007	579.5	625.9	5.956	17.007	0.1300	
Heptane +	4.374	4.383	0.151	6.573	223.1	240.7	2.292	6.573	0.0435	
	100.000	66.683	2.302		3,430.4	3,712.3	35.295	99.819	0.9837	-

Gas Density (STP) = 0.186

Ideal Gross (HHV)	3,712.3
Ideal Gross (sat'd)	3,648.3
	-
Real Gross (HHV)	3,774.0
Real Net (LHV)	3,487.4

Icon Midstream Pipeline, LLC
Big Moses Liquids Management Facility
Tank Emissions Calculations

Icon Midstream operates five 210 BBL atmospheric pressure tanks that receives condensate that has been received via pipeline and separated from entrained water and NGL. Condensate is accumulated in these tanks, pending truck transportation to a fractionation facility. A maximum of 25,000 BBL will pass through these tanks per year. In addition, Icon also operated a single 210 BBL tank where produced water is accumulated prior to truck transportation to a re-use center or a disposal facility. A maximum of 1400 BBL will pass through this tank per year. The following summarizes potential emissions from these tanks.

Emissions from the condensate tanks will be a combination of flash emissions (as the pressure is reduced on the liquid to atmospheric) plus working and breathing losses while the condensate is in the tanks. Using data from a well pad that will be routing condensate to this facility, flash and working/breathing losses were calculated (following this summary). In a similar manner, flash emissions from the water tank were determined using actual data from a produced water tank from a well pad similar to those routing produced water to the Big Moses facility. Working and breathing losses for the water tank is considered negligible.

Emissions from the condensate tanks are routed to a vapor recovery unit via a hard pipe system. A capture efficiency of 95% is claimed. It is important to note that when the VRU is down for maintenance or repair, the condensate tank vapors are routed to a combustor with a 98% capture and control efficiency.

	Flash Emissions (tpy)	W&B Emissions (tpy)	Uncontrolled Total (tpy)	(uncaptured) Total (tpy)
Condensate	483.56 VOCs	3.74 VOCs	487.30 VOCs	24.37 VOCs
	15.8 HAPs	0.12 HAPs	15.9 HAPs	0.80 HAPs
	14.5 n-Hexane	0.11 n-Hexane	14.6 n-hexane	0.73 n-Hexane
Water	0.16 VOC	<0.01 VOCs	0.16 VOCs	0.16 VOCs
	0.01 HAPs	<0.01 HAPs	0.01 HAPs	0.01 HAPs
	<0.01 n-Hexane	<0.01 n-Hexane	<0.01 n-Hexane	<0.01 n-Hexane
Total	**483.72 VOCs**	**3.74 VOCs**	**488.76VOCs**	**24.53 VOCs**
	5.00 HAPs	**0.12 HAPs**	**15.9 HAPs**	**0.80 HAPs**
	1.45 n-Hexane	**0.11 n-Hexane**	**14.6 n-Hexane**	**0.73 n-Hexane**

It is assumed that emissions will generally be continuous and consistent over the year. However, in order to account for day to day variances, the requested hourly maximum emissions are 25% higher than a straight extrapolation from the annual emission rates.

Loading to Enclosed Combustor

As noted above, Flash, Working and Breathing losses from the condensate tanks are normally controlled by a VRU. When that unit is down for maintenance or repairs, the gas flow is routed to an enclosed combustor (EC-1). As noted in the following worksheets, there are 689.14 tpy of Flash Gas and 3.74 tpy of Working and Breathing potential emissions from the condensate tanks. This is equivalent to 158.2 lb/hr. As it is the largest component of this gas stream, the flash gas characteristics are assumed to be representative of the entire gas stream. Thus, this gas will have a density of 0.112 lb/scf and a heat content of 2282 BTU/scf. Potential loading to the combustor is then 1412.5 scf/hr (33,900 scfd) and 3.22 MMBTU/Hr.

For permitting purposes, it is assumed that the VRU will be unavailable for 500 hours per year. Thus annual loading to the combustor will be 706,250 scf [33,900 scf/day x 500/24] or 1,612 MMBTU/Yr.

The stream going to the combustor when the VRU is down has a composition that is 70.3% VOCs and 2.1% n-Hexane. Thus, with a 98% destruction efficiency and maximum loading of 158.2 lb/hr, potential VOC emissions would be 2.22 lb/hr [158.2 x 0.703 x 0.02]. Potential n-Hexane emissions would be 0.067 lb/hr [158.2 x 0.021 x 0.02].

Flash Emission Calculations

Using Gas-Oil Ratio Method

Un-Controlled

Site specific data

Gas-Oil-ratio	=	500	scf/bbl Using Actual GOR from RPT-8
Throughput	=	25,000	bbl/yr
Stock tank gas molecular weight	=	39.56	g/mole

Conversions

1 lb	=	453.6	g
1 mole	=	22.4	L
1 scf	=	28.32	L
1 ton	=	2000	lb

Equations

$$E_{TOT} = Q\frac{(bbl)}{(yr)} \times R\frac{(scf)}{(bbl)} \times \frac{28.32(L)}{1(scf)} \times \frac{1(mole)}{22.4(L)} \times MW\frac{(g)}{(mole)} \times \frac{1(lb)}{453.6(g)}) \times \frac{1(ton)}{2000(lb)}$$

E_{TOT} = Total stock tank flash emissions (TPY)

R = Measured gas-oil ratio (scf/bbl)

Q = Throughput (bbl/yr)

MW = Stock tank gas molecular weight (g/mole)

$$E_{spec} = E_{TOT} \times X_{spec}$$

E_{spec} = Flash emission from constituent

X_{spec} = Weight fraction of constituent in stock tank gas

Flash Emissions

Constituent	TPY	
Total	689.1416	E_{TOT}
VOC	**483.5638**	Sum of C3+
Nitrogen	1.72E-01	
Carbon Dioxide	1.08E+00	
Methane	6.84E+01	
Ethane	1.36E+02	
Propane	1.79E+02	
Isobutane	4.83E+01	
n-Butane	1.11E+02	
2,2 Dimethylpropane	1.36E+00	
Isopentane	3.80E+01	
n-Pentane	3.99E+01	
2,2 Dimethylbutane	1.44E+00	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	2.09E+00	
2 Methylpentane	1.11E+01	
3 Methylpentane	6.62E+00	
n-Hexane	1.45E+01	
Methylcyclopentane	1.05E+00	
Benzene	2.48E-01	
Cyclohexane	1.50E+00	
2-Methylhexane	3.21E+00	
3-Methylhexane	3.16E+00	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	3.00E+00	
n-Heptane	4.64E+00	
Methylcyclohexane	2.89E+00	
Toluene	5.65E-01	
Other C8's	4.72E+00	
n-Octane	1.57E+00	
Ethylbenzene	3.45E-02	
M & P Xylenes	4.07E-01	
O-Xylene	5.51E-02	
Other C9's	1.96E+00	
n-Nonane	4.69E-01	
Other C10's	7.37E-01	
n-Decane	9.65E-02	
Undecanes (11)	1.03E-01	

April 24, 2014

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

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Date Sampled: 04/07/14

Date Analyzed: 04/21/14

Sample: RPT 8-1

Job Number: J42794

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	Stock Tank
Pressure, psig	340	0
Temperature, °F	65	70
Gas Oil Ratio (1)	------	500
Gas Specific Gravity (2)	------	1.387
Separator Volume Factor (3)	1.2987	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.7700
Oil API Gravity at 60 °F	70.79
Reid Vapor Pressure, psi (5)	5.28

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	------	W-2408*	W-2423
Pressure, psig	340	299	297
Temperature, °F	65	66	66

(1) - Scf of flashed vapor per barrel of stock tank oil
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
(4) - Fraction of first stage separator liquid
(5) - Absolute pressure at 100 deg F
Analyst: M. G.
* Sample used for flash study
Base Conditions: 14.85 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

April 23, 2014

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Gas Evolved from Hydrocarbon Liquid Flashed
From 340 psig & 65 °F to 0 psig & 70 °F

Date Sampled: 04/07/14

Job Number: 42794.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.036	
Carbon Dioxide	0.141	
Methane	24.485	
Ethane	25.943	6.993
Propane	23.253	6.457
Isobutane	4.773	1.574
n-Butane	10.980	3.489
2-2 Dimethylpropane	0.108	0.042
Isopentane	3.027	1.116
n-Pentane	3.175	1.160
Hexanes	2.378	0.988
Heptanes Plus	1.701	0.761
Totals	100.000	22.579

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.599	(Air=1)
Molecular Weight	102.69	
Gross Heating Value	5488	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.387	(Air=1)
Compressibility (Z)	0.9850	
Molecular Weight	39.58	
Gross Heating Value		
Dry Basis	2321	BTU/CF
Saturated Basis	2282	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: AL
Cylinder ID: ST# 20

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.036		0.025
Carbon Dioxide	0.141		0.157
Methane	24.485		9.930
Ethane	25.943	6.993	19.719
Propane	23.253	6.457	25.920
Isobutane	4.773	1.574	7.013
n-Butane	10.980	3.489	16.132
2,2 Dimethylpropane	0.108	0.042	0.197
Isopentane	3.027	1.116	5.521
n-Pentane	3.175	1.160	5.791
2,2 Dimethylbutane	0.096	0.040	0.209
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.139	0.057	0.303
2 Methylpentane	0.738	0.309	1.608
3 Methylpentane	0.441	0.181	0.961
n-Hexane	0.964	0.400	2.100
Methylcyclopentane	0.072	0.025	0.153
Benzene	0.018	0.005	0.036
Cyclohexane	0.102	0.035	0.217
2-Methylhexane	0.184	0.086	0.466
3-Methylhexane	0.181	0.083	0.458
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.174	0.076	0.436
n-Heptane	0.266	0.124	0.674
Methylcyclohexane	0.169	0.068	0.419
Toluene	0.035	0.012	0.082
Other C8's	0.246	0.115	0.685
n-Octane	0.079	0.041	0.228
Ethylbenzene	0.002	0.001	0.005
M & P Xylenes	0.022	0.009	0.059
O-Xylene	0.003	0.001	0.008
Other C9's	0.089	0.046	0.284
n-Nonane	0.021	0.012	0.068
Other C10's	0.030	0.018	0.107
n-Decane	0.004	0.002	0.014
Undecanes (11)	0.004	0.002	0.015
Totals	100.000	22.579	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.367	(Air=1)
Compressibility (Z)	0.9850	
Molecular Weight	39.56	
Gross Heating Value		
Dry Basis	2321	BTU/CF
Saturated Basis	2282	BTU/CF

April 29, 2014

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

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Separator Hydrocarbon Liquid
Sampled @ 340 psig & 65 °F

Date Sampled: 04/07/14

Job Number: 42794.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.011	0.003	0.004
Carbon Dioxide	0.025	0.011	0.014
Methane	7.015	3.036	1.384
Ethane	7.995	5.461	2.958
Propane	9.072	6.384	4.919
Isobutane	2.654	2.218	1.896
n-Butane	7.473	6.018	5.341
2,2 Dimethylpropane	0.192	0.188	0.170
Isopentane	4.335	4.049	3.845
n-Pentane	5.799	5.369	5.144
2,2 Dimethylbutane	0.319	0.341	0.336
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.532	0.557	0.564
2 Methylpentane	3.616	3.833	3.831
3 Methylpentane	2.379	2.481	2.521
n-Hexane	6.324	6.642	6.701
Heptanes Plus	42.259	53.409	60.372
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7441	(Water=1)
°API Gravity	58.86	@ 60°F
Molecular Weight	116.2	
Vapor Volume	20.33	CF/Gal
Weight	6.20	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.6583	(Water=1)
°API Gravity	83.46	@ 60°F
Molecular Weight	81.3	
Vapor Volume	25.69	CF/Gal
Weight	5.48	Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: W-2408

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.025	0.011	0.014
Nitrogen	0.011	0.003	0.004
Methane	7.016	3.036	1.384
Ethane	7.995	5.461	2.956
Propane	9.072	6.384	4.919
Isobutane	2.654	2.218	1.896
n-Butane	7.666	6.206	5.511
Isopentane	4.335	4.049	3.845
n-Pentane	5.799	5.389	5.144
Other C-6's	6.846	7.212	7.264
Heptanes	13.266	15.122	16.031
Octanes	12.697	15.144	16.932
Nonanes	4.935	6.806	7.697
Decanes Plus	8.665	13.799	16.337
Benzene	0.113	0.081	0.108
Toluene	0.613	0.525	0.695
E-Benzene	0.534	0.526	0.697
Xylenes	1.436	1.407	1.875
n-Hexane	6.324	6.642	6.701
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.6583	(Water=1)
°API Gravity	83.46	@ 60°F
Molecular Weight	81.3	
Vapor Volume	25.69	CF/Gal
Weight	5.48	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7794	(Water=1)
Molecular Weight	153.3	

Characteristics of Atmospheric Sample:

°API Gravity	70.79	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	5.28	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	-----	W-2408*	W-2423
Pressure, PSIG	340	299	297
Temperature, °F	65	66	66

* Sample used for analysis

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.011	0.003	0.004
Carbon Dioxide	0.025	0.011	0.014
Methane	7.015	3.036	1.384
Ethane	7.995	5.481	2.956
Propane	9.072	6.384	4.919
Isobutane	2.854	2.218	1.896
n-Butane	7.473	6.018	5.341
2,2 Dimethylpropane	0.192	0.188	0.170
Isopentane	4.335	4.049	3.845
n-Pentane	5.799	5.369	5.144
2,2 Dimethylbutane	0.319	0.341	0.338
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.632	0.557	0.564
2 Methylpentane	3.616	3.833	3.831
3 Methylpentane	2.379	2.481	2.521
n-Hexane	6.324	6.642	6.701
Methylcyclopentane	0.537	0.486	0.556
Benzene	0.113	0.081	0.108
Cyclohexane	0.956	0.831	0.989
2-Methylhexane	3.063	3.637	3.774
3-Methylhexane	2.577	3.022	3.175
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.532	1.725	1.888
n-Heptane	4.601	5.422	5.669
Methylcyclohexane	2.764	2.838	3.337
Toluene	0.613	0.525	0.695
Other C-8's	7.205	8.736	9.764
n-Octane	2.728	3.569	3.831
E-Benzene	0.534	0.526	0.697
M & P Xylenes	0.618	0.611	0.804
O-Xylene	0.820	0.796	1.071
Other C-9's	3.468	4.696	5.383
n-Nonane	1.467	2.109	2.314
Other C-10's	2.979	4.434	5.175
n-decane	0.771	1.208	1.349
Undecanes(11)	2.240	3.420	4.048
Dodecanes(12)	1.277	2.107	2.529
Tridecanes(13)	0.746	1.320	1.606
Tetradecanes(14)	0.349	0.660	0.814
Pentadecanes(15)	0.160	0.324	0.404
Hexadecanes(16)	0.078	0.169	0.213
Heptadecanes(17)	0.037	0.085	0.108
Octadecanes(18)	0.018	0.043	0.055
Nonadecanes(19)	0.007	0.017	0.022
Eicosanes(20)	0.002	0.005	0.006
Heneicosanes(21)	0.001	0.003	0.003
Docosanes(22)	0.001	0.001	0.002
Tricosanes(23)	0.000	0.001	0.001
Tetracosanes(24)	0.000	0.001	0.001
Pentacosanes(25)	0.000	0.000	0.000
Hexacosanes(26)	0.000	0.000	0.000
Heptacosanes(27)	0.000	0.000	0.000
Octacosanes(28)	0.000	0.000	0.000
Nonacosanes(29)	0.000	0.000	0.000
Triacontanes(30)	0.000	0.000	0.000
Hentriacontanes Plus(31+)	0.000	0.000	0.000
Total	100.000	100.000	100.000

= HAP

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	TK-01	
City:	Huntington	
State:	West Virginia	
Company:	Icon Midstream	
Type of Tank:	Vertical Fixed Roof Tank	
Description:	Condensate Tank W&B Emissions	
Tank Dimensions		
Shell Height (ft):		15.00
Diameter (ft):		10.00
Liquid Height (ft) :		14.00
Avg. Liquid Height (ft):		8.00
Volume (gallons):		8,225.29
Turnovers:		25.53
Net Throughput(gal/yr):		210,000.00
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	Gray/Light	
Shell Condition	Good	
Roof Color/Shade:	Gray/Light	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		0.25
Slope (ft/ft) (Cone Roof)		0.05
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.30

Meterological Data used in Emissions Calculations: Huntington, West Virginia (Avg Atmospheric Pressure = 14.33 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-01 - Vertical Fixed Roof Tank
Huntington, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 6)	All	61.42	53.10	69.74	57.09	3.0220	2.5373	3.5797	69.0000			92.00	Option 4: RVP=6, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-01 - Vertical Fixed Roof Tank
Huntington, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	450.1831
Vapor Space Volume (cu ft):	556.3237
Vapor Density (lb/cu ft):	0.0373
Vapor Space Expansion Factor:	0.1269
Vented Vapor Saturation Factor:	0.4685
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	556.3237
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	7.0833
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	8.0000
Roof Outage (ft):	0.0833
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0833
Roof Height (ft):	0.2500
Roof Slope (ft/ft):	0.0500
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0373
Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.0220
Daily Avg. Liquid Surface Temp. (deg. R):	521.0866
Daily Average Ambient Temp. (deg. F):	54.8458
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.7558
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,246.2101
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1269
Daily Vapor Temperature Range (deg. R):	33.2847
Daily Vapor Pressure Range (psia):	1.0425
Breather Vent Press. Setting Range(psia):	0.3300
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.0220
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.5373
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	3.5797
Daily Avg. Liquid Surface Temp. (deg R):	521.0866
Daily Min. Liquid Surface Temp. (deg R):	512.7654
Daily Max. Liquid Surface Temp. (deg R):	529.4077
Daily Ambient Temp. Range (deg. R):	20.0583
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.4685
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	3.0220
Vapor Space Outage (ft):	7.0833

Working Losses (lb):	1,042.6040
Vapor Molecular Weight (lb/lb-mole):	69.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.0220
Annual Net Throughput (gal/yr.):	210,000.0000
Annual Turnovers:	25.5310
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	8,225.2880
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,492.7871

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-01 - Vertical Fixed Roof Tank
Huntington, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 6)	1,042.60	450.18	1,492.79

Per Tank

5213	2251	7464	Five Tanks lb/yr
2.61	1.13	3.74	Five Tanks tpy

Icon Midstream Pipeline - Big Moses

Flash Emission Calculations - Produced Water

Using Gas-Water Ratio Method

Un-Controlled

Site specific data

Gas-Water-ratio	=	4.06	scf/bbl Using GOW from comparable well pad
Throughput	=	1,400	bbl/yr
Stock tank gas molecular weight	=	39.56	g/mole

Conversions

1 lb	=	453.6	g
1 mole	=	22.4	L
1 scf	=	28.32	L
1 ton	=	2000	lb

Equations

$$E_{TOT} = Q\frac{(bbl)}{(yr)} \times R\frac{(scf)}{(bbl)} \times \frac{28.32(L)}{1(scf)} \times \frac{1(mole)}{22.4(L)} \times MW\frac{(g)}{(mole)} \times \frac{1(lb)}{453.6(g)}) \times \frac{1(ton)}{2000(lb)}$$

E_{TOT} = Total stock tank flash emissions (TPY)

R = Measured gas-oil ratio (scf/bbl)

Q = Throughput (bbl/yr)

MW = Stock tank gas molecular weight (g/mole)

$$E_{spec} = E_{TOT} \times X_{spec}$$

E_{spec} = Flash emission from constituent

X_{spec} = Weight fraction of constituent in stock tank gas

Flash Emissions

Constituent	TPY	
Total	0.3134	E_{TOT}
VOC	**0.1603**	Sum of C3+
Nitrogen	5.21E-03	
Carbon Dioxide	4.72E-03	
Methane	9.27E-02	
Ethane	5.04E-02	
Propane	3.60E-02	
Isobutane	9.00E-03	
n-Butane	2.54E-02	
2,2 Dimethylpropane	3.98E-04	
Isopentane	1.28E-02	
n-Pentane	1.77E-02	
2,2 Dimethylbutane	6.61E-04	
Cyclopentane	0.00E+00	
2,3 Dimethylbutane	1.28E-03	
2 Methylpentane	7.11E-03	
3 Methylpentane	4.58E-03	
n-Hexane	1.24E-02	HAP
Methylcyclopentane	1.15E-03	
Benzene	2.26E-04	HAP
Cyclohexane	1.59E-03	
2-Methylhexane	3.45E-03	
3-Methylhexane	3.59E-03	
2,2,4 Trimethylpentane	0.00E+00	
Other C7's	3.30E-03	
n-Heptane	6.02E-03	
Methylcyclohexane	3.19E-03	
Toluene	4.95E-04	HAP
Other C8's	5.47E-03	
n-Octane	1.72E-03	
Ethylbenzene	3.45E-05	HAP
M & P Xylenes	2.82E-04	HAP
O-Xylene	3.13E-05	HAP
Other C9's	1.66E-03	
n-Nonane	3.10E-04	
Other C10's	3.64E-04	
n-Decane	6.27E-05	
Undecanes (11)	5.95E-05	

September 2, 2015

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

For: SE Technologies, LLC
Building D, Second Floor
98 Vanadium Road
Bridgeville, Pennsylvania 15017-3061

Date Sampled: 08/12/15

Date Analyzed: 08/22/15

Job Number: [redacted]

Sample: [redacted] Well B1 2H

FLASH LIBERATION OF SEPARATOR WATER		
	Separator	**Stock Tank**
Pressure, psig	540	0
Temperature, °F	78	70
Gas Water Ratio (1)	------	4.06
Gas Specific Gravity (2)	------	1.069

(1) - Scf of water saturated vapor per barrel of stock tank water
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
Analyst: T.G.

Piston No. : WF# 235

Base Conditions: 14.65 PSI & 60 °F

Certified: FESCO, Ltd. Alice, Texas

David Dannhaus 361-661-7015

August 27, 2015

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: SE Technologies, LLC
Building D, Second Floor
98 Vanadium Road
Bridgeville, Pennsylvania 15017-3061

Sample: [redacted] Well B1 2H
Gas Liberated from Separator Water
From 540 psig & 78 °F to 0 psig & 70 °F

Date Sampled: 08/12/15 Job Number: [redacted]

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	1.821	
Carbon Dioxide	1.049	
Methane	56.602	
Ethane	16.424	4.367
Propane	8.000	2.191
Isobutane	1.516	0.493
n-Butane	4.274	1.340
2-2 Dimethylpropane	0.054	0.020
Isopentane	1.730	0.629
n-Pentane	2.405	0.867
Hexanes	2.953	1.209
Heptanes Plus	3.172	1.397
Totals	100.000	12.514

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.549	(Air=1)
Molecular Weight	101.90	
Gross Heating Value	5380	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (16) Gonzalez
Analyst: MR
Processor: OA
Cylinder ID: WF# 10S

Certified: FESCO, Ltd. Alice, Texas

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	1.821		1.663
Carbon Dioxide	1.049		1.505
Methane	56.602		29.592
Ethane	16.424	4.367	16.095
Propane	8.000	2.191	11.497
Isobutane	1.516	0.493	2.872
n-Butane	4.274	1.340	8.096
2,2 Dimethylpropane	0.054	0.020	0.127
Isopentane	1.730	0.629	4.069
n-Pentane	2.405	0.867	5.655
2,2 Dimethylbutane	0.075	0.031	0.211
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.145	0.059	0.407
2 Methylpentane	0.807	0.333	2.268
3 Methylpentane	0.520	0.211	1.461
n-Hexane	1.405	0.575	3.947
Methylcyclopentane	0.134	0.046	0.368
Benzene	0.028	0.008	0.072
Cyclohexane	0.185	0.063	0.507
2-Methylhexane	0.337	0.156	1.102
3-Methylhexane	0.351	0.159	1.145
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.326	0.141	1.054
n-Heptane	0.568	0.270	1.921
Methylcyclohexane	0.318	0.127	1.018
Toluene	0.053	0.018	0.158
Other C8's	0.486	0.225	1.747
n-Octane	0.147	0.075	0.548
Ethylbenzene	0.003	0.001	0.011
M & P Xylenes	0.026	0.010	0.090
O-Xylene	0.003	0.001	0.010
Other C9's	0.129	0.065	0.530
n-Nonane	0.024	0.013	0.099
Other C10's	0.025	0.015	0.116
n-Decane	0.004	0.003	0.020
Undecanes (11)	0.004	0.002	0.019
Totals	100.000	12.514	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	BTU/CF

Condensate Truck Loading Lost Emissions Per AP-42

Per AP-42, Chapter 5.2.2.1.1, the uncontrolled loading loss emission factor L_L can be estimated as follows:

$$L_L = 12.46[SPM/T]$$

Where:

L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded
S= saturation factor (0.6)
P=true vapor pressure of liquid loaded: 7.45 psia
M= Molecular weight of vapor in lb/lb-mole (66.6 From Lab Report)
T= temperature of bulk liquid loaded in deg R or 460+deg F (60 Deg F)

Thus, $L_L = 12.46[0.6 \times 7.45 \times 66.6]/[460+60]$
$L_L = 7.13$ lb/1000 gallons loaded

Based on sample data of breathing vapor (attached), these emissions are 99.6% VOCs. It is assumed that vapor composition from truck loading is the same as that from the tank breathing vapors.

Given a maximum loading of 200 BBL (8400 gallons) a day, uncontrolled VOC emissions are estimated at 59.65 lb of VOC per day [8.4 x 7.13 x .996]. With all daily loading taking place within 1 hour, the hourly uncontrolled emission rate is estimated at 59.65 lb/hr. NSPS certified trucks will be used for condensate transportation. Thus, a 98.7% capture efficiency can be claimed. Accordingly, potential un-captured VOC emissions are estimated at 0.76 lb/hr.

Maximum annual throughput is 25,000 BBL (1,050,000 gallons) per year. Thus, un-captured VOC emissions are conservatively estimated at 96.9 pounds per year [1050 x 7.13 x .996 x 1.3%] or 0.05 tons per year.

Based on the attached analysis of a representative tank's breathing emissions, HAPs represent 6.8 percent of the emissions. Thus, hourly un-captured HAPs emissions equals 0.05 lb/hr [8.4 x 7.13 x 1.3% x 6.8%]. Annual maximum uncaptured HAPs emissions are estimated at 6.6 lb/yr [1050 x 7.13 x 1.3% x 6.8%] or <0.01 tpy.

Loading to Combustor
Captured emissions are 98.7% of total emissions or 59.11 lb/Hr during loading [8.4 x 7.13 x 98.7%]. Using the composition of the measured condensate breathing vapors from a well that will be sending condensate to this facility (a heat content of 3921 BTU/scf and a density of 0.186 lb/scf) total hourly load to the combustor from truck loading will be 59.11/0.186 or 318 scf/hr. Heat loading to the combustor will be 1.25 MMBTU/Hr.

Annual loading to the combustor will be 7389 lbs [1050 x 7.13 x .987] or 39,727 scf and 155.77 MMBTU/Hr.

Using a combustion efficiency of 98%, captured/controlled VOC emissions are 1.18 lb/hr [8.4 x 7.13 x 98.7% x 0.02] and 148 lb/yr [1050 x 7.13 x 98.7% x 2%] or 0.07 tpy.

May 2, 2014

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Breathing Vapor
From 0 psig & 70 °F to 0 psig & 100 °F

Date Sampled: 04/07/14 Job Number: 42794.011

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.185	
Carbon Dioxide	0.018	
Methane	0.000	
Ethane	0.202	0.054
Propane	10.137	2.815
Isobutane	8.852	2.920
n-Butane	30.167	9.586
2-2 Dimethylpropane	0.370	0.142
Isopentane	15.123	5.574
n-Pentane	17.412	6.361
Hexanes	13.160	5.466
Heptanes Plus	4.374	1.881
Totals	100.000	34.799

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.547	(Air=1)
Molecular Weight	98.01	
Gross Heating Value	5251	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	2.412	(Air=1)
Compressibility (Z)	0.9539	
Molecular Weight	66.64	
Gross Heating Value		
Dry Basis	3921	BTU/CF
Saturated Basis	3853	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: AL
Cylinder ID: ST# 21

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.185		0.078
Carbon Dioxide	0.018		0.012
Methane	0.000		0.001
Ethane	0.202	0.054	0.091
Propane	10.137	2.815	6.708
Isobutane	8.852	2.920	7.721
n-Butane	30.167	9.586	26.312
2,2 Dimethylpropane	0.370	0.142	0.401
Isopentane	15.123	5.574	16.374
n-Pentane	17.412	6.361	18.852
2,2 Dimethylbutane	0.570	0.240	0.737
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.805	0.332	1.041
2 Methylpentane	4.259	1.782	5.508
3 Methylpentane	2.477	1.019	3.203
n-Hexane	5.049	2.093	6.529
Methylcyclopentane	0.356	0.124	0.450
Benzene	0.078	0.022	0.091
Cyclohexane	0.432	0.148	0.545
2-Methylhexane	0.606	0.284	0.911
3-Methylhexane	0.569	0.261	0.858
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.649	0.285	0.966
n-Heptane	0.658	0.306	0.989
Methylcyclohexane	0.408	0.165	0.601
Toluene	0.071	0.024	0.098
Other C8's	0.379	0.178	0.627
n-Octane	0.082	0.042	0.141
Ethylbenzene	0.002	0.001	0.003
M & P Xylenes	0.020	0.008	0.032
O-Xylene	0.002	0.001	0.003
Other C9's	0.048	0.025	0.091
n-Nonane	0.007	0.004	0.013
Other C10's	0.005	0.003	0.011
n-Decane	0.002	0.001	0.004
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	34.799	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity ---------- 2.412 (Air=1)

Compressibility (Z) ---------- 0.9539

Molecular Weight ---------- 66.64

Gross Heating Value

Dry Basis ---------- 3921 BTU/CF

Saturated Basis ---------- 3853 BTU/CF

April 29, 2014

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

For: Jay-Bee Oil & Gas, Inc.
1720 Route 22 East
Union, New Jersey 07083

Sample: RPT 8-1
Separator Hydrocarbon Liquid
Sampled @ 340 psig & 65 °F

Date Sampled: 04/07/14

Job Number: 42794.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.011	0.003	0.004
Carbon Dioxide	0.025	0.011	0.014
Methane	7.015	3.036	1.384
Ethane	7.995	5.461	2.956
Propane	9.072	6.384	4.919
Isobutane	2.654	2.218	1.896
n-Butane	7.473	6.018	5.341
2,2 Dimethylpropane	0.192	0.188	0.170
Isopentane	4.335	4.049	3.845
n-Pentane	5.799	5.369	5.144
2,2 Dimethylbutane	0.319	0.341	0.338
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.532	0.557	0.564
2 Methylpentane	3.616	3.833	3.831
3 Methylpentane	2.379	2.481	2.521
n-Hexane	6.324	6.642	6.701
Heptanes Plus	42.259	53.409	60.372
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7441	(Water=1)
°API Gravity	58.66	@ 60°F
Molecular Weight	116.2	
Vapor Volume	20.33	CF/Gal
Weight	6.20	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.6583	(Water=1)
°API Gravity	83.46	@ 60°F
Molecular Weight	81.3	
Vapor Volume	25.69	CF/Gal
Weight	5.48	Lbs/Gal

Base Conditions: 14.850 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: W-2408

David Dannhaus 361-661-7015

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.025	0.011	0.014
Nitrogen	0.011	0.003	0.004
Methane	7.015	3.036	1.384
Ethane	7.995	5.461	2.956
Propane	9.072	6.384	4.919
Isobutane	2.654	2.218	1.896
n-Butane	7.666	6.206	5.511
Isopentane	4.335	4.049	3.845
n-Pentane	5.799	5.369	5.144
Other C-6's	6.846	7.212	7.254
Heptanes	13.266	15.122	16.031
Octanes	12.697	15.144	16.932
Nonanes	4.935	6.806	7.697
Decanes Plus	8.665	13.799	16.337
Benzene	0.113	0.081	0.108
Toluene	0.613	0.525	0.695
E-Benzene	0.534	0.526	0.697
Xylenes	1.436	1.407	1.875
n-Hexane	6.324	6.642	6.701
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity --	0.6583	(Water=1)
°API Gravity ---	83.46	@ 60°F
Molecular Weight------------------------------------	81.3	
Vapor Volume --	25.69	CF/Gal
Weight ---	5.48	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity ------------------------------------	0.7794	(Water=1)
Molecular Weight------------------------------------	153.3	

Characteristics of Atmospheric Sample:

°API Gravity ---	70.79	@ 60°F
Reid Vapor Pressure (ASTM D-5191)----------	5.28 psi	= ~7.45 psia true vapor pressure

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-2408*	W-2423
Pressure, PSIG	340	299	297
Temperature, °F	65	66	66

* Sample used for analysis

Water Truck Loading Lost Emissions Per AP-42

Per AP-42, Chapter 5.2.2.1.1, the uncontrolled loading loss emission factor L_L can be estimated as follows:

$$L_L = 12.46[SPM/T]$$

Where:

L_L = uncontrolled loading loss in pounds per 1000 gallons of liquid loaded
S= saturation factor (0.6)
P=true vapor pressure of liquid loaded (0.3 psia) Based on water at 60 Deg. F
M= Molecular weight of vapor in lb/lb-mole (30.68) From Flash gas of comparable water sample
T= temperature of bulk liquid loaded in deg R or 460+deg F (60 Deg F)

Thus, $L_L = 12.46[0.6 \times 0.3 \times 37.74]/[460+60]$
$L_L = 0.16$ lb/1000 gallons loaded

Based on produced water flash gas from comparable wells, estimated that these emissions are 24.1% VOCs

Given a maximum water loading of 80 BBL (3,360 gallons) a day, uncontrolled emissions are estimated at 0.13 lb of VOC per day [3.36 x 0.16 x 24.1%]. Un-certified trucks will be used for condensate transportation and there will be no controls on emissions from water truck loading. Therefore, uncaptured VOC emissions are also estimated at 0.13 lb/day. As all daily loading will take place within a 1 hour period, the uncaptured/uncontrolled hourly emission rate is also estimated at 0.13 lb/hr.

Maximum annual throughput is 1,400 BBL per year (58,800 gallons per year). Thus, un-captured water loading VOC emissions are estimated at 2.27 pounds per year [58.8 x 0.16 x 24.1%] or <0.01 tons per year.

August 27, 2015

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: SE Technologies, LLC
Building D, Second Floor
98 Vanadium Road
Bridgeville, Pennsylvania 15017-3061

Sample: [redacted] Well B1 2H
Gas Liberated from Separator Water
From 540 psig & 78 °F to 0 psig & 70 °F

Date Sampled: 08/12/15 Job Number: [redacted]

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	1.821	
Carbon Dioxide	1.049	
Methane	56.602	
Ethane	16.424	4.367
Propane	8.000	2.191
Isobutane	1.516	0.493
n-Butane	4.274	1.340
2-2 Dimethylpropane	0.054	0.020
Isopentane	1.730	0.629
n-Pentane	2.405	0.867
Hexanes	2.953	1.209
Heptanes Plus	3.172	1.397
Totals	100.000	12.514

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.549	(Air=1)
Molecular Weight	101.90	
Gross Heating Value	5380	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (16) Gonzalez
Analyst: MR
Processor: OA
Cylinder ID: WF# 10S

Certified: FESCO, Ltd. Alice, Texas
David Dannhaus
David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	1.821		1.663
Carbon Dioxide	1.049		1.505
Methane	56.602		29.592
Ethane	16.424	4.367	16.095
Propane	8.000	2.191	11.497
Isobutane	1.516	0.493	2.872
n-Butane	4.274	1.340	8.096
2,2 Dimethylpropane	0.054	0.020	0.127
Isopentane	1.730	0.629	4.069
n-Pentane	2.405	0.867	5.655
2,2 Dimethylbutane	0.075	0.031	0.211
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.145	0.059	0.407
2 Methylpentane	0.807	0.333	2.268
3 Methylpentane	0.520	0.211	1.461
n-Hexane	1.405	0.575	3.947
Methylcyclopentane	0.134	0.046	0.368
Benzene	0.028	0.008	0.072
Cyclohexane	0.185	0.063	0.507
2-Methylhexane	0.337	0.156	1.102
3-Methylhexane	0.351	0.159	1.145
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.326	0.141	1.054
n-Heptane	0.588	0.270	1.921
Methylcyclohexane	0.318	0.127	1.018
Toluene	0.053	0.018	0.158
Other C8's	0.486	0.225	1.747
n-Octane	0.147	0.075	0.548
Ethylbenzene	0.003	0.001	0.011
M & P Xylenes	0.026	0.010	0.090
O-Xylene	0.003	0.001	0.010
Other C9's	0.129	0.065	0.530
n-Nonane	0.024	0.013	0.099
Other C10's	0.025	0.015	0.116
n-Decane	0.004	0.003	0.020
Undecanes (11)	0.004	0.002	0.019
Totals	100.000	12.514	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.069	(Air=1)
Compressibility (Z)	0.9914	
Molecular Weight	30.68	
Gross Heating Value		
Dry Basis	1741	BTU/CF
Saturated Basis	1712	BTU/CF

Fugitive Emissions Calculations

NGL Truck Loading Lost Emissions

As noted in the project overview, NGL will be produced and accumulated in a pressure vessel at this facility. NGL loading to a transport truck will be accomplished by simply connecting the tank truck to the pressurized storage vessel and allowing it to fill to the point where it equalizes with the pressure of the bulk storage tank or brought to the maximum pressure of the transport truck, depending upon the pressure rating of the transport truck and the operating pressure of the bulk storage tank. Thus, the only emissions are the small amount of NGL left in the connection line at the time of disconnection.

The gap between the valve for the tank truck and the valve for the bulk storage tank is estimated at 0.029 cubic feet. Using liquid propane as a surrogate for NGL, this represents a release of 0.90 lb of VOCs during each disconnect [31.12 lb/cf x 0.029 cf].

NGL will be loaded at a maximum rate of 16,000 BBL/yr. With an estimated 200 BBL/tank truck, this represents a maximum of 80 truckloads or 80 disconnects per year. Thus, annual VOC emissions from NGL loading will be 72 pounds [0.90 x 80] or 0.04 tpy.

FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	10	3
p =	Number of days per year with precipitation >0.01 in.	157	157

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Produced Water Tanker Trucks	10	27	10	0.6	1	18	None	0
2	Condensate Truck	18	27	10	0.6	1	125	None	0
3	NGL Trucks	18	27	10	0.6	1	75	None	0
4									
5									
6									
7									
8									

Source: *AP-42 Fifth Edition – 13.2.2 Unpaved Roads*

$E = k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365) =$ lb/Vehicle Mile Traveled (VMT)

Where:

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)	10	3
S =	Mean vehicle speed (mph)	10	10
W =	Mean vehicle weight (tons)	27	27
w =	Mean number of wheels per vehicle	18	18
p =	Number of days per year with precipitation >0.01 in.	157	157

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	3.0	0.03	3.0	0.03	0.4	<0.01	0.4	<0.01
2	3.8	0.24	3.8	0.24	0.51	0.03	0.51	0.03
3	3.8	0.14	3.8	0.14	0.51	0.02	0.51	0.02
4								
5								
6								
7								
8								
TOTALS	10.6	0.41	10.6	0.41	1.42	0.05	1.42	0.05

FUGITIVE EMISSIONS FROM PAVED HAULROADS

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	None						
2							
3							
4							
5							
6							
7							
8							

Source: *AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads*

$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7} =$ lb/Vehicle Mile Traveled (VMT)

Where:

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface meterial silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY
1				
2				
3				
4				
5				
6				
7				
8				
TOTALS				

VRG260 VRC2/3, 3 Stage (Note: assumed ideal gas behavior and used OD for volume calc)

ENTER the following Values:

Suction Pressure, psig	20	Suction Temperature, F	80
Discharge Pressure, psig	450	Discharge Temperature, F	120

Cylinders	Bore, in	Stroke, in	Rod Diameter, in	Pocket Clearance, in^3	Total Cylinder Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles
1st Stage Cylinder	6.50	3.00	1.13	0.00	97	539	143	0.002
2nd Stage Cylinder	4.00	3.00	1.13	0.00	35	739	287	0.001
3rd Stage Cylinder	2.25	3.00	1.13	0.00	9	739	450	0.000

Scrubbers/Suction & Discharge Drums	OD, in	Height, in	Total Scrubber Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles
1st Stage Scrubber	12.00	60.00	6786	539	20	0.024
2nd Stage Scrubber	8.00	48.00	2413	589	143	0.035
3rd Stage Scrubber	8.00	48.00	2413	589	287	0.067

Cooler Section	No. of Tubes	OD, in	Length, in	Total Tube Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles
1st Stage Cooler Section	17	0.63	60	313	739	143	0.004
2nd Stage Cooler Section	14	0.63	60	258	739	287	0.006
3rd Stage Cooler Section	14	0.63	60	258	739	450	0.009

Piping	OD, in	Length, in	Total Piping Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles
1st Stage Piping / Inlet vessel to compressor	4.00	54	679	539	20	0.002
From Compressor to 1st cooler section.	3.00	132	933	739	143	0.011
From 1st cooler section to 1st interstage vessel	2.00	172	540	589	143	0.008
2nd Stage Piping / 1st interstage vessel to compres	3.00	87	615	589	143	0.009
From compressor to 2nd cooler section	2.00	112	352	739	287	0.008
From 2nd cooler section to 2nd interstage vessel	2.00	153	481	589	287	0.013
3rd Stage Piping / 2nd interstage vessel to compres	3.00	91	643	589	287	0.018
From compressor to 3rd cooler section	2.00	107	336	739	450	0.011
Bypass	1.00	167	131	589	450	0.006

Total Estimated Moles of Gas Discharged to Atmosphere per Blowdown = 0.23

Total Estimated Volume of Blowdown Gas, ft^3 @ STP (68F, 14.7 psia) = 89

G8.3 JGP2, 3 Stage (Note: assumed ideal gas behavior and used OD for volume calc)

ENTER the following Values:				
	Suction Pressure, psig	60	Suction Temperature, F	80
	Discharge Pressure, psig	1100	Discharge Temperature, F	120

Cylinders	Bore, in	Stroke, in	Rod Diameter, in	Pocket Clearance, in^3	Total Cylinder Volume, in^3	Temperature, R	Pressure, psig	Calculated Moles
1st Stage Cylinder	6.50	3.00	1.13	0.00	97	539	347	0.003
2nd Stage Cylinder	4.38	3.00	1.13	0.00	42	739	693	0.002
3rd Stage Cylinder	2.75	3.00	1.13	0.00	15	739	1100	0.001
Scrubbers/Suction & Discharge Drums	**OD, in**	**Height, in**	**Total Scrubber Volume, in^3**			**Temperature, R**	**Pressure, psig**	**Calculated Moles**
1st Stage Scrubber	16.00	72.00	14476			539	60	0.108
2nd Stage Scrubber	12.00	59.00	6673			579	347	0.225
3rd Stage Scrubber	12.00	59.00	6673			579	693	0.440
Cooler Section	**No. of Tubes**	**OD, in**	**Length, in**	**Total Tube Volume, in^3**		**Temperature, R**	**Pressure, psig**	**Calculated Moles**
1st Stage Cooler Section	29	0.63	96	854		739	347	0.023
2nd Stage Cooler Section	23	0.63	96	677		739	693	0.035
3rd Stage Cooler Section	24	0.63	96	707		739	1100	0.058
Piping	**OD, in**	**Length, in**	**Total Piping Volume, in^3**			**Temperature, R**	**Pressure, psig**	**Calculated Moles**
1st Stage Piping / Inlet vessel to compressor	6.00	52	1470			539	60	0.011
From Compressor to 1st cooler section.	4.00	148	1860			739	347	0.049
From 1st cooler section to 1st interstage vessel	2.00	205	644			579	347	0.022
2nd Stage Piping / 1st interstage vessel to compres	4.00	44	553			579	347	0.019
From compressor to 2nd cooler section	2.00	124	390			739	693	0.020
From 2nd cooler section to 2nd interstage vessel	2.00	228	716			579	693	0.047
3rd Stage Piping / 2nd interstage vessel to compres	2.00	46	145			579	693	0.010
From compressor to 3rd cooler section	2.00	144	452			739	1100	0.037
Bypass	1.00	214	168			579	1100	0.017
						Total Estimated Moles of Gas Discharged to Atmosphere per Blowdown =		1.13
						Total Estimated Volume of Blowdown Gas, ft^3 @ STP (68F, 14.7 psia) =		**433**

PIGGING EVENT VENTING VOLUME

Given:

Q_a =	64.00 Cubic feet	yields	1.8122752 Cubic Meters	Volume of receiver
P_i=	68.03 Atm	yields	6893.14 kPa	Pressure of Pipeline
T_i =	25.00 Deg C	yields	298.15 Deg K	Temperature in Pipeline
P_f=	1.00 Atm	yields	101.33 kPa	Ambient Pressure (Usually 1 ATM)
T_f=	25.00 Deg C	yields	298.15 Deg K	Ambient Temperature (Usually 10-25 Deg. C or Standard Temp -15Deg. C)
z_i=	0.84311			See Compressiblity spreadsheet
z_f=	1.00111			See Compressiblity spreadsheet

Q_t= 139.587 Cubic Meters or 4929.48 Cubic Feet

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1 , Equation 22-23

$$Q_t = Q_a \times (T_s/P_s) \times (Pi/(z_i*T_i)) - (P_f/(z_f*T_f))$$

Where :

Q_t = Total volume of gas released in cubic meters at STP (15 Deg C and 1 Atm)

Q_a = Actual volume of gas at process conditions in cubic meters

P_s = Standard Pressure in kPa (101.3)

T_s = Standard Temperature in K (288.1)

z = Compressibility factor for the gas

i = initial pressure and temperature

f = final temperature and pressure (generally STP)

COMPRESSABILITY FACTOR

Given:

Pressure	**1.0 Atm.**	**101.3 kPa**
Temperature	**25 Deg. C**	
Compressibility Factor (z)	**1.0011085**	

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1 , Equation 22.25

$$z = a + bP + cT + dP^2 + eT^2 + fPT$$

where
P = Pressure in kPa
T = Tepereature in Deg. C
a = 0.99187
b=-3.3501E-05
c=6.9652E-04
d=6.3134E-10
e=-8.6023E-06
f=2.3290E-07

COMPRESSABILITY FACTOR

Given:

Pressure	**68.03 Atm.**	**6893.1 kPa**	**1000.04 PSIG**
Temperature	**25 Deg. C**		

Compressibility Factor (z) **0.8431113**

Based on EPA's Addendum 1 to the Oil and Gas Production Protocol, Version 1.1 , Equation 22.25

$$z = a + bP + cT + dP^2 + eT^2 + fPT$$

where
P = Pressure in kPa
T = Tepereature in Deg. C
a = 0.99187
b=-3.3501E-05
c=6.9652E-04
d=6.3134E-10
e=-8.6023E-06
f=2.3290E-07

GOVAN ENGINEERING By Industry we Prosper	Client ICON MIDSTREAM PIPELINE, LLC Doc. No.: 100102-0019-101915-0 BIG MOSES EQUIPMENT EMISSIONS INFORMATION	Project Number 100102 Blank

BIG MOSES PROCESS EQUIPMENT FUGITIVE EMISSIONS CONNECTIONS COUNT

LINE	QUANTITY	PFD ITEM	DESCRIPTION	COUNT
2	1	SLUG CATCHER DUMP VALVE	NORRISEAL 1" DUMP VALVE	
		Connections	1" NPT	2
			3/16 stainless steel tubing instrument gas connection	1
			Dump valve vents to atmosphere during dump cycle	
3	1	SLUG CATCHER LEVEL CONTROLLER	NORRISEAL LEVEL CONTROLLER	
		Connections	3/16 stainless steel tubing instrument gas connection	3
4	1	LINE HEATER	.250 MBTU/HR DIRECT FIRED LINE HEATER	
	SPEC INFO	Heater Size	250MBtu/hr	
		Stack Height	10'	
		Stack Size	8-5/8" OD (8-1/8" ID)	
		Brand	Exterran	
		Fuel Heating Value BTU/FT3	1150	
		Connections	1/2" NPT	1
			1/2" Needle Valve	2
			1" Ball Valve	1
6	1	HEATED SEPARATOR	36" OD X 10' X 125# W.P. HORIZONTAL (3) PHASE DIRECT FIRED HEATED SEPARATOR - 1MMBTU/HR	
	SPEC INFO	Heater Size	250MBtu/hr	
		Stack Height	15'	
		Stack Size	8-5/8" OD (8-1/8" ID)	
		Brand	Valerus	
		Fuel Heating Value BTU/FT3	1150	
		Connections	1" Ball Valve	23
			1" NPT	51
			1" Regulator	2
			1" Relief Valve	1
			1/2" Ball Valve	20
			1/2" Needle Valve	4
			1/2" NPT	50
			1/4" Ball Valve	1
			1/4" Needle Valve	2
			1/4" NPT	10
			2" Ball Valve	8
			2" BP Regulator	1
			2" Controller	2
			2" NPT	25
			2" Relief Valve	1
			2" Valve Motor	1
			2x10 Float Valve	1
			3/16 stainless steel tubing instrument gas connection	2
			3/4" NPT	1
8	1	FLASH COMPRESSOR	NATURAL GAS DRIVER W/ LeROI HGF1000 SCREW COMPRESSOR 47 HP	
		Connections	6" ANSI 300 Flange	1
			2" ANSI 600 Flange	1
			1" NPT	3
			1/2" NPT	2
10	1	VRU COMPRESSOR	NATURAL GAS CUMMINS W/ ARIEL JGP/2 1800 RPM 80 HP	
		Connections	6" ANSI 300 Flange	1
			2" ANSI 600 Flange	1
			1" NPT	3
			1/2" NPT	2

BIG MOSES PROCESS EQUIPMENT FUGITIVE EMISSIONS CONNECTIONS COUNT

11	2	CONDENSATE TANK	API 12F ATM 500 BBL, THIEF HATCH, FITTINGS, PRIME COATED, DELIVERED	
		Brand	Waterford Tank	
		Size	500 BBL	
		Dimensions	15' 6" Wide x 16' High	
		Daily Throughput	100 BBL/Day	
		Tank Type	API 12F	
		Tank Material	Steel	
13	1	NGL TANK	18,000 GALLON NGL BULLET TANK W/ SADDLE	
		Brand	Waterford Tank	
		Size	18,000 Gallon	
		Dimensions	38' x 10'	
		Daily Throughput	68 BBL/Day	
		Tank Type	ASME Code, section VIII, Division I, II and III for 250 PSIG MAWP	
		Tank Material	Steel	
14	1	NGL LOAD OUT STATION	PUMP, METER, RETURN LINE, ETC.	
		Connections	3" NPT	1
			1" NPT	1
15	1	WATER TANK	ATM 100 BBL	
		Brand	Waterford Tank	
		Size	100 BBL	
		Dimensions	10' Wide x 8' High	
		Daily Throughput	1 BBL/Day	
		Tank Type	API 12F	
		Tank Material	Steel	
N/A		STATION PIPE, VALVES, AND FITTINGS		
		Connections		

Station pipe connections are counted with the skid connections as they would be the other side of the flange/valve/thread.

BIG MOSES EQUIPMENT FUGITIVE EMISSIONS COUNT

SLUG CATCHER NON-WELDED FITTING CONNECTION & VALVES SEE DRAWING 100102-D030 REV 3

ITEM	QTY	PART NUMBER	DESCRIPTION
2	5	0.5 IN ON 2 IN THREADOLET	3000#, THREADOLET, ASTM A105 , ASME B 31.8
3	1	0.5 IN ON 3 IN THREADOLET	3000#, THREADOLET, ASTM A105 , ASME B 31.8
4	6	0.5 IN PIPE PLUG NPT	SOLID, HEX HEAD, 316 SS, B16.11, THREADED
9	2	12 IN 600# RFWN FLANGE	RFWN, STD BORE, CLASS 600, MSS-SP-44, F-52
10	12	18 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, MSS-SP-44, F-60
18	2	2 IN 600# CLASS PLUG VALVE	PLUG VALVE CLASS 600, A105, ASME B16.34
19	2	2 IN 600# RF BLIND FLANGE	RF, BLIND, CLASS 600, A105, B16.5
20	24	2 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, A105, B16.5
29	1	20 IN 600# RF BLIND FLANGE	RF, BLIND, CLASS 600, A105, B16.5
30	1	20 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, MSS-SP-44, F-60
37	2	3 IN 600# RF BLIND FLANGE	RF, BLIND, CLASS 600, A105, B16.5
38	12	3 IN 600# RFWN FLANGE	RFWN, STD BORE, CLASS 600, A105, B16.5
54	8	36 IN 600# RFWN FLANGE	RFWN, 34.25 IN BORE, CLASS 600, MSS-SP-44, F-65, ASME B16.47 SERIES A
	1	SLUG CATCHER DUMP VALVE	NORRISEAL 1" DUMP VALVE

LAUNCHER-RECEIVER NON-WELDED FITTING CONNECTIONS & VALVES SEE DRAWING 100102-D002 REV 1 SHEET 2 OF 2

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	0.5 IN ON 20 IN THREADOLET	3000#, THREADOLET, ASTM A105 , ASME B 31.8
2	1	0.5 IN ON 24 IN THREADOLET	3000#, THREADOLET, ASTM A105 , ASME B 31.8
3	2	0.5 IN BALL VALVE THD 3000 CWP	3000 PSI, THRD, CS BODY, FP/RP, API 607, CS TRIM, PTFE SEAT, LO
4	2	0.5 IN PIPE PLUG NPT	SOLID, HEX HEAD, 316 SS, B16.11, THREADED
5	2	0.5 IN PIPE SECTION 1	XS, A106/A53/API 5L, GRADE B, PE
16	3	2 IN 600# CLASS PLUG VALVE	PLUG VALVE CLASS 600, A105, ASME B16.34
17	1	2 IN 600# CLASS VERTICAL CLOSURE	YALE 2225 PSIG MAX TEST PRESSURE
18	1	2 IN 600# RF THREADED FLANGE	RF, THREADED, CLASS 600, A105, B16.5
19	9	2 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, A105, B16.5
22	1	2 IN PIPE PLUG NPT	SOLID, HEX HEAD, A105, B16.11, THREADED
26	2	20 IN 600# CLASS BALL VALVE	CLASS 600 RF, FP, A216 WCB/WCC, TRUNNION, ENP BALL, API 607, GO
27	6	20 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, MSS-SP-44, F-60
37	1	24 IN TDW D2000 PIPELINE PIG CLOSURE	2225 PSIG MAX TEST PRESSURE
43	1	6 IN 600# CLASS BALL VALVE	CLASS 600 RF, RP, A216 WCB/WCC, TRUNNION, ENP BALL, API 607, GO
44	1	6 IN 600# CLASS VERTICAL CLOSURE	YALE 2225 PSIG MAX TEST PRESSURE
45	2	6 IN 600# RFWN FLANGE	RFWN, STD BORE, CLASS 600, A105, B16.5
48	1	8 IN 600# CLASS BALL VALVE	CLASS 600 RF, RP, A216 WCB/WCC, TRUNNION, ENP BALL, API 607, GO
49	1	8 IN 600# RF BLIND FLANGE	RF, BLIND, CLASS 600, A105, B16.5
50	5	8 IN 600# RFWN FLANGE	RFWN, STD BORE, CLASS 600, MSS-SP-44, F-42
59	2	TDW THREAD-O-RING NIPPLE	TDW 00-1023-0333-51

12" TIE-IN-BYPASS NON-WELDED FITTING CONNECTIONS & VALVES SEE DRAWING 100102-D007 REV 3

ITEM	QTY	PART NUMBER	DESCRIPTION
5	2	12 IN 600# CLASS BALL VALVE	CLASS 600 RF, RP, A216 WCB/WCC, TRUNNION, ENP BALL, API 607, GO
6	2	12 IN 600# RF BLIND FLANGE	RF, BLIND, CLASS 600, A105, B16.5
7	2	12 IN 600# RFWN FLANGE	RFWN, STD BORE, CLASS 600, MSS-SP-44, F-52
13	1	20 IN 600# CLASS BALL VALVE	CLASS 600 RF, FP, A216 WCB/WCC, TRUNNION, ENP BALL, API 607, GO
14	4	20 IN 600# RFWN FLANGE	RFWN, XS BORE, CLASS 600, MSS-SP-44, F-60

SPL

Certificate of Analysis

Number: 2030-14090166-003A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Gary Vermillion
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

Sep. 17, 2014

Field:	Jay Bee Oil & Gas
Station Name:	Big Moses Fuel Gas Before Skid
Station Number:	
Sample Point:	Submeter
Analyzed:	09/16/2014 16:23:04 by CC39

Sampled By:	TD-GAS
Sample Of:	Gas Spot
Sample Date:	09/09/2014 10:20
Sample Conditions:	900 psig
Method:	GPA 2286
Cylinder No:	0454

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.73 psia		
Nitrogen	0.392	0.530		GPM TOTAL C2+	5.908
Carbon Dioxide	0.154	0.327			
Methane	78.367	60.673			
Ethane	13.883	20.146	3.725		
Propane	4.458	9.487	1.232		
Iso-Butane	0.582	1.633	0.191		
n-Butane	1.145	3.212	0.362		
Iso-Pentane	0.297	1.034	0.109		
n-Pentane	0.296	1.031	0.107		
i-Hexanes	0.146	0.588	0.058		
n-Hexane	0.096	0.393	0.039		
Benzene	0.002	0.007	0.001		
Cyclohexane	0.011	0.044	0.004		
i-Heptanes	0.075	0.343	0.032		
n-Heptane	0.030	0.141	0.013		
Toluene	0.004	0.017	0.001		
i-Octanes	0.042	0.240	0.021		
n-Octane	0.008	0.041	0.004		
Ethylbenzene	NIL	0.001	NIL		
Xylenes	0.002	0.013	0.001		
i-Nonanes	0.006	0.049	0.004		
n-Nonane	0.002	0.012	0.001		
Decane Plus	0.002	0.038	0.003		
	100.000	100.000	5.908		

Physical Properties	**Total**	**C10+**
Calculated Molecular Weight	20.72	144.93
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.73 psia & 60°F		
Real Gas Dry BTU	1258.4	7711.6
Water Sat. Gas Base BTU	1236.5	7577.4
Relative Density Real Gas	0.7176	5.0168
Compressibility Factor	0.9965	

Patti L. Petro

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

CORE LABORATORIES
201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

SAYBOLT LP
Thomas Hogya
3915 SAW MILL RUN BLVD
PITTSBURGH, PA 15227

Report Number : 57801- 140803
Date Reported: 3/20/2014
Date Received: 3/18/2014

Analytical Report

Sample No. 140803-002 Sample ID 2014000147-02 (87-9505) Condensate Tank 2,RPT8 Pad, Eureka Pipeline **Date Sampled 3/14/2014**

Test	Result	Units	Method	Date	Analyst
Detailed Hydrocarbon Analysis					
Capillary Gas Chromatography	See Attached		ASTM D-6733	3/18/2014	CC

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201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

Saybolt LP 3/20/14

Sample Number 140803-002 ASTM D-6733

Sample ID 2014000147-02 (87-9505) Condensate

Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %	
Carbon Dioxide	0.07	0.06	0.14	
Methane	0.04	0.09	0.22	
Ethane	0.37	0.70	1.07	
Propane	3.40	4.51	6.71	
Isobutane	2.58	3.08	3.86	
N-Butane	9.84	11.33	14.73	
2,2-Dimethylpropane	0.22	0.25	0.27	→ To I-Pent
Isopentane	7.54	8.11	9.09	
N-Pentane	9.88	10.54	11.92	
2,2-Dimethylbutane	0.34	0.35	0.35	→ To ~~I-Pent~~ C6
Cyclopentane	0.06	0.06	0.08	→ To I-Pent
2,3-Dimethylbutane	0.56	0.56	0.56	C6
2-Methylpentane	3.67	3.75	3.71	C6
3-Methylpentane	2.42	2.43	2.44	C6
N-Hexane	6.34	6.42	6.40	C6
2,2-Dimethylpentane	0.21	0.21	0.18	- To C7
Methylcyclopentane	0.49	0.43	0.50	→ To C6
2,4-Dimethylpentane	0.32	0.32	0.28	> To C7
2,2,3-Trimethylbutane	0.05	0.05	0.05	> To C7
Benzene	0.10	0.08	0.11	→ To C6
3,3-Dimethylpentane	0.14	0.14	0.13	→ To C7
Cyclohexane	0.88	0.76	0.91	→ To C6
2-Methylhexane	2.55	2.51	2.21	C7
2,3-Dimethylpentane	0.59	0.57	0.52	C7
1,1-Dimethylcyclopentane	0.09	0.08	0.08	C7
3-Methylhexane	2.65	2.57	2.30	C7
Cis-1,3-dimethylcyclopentane	0.15	0.14	0.14	C7
Trans-1,3-dimethylcyclopentane	0.14	0.12	0.12	C7
3-Ethylpentane	0.23	0.22	0.20	C7
Trans-1,2-dimethylcyclopentane	0.20	0.18	0.18	C7
2,2,4-Trimethylpentane	0.02	0.02	0.01	- C8
N-Heptane	4.61	4.50	4.00	C7
Methylcyclohexane	2.75	2.38	2.43	C7
1,1,3-Trimethylcyclopentane	0.18	0.16	0.14	C7
Ethylcyclopentane	0.12	0.10	0.10	C7
2,5-Dimethylhexane	0.32	0.31	0.25	- C8
2,4-Dimethylhexane	0.41	0.39	0.32	- C8
Trans,cis-1,2,4-trimethylcyclopentane	0.07	0.06	0.06	- C8
3,3-Dimethylhexane	0.13	0.12	0.10	- C8

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RESERVOIR OPTIMIZATION

CORE LABORATORIES

201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

Saybolt LP 3/20/14
Sample Number **140803-002** ASTM D-6733
Sample ID **2014000147-02 (87-9505) Condensate**
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %
Trans,cis-1,2,3-trimethylcyclopentane	0.05	0.05	0.04
2,3,4-Trimethylpentane	0.03	0.03	0.02
Toluene	0.58	0.44	0.54
2,3,3-Trimethylpentane	0.03	0.03	0.02
2,3-Dimethylhexane	0.32	0.30	0.25
2-Methyl-3-Ethylpentane	0.06	0.06	0.05
2-Methylheptane	1.63	1.56	1.24
4-Methylheptane	0.80	0.76	0.61
3,4-Dimethylhexane	0.07	0.07	0.05
3-Methylheptane	2.43	2.30	1.85
3-Ethylhexane	0.29	0.27	0.22
Trans-1,4-dimethylcyclohexane	0.32	0.28	0.25
1,1-Dimethylcyclohexane	0.13	0.11	0.10
Trans-1-ethyl-3-methylcyclopentane	0.07	0.06	0.06
Cis-1-ethyl-3-methylcyclopentane	0.05	0.05	0.04
Trans-1-ethyl-2-methylcyclopentane	0.05	0.04	0.03
Trans-1,2,dimethylcyclohexane	0.23	0.20	0.18
N-Octane	3.10	2.95	2.36
Isopropylcyclopentane	0.02	0.02	0.01
2,4,4-Trimethylhexane	0.01	0.01	0.01
2,3,5-Trimethylhexane	0.05	0.04	0.03
Cis-1-ethyl-2-methylcyclopentane	0.02	0.02	0.01
2,2-Dimethylheptane	0.07	0.07	0.05
Cis-1,2-dimethylcyclohexane	0.07	0.06	0.06
2,4-Dimethylheptane	0.21	0.19	0.14
4,4-Dimethylheptane	0.03	0.03	0.02
Ethylcyclohexane	0.39	0.33	0.30
2-Methyl-4-ethylhexane	0.05	0.04	0.03
2,6-Dimethylheptane	0.21	0.19	0.14
1,1,3-Trimethylcyclohexane	0.07	0.06	0.05
2,5-Dimethylheptane	0.43	0.40	0.29
3,5-Dimethylheptane	0.13	0.12	0.09
C9 Naphthene	0.01	0.01	0.01
C9 Naphthene	0.01	0.01	0.01
Ethylbenzene	0.06	0.05	0.05
2,3,4,Trimethylhexane	0.19	0.17	0.13
Cis,trans,1,3,5-trimethylcyclohexane	0.02	0.02	0.01
3,3,4,Trimethylhexane	0.04	0.03	0.02
Meta-Xylene	0.51	0.40	0.42

CORE LABORATORIES

201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

Saybolt LP
Sample Number 140803-002
Sample ID 2014000147-02 (87-9505) Condensate
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

3/20/14
ASTM D-6733

	WT %	LV %	MOL %
Para-Xylene	0.19	0.15	0.15
2,3-Dimethylheptane	0.19	0.17	0.13
3,4-Dimethylheptane D/L	0.06	0.06	0.04
3,4-Dimethylheptane L/D	0.08	0.07	0.05
4-Ethylheptane	0.17	0.16	0.12
4-Methyloctane	0.73	0.68	0.49
2-Methyloctane	0.82	0.77	0.56
Trans,cis,1,2,4,trimethylcyclohexane	0.01	0.01	0.01
3-Ethylheptane	0.21	0.19	0.14
3-Methyloctane	0.86	0.80	0.59
Cis,trans,1,2,4,trimethylcyclohexane	0.01	0.01	0.01
Cis,cis,1,2,4,trimethylcyclohexane	0.02	0.02	0.01
Ortho-Xylene	0.14	0.11	0.12
Trans-1-Methyl-2-propylcyclopentane	0.04	0.03	0.02
Cis-1-ethyl-3-methylcyclohexane	0.17	0.14	0.12
Trans-1-ethyl-4-methylcyclohexane	0.07	0.06	0.05
Isobutylcyclopentane	0.01	0.01	0.01
1-Ethyl-1-methylcyclohexane	0.01	0.01	0.01
Cis,trans,1,2,3,trimethylcyclohexane	0.02	0.02	0.01
Trans,trans,1,2,3,trimethylcyclohexane	0.02	0.02	0.01
N-Nonane	1.83	1.70	1.24
Trans-1-ethyl-3-methylcyclohexane	0.10	0.08	0.07
Trans-1-ethyl-2-methylcyclohexane	0.04	0.03	0.02
Cis-1-ethyl-4-methylcyclohexane	0.04	0.03	0.02
Isopropylbenzene	0.02	0.01	0.01
Isopropylcyclohexane	0.05	0.04	0.03
2,4-Dimethyloctane	0.17	0.16	0.10
2,6-Dimethyloctane	0.10	0.09	0.06
2,5-Dimethyloctane	0.04	0.03	0.02
N-propylcyclohexane	0.32	0.27	0.22
3,5-Dimethyloctane	0.09	0.08	0.06
2,7-Dimethyloctane	0.22	0.20	0.13
n-Propylbenzene	0.04	0.03	0.03
3,6-Dimethyloctane	0.07	0.07	0.04
3,3-Dimethyloctane	0.03	0.02	0.02
1-Methyl-3-ethylbenzene	0.15	0.12	0.11
1-Methyl-4-ethylbenzene	0.10	0.08	0.07
2,3-Dimethyloctane	0.01	0.01	0.01
1,3,5-Trimethylbenzene	0.32	0.25	0.23

-MX ✓ C-9 -MX ✓ C9

CORE LABORATORIES

201 Deerwood Glen Dr
Deer Park, TX 77536
281-478-1300

Saybolt LP
Sample Number 140803-002
Sample ID 2014000147-02 (87-9505) Condensate
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %
4-Ethyloctane	0.20	0.18	0.12
C10 Naphthene	0.01	0.01	0.01
5-Methylnonane	0.23	0.21	0.14
4-Methylnonane	0.42	0.39	0.26
1-Methyl-2-ethylbenzene	0.02	0.01	0.01
2-Methylnonane	0.45	0.41	0.28
3-Ethyloctane	0.11	0.10	0.07
1,2,3,5 Tet-methylcyclohexane	0.02	0.02	0.01
3-Methylnonane	0.47	0.43	0.29
1,2,3,4 Tet-methylcyclohexane	0.03	0.02	0.02
C10 Naphthenes	0.06	0.05	0.04
C10 Paraffin	0.03	0.02	0.02
1,2,4-Trimethylbenzene	0.19	0.14	0.14
Cis-1-methyl-3-propylcyclohexane	0.06	0.05	0.04
Trans 1,4 diethylcyclohexane	0.08	0.07	0.05
Trans-1-methyl-3-propylcyclohexane	0.01	0.01	0.01
1-Ethyl-2,3-dimethylcyclohexane	0.02	0.02	0.01
Isobutylbenzene	0.05	0.04	0.04
sec-Butylbenzene	0.03	0.02	0.02
N-Decane	1.19	1.09	0.73
C10 Naphthene	0.02	0.02	0.01
Trans 1,3 diethylcyclohexane	0.01	0.01	0.01
1,2,3-Trimethylbenzene	0.05	0.03	0.03
1-Methyl-3-isopropylbenzene	0.04	0.03	0.02
1-Methyl-4-isopropylbenzene	0.03	0.02	0.02
Indan (2,3-Dihydroindene)	0.06	0.04	0.05
Sec-butylcyclohexane	0.09	0.08	0.06
1-Methyl-2-isopropylbenzene	0.14	0.11	0.09
Butylcyclohexane	0.04	0.03	0.02
1-Methyl-3-n-propylbenzene	0.13	0.10	0.08
1-Methyl-4-n-propylbenzene	0.11	0.08	0.07
1,4-Diethylbenzene	0.03	0.02	0.02
N-Butylbenzene	0.04	0.03	0.02
1,3-Dimethyl-5-ethylbenzene	0.05	0.03	0.03
1,2-Diethylbenzene	0.02	0.01	0.01
1-Methyl-2-n-propylbenzene	0.05	0.03	0.03
5-Methyldecane	0.15	0.14	0.09
4-Methyldecane	0.23	0.21	0.13
2-Methyldecane	0.22	0.19	0.12

CORE LABORATORIES

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Deer Park, TX 77536
281-478-1300

Saybolt LP 3/20/14

ASTM D-6733

Sample Number 140803-002

Sample ID 2014000147-02 (87-9505) Condensate
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %
1,3-Dimethyl-4-ethylbenzene	0.02	0.01	0.01
3-Methyldecane	0.30	0.27	0.17
1-Methylindan	0.26	0.18	0.17
1,2-Dimethyl-4-ethylbenzene	0.06	0.05	0.04
1,3-Dimethyl-2-ethylbenzene	0.02	0.01	0.01
1,2-Dimethyl-3-Ethylbenzene	0.03	0.02	0.02
C11 Naphthenes	0.07	0.06	0.04
C11 Paraffins	0.42	0.38	0.22
N-Undecane	0.83	0.75	0.46
1,2,4,5-Tetramethylbenzene	0.04	0.03	0.02
1,2,3,5-Tetramethylbenzene	0.02	0.01	0.01
C12 Unidentified	0.76	0.64	0.41
4-Methylindan	0.07	0.05	0.05
5-Methylindan	0.08	0.06	0.05
1,2,3,4-Tetramethylbenzene	0.04	0.03	0.02
Tetralin	0.02	0.01	0.01
5-Methylundecane	0.08	0.07	0.04
4-Methylundecane	0.14	0.13	0.07
2-Methylundecane	0.14	0.13	0.07
Pentylbenzene	0.02	0.01	0.01
Naphthalene	0.17	0.12	0.12
1,1 Dimethylindan	0.05	0.03	0.03
1,2 Dimethylindan	0.02	0.01	0.01
3-Methylundecane	0.14	0.13	0.07
C11 Aromatic	0.27	0.21	0.16
N-Dodecane	0.58	0.51	0.29
1,3,5-triethylbenzene	0.05	0.04	0.03
1,3 Dimethylindan	0.01	0.01	0.01
5,6 Dimethylindan	0.02	0.01	0.01
1,2,4-triethylbenzene	0.05	0.03	0.02
2-Methylnaphthalene	0.01	0.01	0.01
4,5 Dimethylindan	0.07	0.05	0.04
Tridecanes	1.31	1.08	0.65
N-Tridecane	0.42	0.37	0.20
1-Methylnaphthalene	0.02	0.01	0.01
Tetradecanes	0.91	0.74	0.42
N-Tetradecane	0.26	0.23	0.11
Pentadecanes	0.51	0.41	0.22
N-Pentadecane	0.15	0.13	0.06

CORE LABORATORIES

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281-478-1300

Saybolt LP

Sample Number 140803-002

Sample ID 2014000147-02 (87-9505) Condensate
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %
Hexadecanes	0.23	0.19	0.09
N-Hexadecane	0.10	0.09	0.04
Heptadecanes	0.14	0.11	0.05
N-Heptadecane	0.05	0.05	0.02
Pristane	0.02	0.02	0.01
Octadecanes	0.04	0.03	0.01
N-Octadecane	0.04	0.03	0.01
Nonadecanes	0.02	0.01	0.01
N-Nonadecane	0.03	0.02	0.01
N-Eicosane	0.02	0.02	0.01
Heneicosanes	0.01	0.01	0.00
Unidentified	0.67	0.61	0.35
Total	100.00	100.00	100.00
Total Paraffins	38.18	39.79	42.13
Total Isoparaffins	39.59	39.58	36.81
Total Naphthenes	8.06	7.02	6.85
Total Aromatics	4.62	3.46	3.39
Unclassified	9.56	10.15	10.82
Total C4	12.42	14.41	18.59
Total C5	17.70	18.96	21.36
Total C6	14.80	14.78	14.98
Total C7	15.36	14.53	13.46
Total C8	12.20	11.32	9.37
Total C9	8.31	7.48	5.69
Total C10	5.76	4.98	3.62
Total C11	2.70	2.35	1.52
Total C12	1.19	1.04	0.59
C4 Paraffin	9.84	11.33	14.73
C5 Paraffin	9.88	10.54	11.92
C6 Paraffin	6.34	6.42	6.40
C7 Paraffin	4.61	4.50	4.00
C8 Paraffin	3.10	2.95	2.36
C9 Paraffin	1.83	1.70	1.24
C10 Paraffin	1.19	1.09	0.73
C11 Paraffin	0.83	0.75	0.46
C12 Paraffin	0.58	0.51	0.29
C4 Isoparaffin	2.58	3.08	3.86
C5 Isoparaffin	7.76	8.36	9.36
C6 Isoparaffin	6.99	7.09	7.06

CORE LABORATORIES

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Saybolt LP
Sample Number 140803-002
Sample ID 2014000147-02 (87-9505) Condensate
Tank 2,RPT8 Pad, Eureka Pipeline 3/14/2014

	WT %	LV %	MOL %
C7 Isoparaffin	6.74	6.59	5.87
C8 Isoparaffin	6.54	6.22	4.99
C9 Isoparaffin	4.52	4.19	3.07
C10 Isoparaffin	2.62	2.40	1.62
C11 Isoparaffin	1.32	1.19	0.73
C12 Isoparaffin	0.51	0.46	0.25
C5 Naphthene	0.06	0.06	0.08
C6 Naphthene	1.37	1.19	1.41
C7 Naphthene	3.44	3.00	3.05
C8 Naphthene	1.66	1.44	1.28
C9 Naphthene	1.02	0.88	0.70
C10 Naphthene	0.44	0.39	0.29
C11 Naphthene	0.07	0.06	0.04
C6 Aromatic	0.10	0.08	0.11
C7 Aromatic	0.58	0.44	0.54
C8 Aromatic	0.91	0.71	0.74
C9 Aromatic	0.95	0.71	0.68
C10 Aromatic	1.51	1.10	0.98
C11 Aromatic	0.48	0.35	0.29
C12 Aromatic	0.10	0.07	0.05

Mol WT of Sample, gm/mol 87.01
Density of Sample, gm/cc 0.6727

Attachment O

Monitoring, Recordkeeping, Reporting and Testing Plan

ATTACHMENT O
Icon Midstream Pipeline, LLC
Big Moses Liquids Management Facility
Monitoring, Recordkeeping, Reporting and Testing Plan

I. Monitoring

Engines

Icon Midstream (Icon) will monitor and record engine hours of operation on a daily basis. Additionally, Icon will monitor the amount of gas managed by the station on a daily basis as well as gas consumed in operating the compressor engines on a daily basis. Together, this information will allow the company to determine emissions for each engine, utilizing the catalyst manufacturer's warranted emission factors.

The air to fuel ratio will be monitored on a weekly basis to ensure proper operation of the catalytic converters. Additionally, the catalytic converters will be inspected and maintained in accordance with the manufacturer's specifications.

Condensate/NGL and Produced Water Tanks

Icon will monitor and record the volume of produced water and condensate being loading out on a monthly basis.

II. Recordkeeping

Icon will maintain accurate operating records of both engines and the facility throughput for each year on a 12-month rolling average. Records will include monthly fuel consumption (facility-wide), hours of operation for each engine, a total gas consumed by the heaters (a total for both heaters) and the amount of gas and each liquid managed by the facility. These records will be signed and dated by an authorized representative.

All inspections, preventive maintenance, failures, duration of failure events, replacements and/or repair of catalytic converters will be recorded, signed and dated by an authorized representative.

All inspections, maintenance, failures, replacements and/or repair of valves and non-welded connections will be recorded, signed and dated by an authorized representative.

All records will be kept either on site or at the nearest office location for a period of at least five (5) years.

III. Testing

Within 180 days of achieving the maximum facility throughput, Icon will conduct emissions testing of the VRU Driver engine as stipulated under Subpart JJJJ to demonstrate compliance with the emission rates set forth in the permit application. Due to its size, subsequent testing of the VRU compressor engine is not required. The Flash Gas compressor driver engine does not require testing.

IV. Reporting

Icon will submit certified emission statements on an annual basis in accordance with WVDEP, Division of Air Quality requirements.

Attachment P

Public Notice Affidavit

Affidavit Notice Will Be Submitted Upon Receipt

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Icon Midstream Pipeline, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Construction Permit for its Big Moses Liquids Management Facility located off of Big Moses Road near Alma, WV in Tyler County., West Virginia (Lat.39.43011, Long. -80.78876)

The applicant estimates the increase in potential to discharge the following regulated air pollutants:

2.55 tons of Nitrogen Oxides per year
4.78 tons of Carbon Monoxide per year
35.09 tons of Volatile Organics per year
0.01 tons of Sulfur Dioxide per year
2.63 tons of Particulate Matter per year
0.04 tons of Benzene
0.75 tons of n-Hexane
0.13 tons of formaldehyde
2,101 tons of CO_{2e} per year

Startup of the modified operation is planned to begin on or about the 30th day of March, 2016. 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 1250, during normal business hours.

Dated this the **(Day)** day of **(Month)**, **(Year)**.

By: Mr. Shane Dowell
Operations Manager
Icon Midstream Pipeline, LLC