July 19, 2016

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

RE: Application for G70-C General Permit
Ascent Resources – Marcellus, LLC
Long 408/409 Well Pad
Permit No. G70-A009B
Facility ID: 103-00080

Dear Sir/Madam:

Ascent Resources - Marcellus, LLC (Ascent) owns and operates the Long 408/409 Well Pad (Facility) in Wetzel County, West Virginia. The Facility currently operates under a G70-A General Permit, G70-A009B, issued March 30, 2016. Ascent has received updated engine information (date of manufacture and emission factors), and is therefore submitting this application under the G70-C General Permit to authorize the updated information, as the G70-A General Permit is no longer in use.

A public notice for the proposed project will be published in The Wetzel Chronicle as soon as possible. Ascent will forward the original Affidavit of Publication to the Agency's attention once it is received from the publisher.

REGULATORY DISCUSSION

This section outlines the State air quality regulations that could be reasonably expected to apply to the Facility and makes an applicability determination for each regulation based on activities conducted at the site and the emissions of regulated air pollutants. This review is presented to supplement and/or add clarification to the information provided in the West Virginia Department of Environmental Protection (WVDEP) G70-C permit application forms.

The West Virginia State Regulations address applicable state (i.e. State Implementation Plan) rules as well as federal regulations, including Title I Prevention of Significant Deterioration Nonattainment New Source Review preconstruction permitting, Title V, New Source Performance Standards, and National Emission Standards for Hazardous Air Pollutants. The regulatory requirements in reference to the Facility are described in detail in the below section.

WEST VIRGINIA STATE AIR REGULATIONS

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

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

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

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

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

The enclosed combustion device located on the Facility is subject to this regulation. Per 45 CSR 6-4.3, opacity of emissions from the enclosed combustion device shall not exceed 20 percent, except as provided by 4.4. Particulate matter emissions from this unit will not exceed the levels calculated in accordance with 6-4.1. The enclosed combustion device is not being altered with the submission of this G70-C application.

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

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

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

This G70-C Application is being submitted to document the changes in the engine information and for the operational activities associated with Ascent's production of natural gas.

45 CSR 14 / 45 CSR 19 – Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration / Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contributed to Non-attainment

Federally regulated construction permitting programs regulate new and modified major sources of regulated pollutants. The G70-C applicability criteria exclude facilities that meet the definition of a major source as defined in 45 CSR 19 from being eligible for the general permit. Operation of equipment at the Facility will not exceed major source emission thresholds established by these permitting programs. Ascent will monitor future construction and modification activities at the site closely and will compare any future increase in emissions with major source thresholds to ensure these activities will not trigger these programs.

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

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

45 CSR 30 – Requirements for Operating Permits

45 CSR 30 applies to the requirements of the federal Title V operating permit program (40 CFR 70). The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAPs, and 100 tpy of all other regulated pollutants. The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility. The Facility is not a major source with respect to the Title V operating permit program.

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

45 CSR 34 applies to all registrants that are subject to any of the NESHAP requirements described in more detail in the Federal Regulations section. Applicable requirements of NESHAPS Subpart ZZZZ are included in the G70-C general permit.

FEDERAL REGULATIONS

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

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

The Cummins G8.3L natural gas-fired compression engine installed at the Facility is subject to the requirements of this Rule. The compressor engine is a spark ignition internal combustion engine that was manufactured on May 1, 2014. This engine is subject to an emission limit of 1.0 g/hp-hr NOx, 2.0 g/hp-hr CO, and 0.7 g/hp-hr VOCs.

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

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

The storage vessels permitted at the Facility are not amended with the submission of this G70-C application. The storage tanks have had a federally enforceable limit of less than six (6) tons per year (TPY) and therefore are not subject to NSPS Subpart OOOO.

Any pneumatic controller installed at this Facility will be intermittent bleed devices. Therefore, there will not be any pneumatic controller affected facilities located at this site.

No additional NSPS are currently applicable to this Facility.

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

Ascent will operate the 118 bhp natural gas-fired reciprocating internal combustion to provide compression to vapors that flash in the low pressure separator. This engine was manufactured after July 1, 2008 and therefore will comply with 40 CFR 63 Subpart ZZZZ by complying with 40 CFR 60 Subpart JJJJ.

The following NESHAP included in the G70-C permit are not applicable to the Facility:

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

Enclosed is the original and two copies of the application, along with the fee in the amount of $1,500. Should you have any questions, please feel free to contact me at 405-252-7753 or by email at evan.foster@ascentresources.com.

Sincerely,

Evan Foster
EH&S Air Compliance Specialist
Ascent Resources – Marcellus, LLC

Enclosures

TABLE OF CONTENTS

ATTACHMENT V – ADDITIONAL INFORMATION 68 ERROR! BOOKMARK NOT DEFINED.
G70-C GENERAL PERMIT REGISTRATION APPLICATION **1**
ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM **3**
ATTACHMENT B - SITING CRITERIA WAIVER **5**
ATTACHMENT C – CURRENT BUSINESS CERTIFICATE **6**
ATTACHMENT D – PROCESS FLOW DIAGRAM **8**
ATTACHMENT E – PROCESS DESCRIPTION **11**
ATTACHMENT F – PLOT PLAN **13**
ATTACHMENT G – AREA MAP **15**
ATTACHMENT H – G70-C SECTION APPLICABILITY FORM **17**
ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE **18**
ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET **19**
ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET **20**
ATTACHMENT L – STORAGE VESSEL DATA SHEET **21**
ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART DC DATA SHEET **23**
ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET **24**
ATTACHMENT O – TANKER TRUCK LOADING DATA SHEET **27**
ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET **29**
ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET **30**
ATTACHMENT R – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS **31**
ATTACHMENT S – EMISSIONS CALCULATIONS **36**
ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET **62**
ATTACHMENT U – CLASS I LEGAL ADVERTISEMENT **66**
ATTACHMENT V – ADDITIONAL INFORMATION **68**

dep	**west virginia** department of environmental protection	Division of Air Quality 601 57th Street SE Charleston, WV 25 4 Phone (304) 926-0475 Fax (304) 926-0479 www.dep.wv.gov

G70-C GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

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

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Ascent Resources – Marcellus, LLC

Federal Employer ID No. (FEIN): 46-5580354

Applicant's Mailing Address: P.O. Box 13678

City: Oklahoma City	State: OK	ZIP Code: 73113

Facility Name: Long 408/409

Operating Site Physical Address: 1220 Long Ridge Road
If none available, list road, city or town and zip of facility.

City: Wileyville	Zip Code: 26155	County: Wetzel

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.58411
Longitude: -80.67497

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 103-00080

CERTIFICATION OF INFORMATION

This G70-C General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G70-C Registration Application will be returned to the applicant. Furthermore, if the G70-C forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

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

I hereby certify that all information contained in this G70-C General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature:_____
Name and Title: Tim Cummings, VP Operations Phone: 405-608-5491 Fax: N/A
Email: tim.cummings@ascentresources.com Date:

If applicable:
Authorized Representative Signature:_____
Name and Title: Phone: Fax:
Email: Date:

If applicable:
Environmental Contact
Name and Title: Evan Foster Phone: 405-252-7753 Fax: N/A
Email: evan.foster@ascentresources.com Date:

OPERATING SITE INFORMATION
Briefly describe the proposed new operation and/or any change(s) to the facility: Ascent is providing updated engine information, including date of manufacture and manufacturer's guaranteed emissions per their consent order.
Directions to the facility: Take Route 7 East out of New Martinsville towards Morgantown, Bear right on Route 20 toward Pine Grove, left onto North Fork C/R 15/17, left onto Barker Run C/R 17, right onto Hoyt Ridge C/R 58, right on lease road.

ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ and/or OOOO [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed in its entirety)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-C Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P (NOT APPLICABLE)	
☒ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment R	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment S	
☒ Facility-wide Emission Summary Sheet(s) – Attachment T	
☒ Class I Legal Advertisement – Attachment U	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

Is there a facility owned by or associated with the natural gas industry located within one (1) mile of the proposed facility? Yes ☐ No ☒

If Yes, please complete the questionnaire on the following page (Attachment A).

Please provide a source aggregation analysis for the proposed facility below:

The Long 408/409 Well Pad is located in Wetzel County, WV and operated by Ascent. Stationary sources of air pollutants may require aggregation of total emission levels to evaluate the potential applicability of Title I, Parts C and D preconstruction permitting programs and the Title V operating permit program if these sources share the same industrial grouping, are operating under common control, and are classified as contiguous or adjacent properties. Ascent will operate the Long 408/409 Well Pad with the same industrial grouping as nearby facilities, and some of these facilities are under common control. Ascent, however, is not subject to the aggregation of stationary emission sources because these sites do not meet the definition of contiguous or adjacent facilities.

The Long 408/409 Well Pad will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by Ascent that share the same two-digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the Long 408/409 Well Pad does share the same SIC codes as the surrounding wells and compressor stations.

Ascent is the sole operator of the Long 408/409 Well Pad. Ascent is also the sole operator of other production sites and compressor stations in the area. Therefore, Ascent does qualify as having nearby operations under common control. Nearby sites do not meet the definition of contiguous or adjacent properties since they are not in contact and do not share a common boundary. Based on the above reasoning, Ascent is not subject to the aggregation of stationary emission sources since the stationary sources are not considered contiguous or adjacent facilities. This aggregation determination is consistent with the aggregation analysis provided by WVDAQ during the issuance of the previous and current permit, G70-A009A and G70-A009B.

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM	
Answer each question with a detailed explanation to determine contiguous or adjacent properties which are under a common control and any support facilities. This section must be completed in its entirety.	
Provide a map of contiguous or adjacent facilities (production facilities, compressor stations, dehydration facilities, etc.) which are under common control and those facilities that are not under common control but are support facilities. Please indicate the SIC code, permit number (if applicable), and the distance between facilities in question on the map.	
Are the facilities owned by the same parent company or a subsidiary of the parent company? Provide the owners identity and the percentage of ownership of each facility.	Yes ☐ No ☐
Does an entity such as a corporation have decision making authority over the operation of a second entity through a contractual agreement or voting interest? Please explain.	Yes ☐ No ☐
Is there a contract for service relationship between the two (2) companies or, a support/dependency relationship that exists between the two (2) companies? Please explain.	Yes ☐ No ☐
Do the facilities share common workforces, plant managers, security forces, corporate executive officers or board executives?	Yes ☐ No ☐
Will managers or other workers frequently shuttle back and forth to be involved actively at both facilities?	Yes ☐ No ☐
Do the facilities share common payroll activities, employee benefits, health plans, retirement funds, insurance coverage, or other administrative functions? Please explain.	Yes ☐ No ☐
Does one (1) facility operation support the operation of the other facility?	Yes ☐ No ☐
Is one (1) facility dependent on the other? If one (1) facility shuts down, what are the limitations on the other to pursue outside business? Please explain.	Yes ☐ No ☐
Are there any financial arrangements between the two (2) entities?	Yes ☐ No ☐
Are there any legal or lease agreements between the two (2) facilities?	Yes ☐ No ☐
Do the facilities share products, byproducts, equipment, or other manufacturing or air pollution control device equipment? Please explain.	Yes ☐ No ☐
Do all the pollutant-emitting activities at the facilities belong to the same SIC Code? Please provide the SIC Codes.	Yes ☐ No ☐
Was the location of the new facility chosen primarily because of its proximity to the existing facility to integrate the operation of the two (2) facilities? Please explain.	Yes ☐ No ☐
Will materials be routinely transferred between the two (2) facilities? Please explain the amount of transfer and how often the transfers take place and what percentages go to the various entities.	Yes ☐ No ☐
Does the facility influence production levels or compliance with environmental regulations at other facilities? Who accepts the responsibility for compliance with air quality requirements? Please explain.	Yes ☐ No ☐

ATTACHMENT B - SITING CRITERIA WAIVER

There are no dwellings within 300 ft of the proposed facility. A Siting Criteria Waiver is not applicable to the Long 408/409 Well Pad.

ATTACHMENT C – CURRENT BUSINESS CERTIFICATE

If the applicant is a resident of West Virginia, the applicant should provide a copy of the current Business Registration Certificate issued to them from the West Virginia Secretary of State's Office. If the applicant is not a resident of the State of West Virginia, the registrant should provide a copy of the Certificate of Authority/Authority of LLC/Registration. This information is required for all sources to operate a business in West Virginia regardless of whether it is a construction, modification, or administrative update.

If you are a new business to West Virginia and have applied to the West Virginia Secretary of State's Office for a business license, please include a copy of your application.

Please note: Under the West Virginia Bureau of Employment Programs, 96CSR1, the DAQ may not grant, issue, or renew approval of any permit, general permit registration, or Certificate to Operate to any employing unit whose account is in default with the Bureau of Employment Programs Unemployment Compensation Division.

State of West Virginia

Certificate

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

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

AMERICAN ENERGY-MARCELLUS, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

ASCENT RESOURCES - MARCELLUS, LLC

Given under my hand and the Great Seal of the State of West Virginia on this day of July 9, 2015

Natalie E Tennant

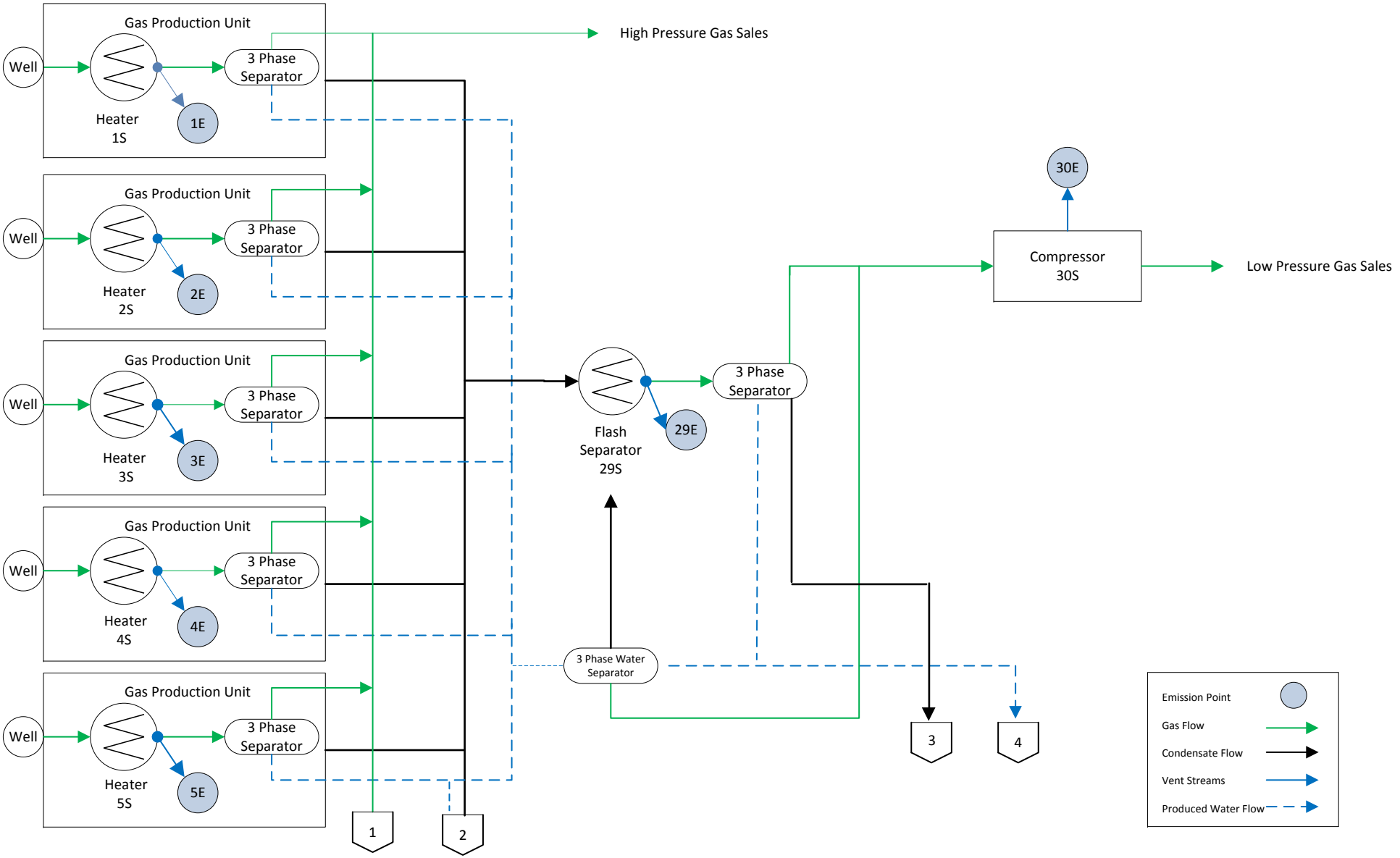
Secretary of State

ATTACHMENT D – PROCESS FLOW DIAGRAM

Provide a diagram or schematic that supplements the process description of the operation. The process flow diagram must show all sources, components or facets of the operation in an understandable line sequence of operation. The process flow diagram should include the emission unit ID numbers, the pollution control device ID numbers, and the emission point ID numbers consistent with references in other attachments of the application. For a proposed modification, clearly identify the process areas, emission units, emission points, and/or control devices that will be modified, and specify the nature and extent of the modification.

Use the following guidelines to ensure a complete process flow diagram:

- The process flow diagram shall logically follow the entire process from beginning to end.
- Identify each emission source and air pollution control device with proper and consistent emission unit identification numbers, emission point identification numbers, and control device identification numbers.
- The process flow lines may appear different for clarity. For example, dotted lines may be used for vapor flow and solid lines used for liquid flow and arrows for direction of flow.
- The process flow lines may be color coded. For example: new or modified equipment may be red; old or existing equipment may be blue; different stages of preparation such as raw material may be green; and, finished product or refuse, another color.



ENVIRO CLEAN CARDINAL
1015 N. BROADWAY
SUITE 300
OKLAHOMA CITY, OK 73102

www.envirocleanps.com

FIGURE TITLE
PROCESS FLOW DIAGRAM

DOCUMENT TITLE
G70-C APPLICATION

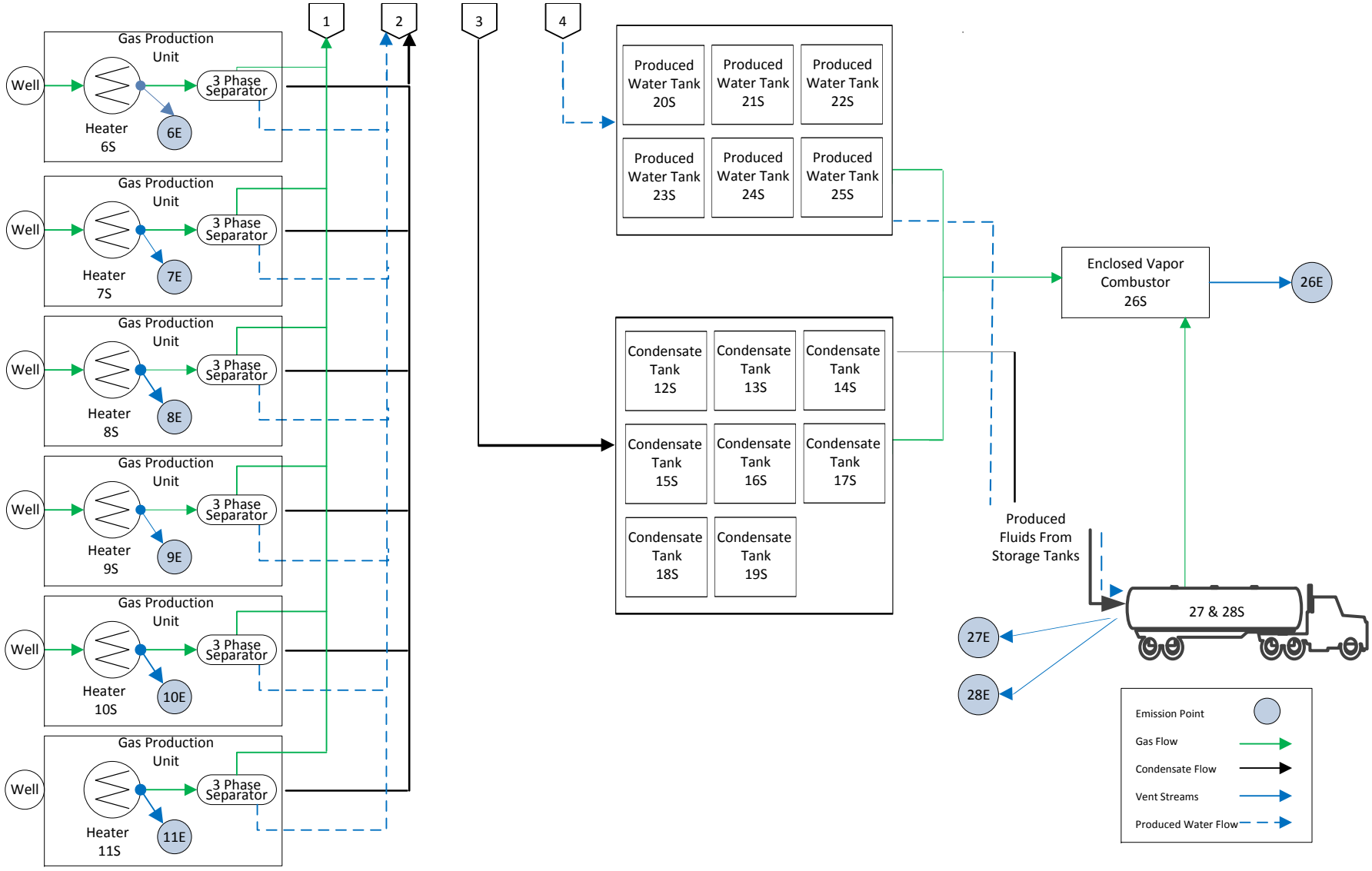
CLIENT
ASCENT RESOURCES- MARCELLUS, LLC

LOCATION
LONG 408/409 WELL PAD
WETZEL COUNTY, WEST VIRGINA

DATE	7/19/2016
SCALE	NOT TO SCALE
DESIGNED BY	AD
APPROVED BY	LWL
DRAWN BY	AD

PART 1 of 2

ATTACHMENT
D



ENVIRO CLEAN CARDINAL

1015 N. BROADWAY
SUITE 300
OKLAHOMA CITY, OK 73102

www.envirocleanps.com

FIGURE TITLE
PROCESS FLOW DIAGRAM

DOCUMENT TITLE
G70-C APPLICATION

CLIENT
ASCENT RESOURCES - MARCELLUS, LLC

LOCATION
LONG 408/409 WELL PAD
WETZEL COUNTY, WEST VIRGINA

DATE	7/19/2016
SCALE	NOT TO SCALE
DESIGNED BY	AD
APPROVED BY	LWL
DRAWN BY	AD

PART 2 OF 2

ATTACHMENT
D

ATTACHMENT E – PROCESS DESCRIPTION

Provide a detailed written description of the operation for which the applicant is seeking a permit. The process description is used in conjunction with the process flow diagram to provide the reviewing engineer a complete understanding of the activity at the operation. Describe in detail and order the complete process operation.

Use the following guidelines to ensure a complete Process Description:

- The process flow diagram should be prepared first and used as a guide when preparing the process description. The written description shall follow the logical order of the process flow diagram.
- All emission sources, emission points, and air pollution control devices must be included in the process description.
- When modifications are proposed, describe the modifications and the effect the changes will have on the emission sources, emission points, control devices and the potential emissions.
- Proper emission source ID numbers must be used consistently in the process description, the process flow diagram, the emissions calculations, and the emissions summary information provided.
- Include any additional information that may facilitate the reviewers understanding of the process operation.

The process description is required for all sources regardless of whether it is a construction, modification, or administrative update.

Attachment E
Process Description

This application is being filed for Ascent Resources – Marcellus, LLC (Ascent) and addresses administrative updates associated with the Long 408/409 Well Pad (Facility). The Facility currently operates under G70-A009B, issued March 30, 2016. With this Application, Ascent is converting the application to the G70C permit and updating the site specific information for the (1) Cummins G8.3 Reciprocating Compressor Engine, rated at 118 bhp, (30S), including date of manufacture and emission factors. All other operations at the Facility remain unchanged from the previous application.

The raw natural gas flows from the eleven (11) wellheads located on the Long 408/409 site. The raw gas is first routed through the 1.0 MMBtu/hr gas production units (GPUs) (1S to 11S) where the first stage of fluid separation occurs. The GPUs separate the well stream into a high pressure natural gas stream, a condensate liquid stream, and a produced water liquid stream. In the second stage of separation, the liquid streams are routed through one (1) 1.0 MMBtu/hr flash separator (29S) where condensate and produced water are removed. The flash from the low pressure separator is compressed by one (1) natural gas-fired compressor engine (30S) and is routed to the sales gas pipeline. Produced water from the separators is sent to six (6) 210-bbl produced water storage tanks (20S to 25S). The condensate from the separators is sent to the eight (8) 210-bbl condensate storage tanks (12S to 19S).

The natural gas stream will exit the facility via pipeline. Condensate and produced water is transported offsite via truck. Flashing emissions and working and breathing losses from the six (6) 210-bbl produced water storage tanks, eight (8) 210-bbl condensate storage tanks, and truck loading emissions (27S, 28S) will be routed to the onsite enclosed combustor (26S).

A process flow diagram is included as Attachment D and a plot plan is included as Attachment F.

ATTACHMENT F – PLOT PLAN

Provide an accurately scaled and detailed Plot Plan showing the locations of all emission units, emission points, and air pollution control devices. Show all emission units, affected facilities, enclosures, buildings and plant entrances and exits from the nearest public road(s) as appropriate. Note height, width and length of proposed or existing buildings and structures.

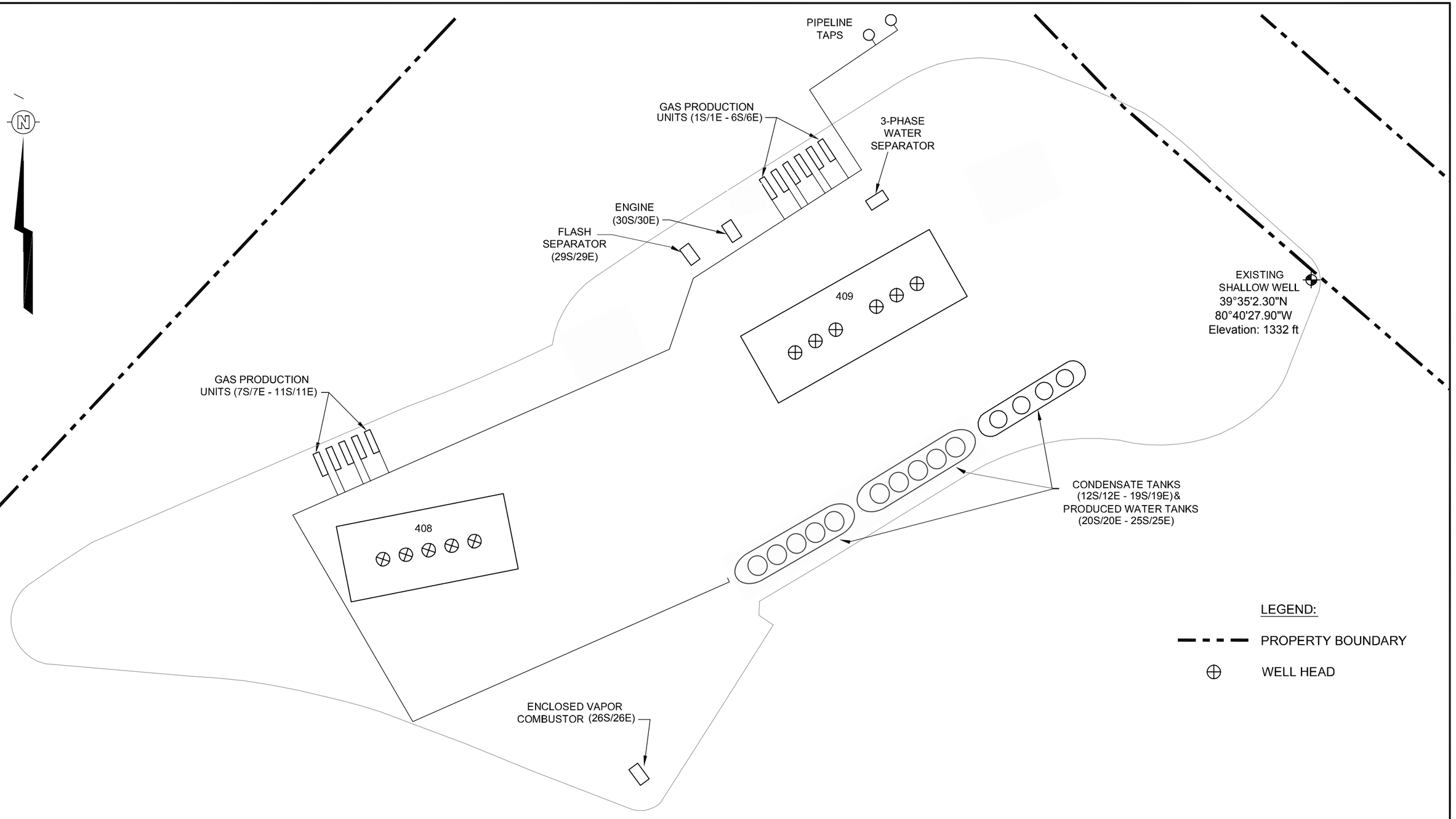
A scale between 1"=10' and 1"=200' should be used with the determining factor being the level of detail necessary to show operation or plant areas, affected facilities, emission unit sources, transfer points, etc. An overall small scale plot plan (e.g., 1"=300') should be submitted in addition to larger scale plot plans for process or activity areas (e.g., 1"=50') if the plant is too large to allow adequate detail on a single plot plan. Process or activity areas may be grouped for the enlargements as long as sufficient detail is shown.

Use the following guidelines to ensure a complete Plot Plan:

- Facility name
- Company name
- Company facility ID number (for existing facilities)
- Plot scale, north arrow, date drawn, and submittal date.
- Facility boundary lines
- Base elevation
- Lat/Long reference coordinates from the area map and corresponding reference point elevation
- Location of all point sources labeled with proper and consistent source identification numbers

This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
Pittsburgh, PA	11/14/14	--	E. Schlegel	--	--	153430-B1



REFERENCE:

DRAWING MODIFIED FROM PENN ENVIRONMENTAL AND REMEDIATION, INC., DRAWING NO. PA006042-01, "AIR PERMIT APPLICATION – WELL UNIT 408/409", DATED 12/06/2013.

MODIFIED BY ECC ON 07/12/2016 TO REFLECT UPDATED EQUIPMENT COUNTS. SUBMITTED jULY 2016.

SCALE
0 60 120 FEET

ASCENT RESOURCES - MARCELLUS, LLC

ATTACHMENT F
PLOT PLAN
LONG 408/409 WELL PAD
FACILITY ID: 103-00080
WILEYVILLE TOWNSHIP
WETZEL COUNTY, WEST VIRGINIA

Xref: Image

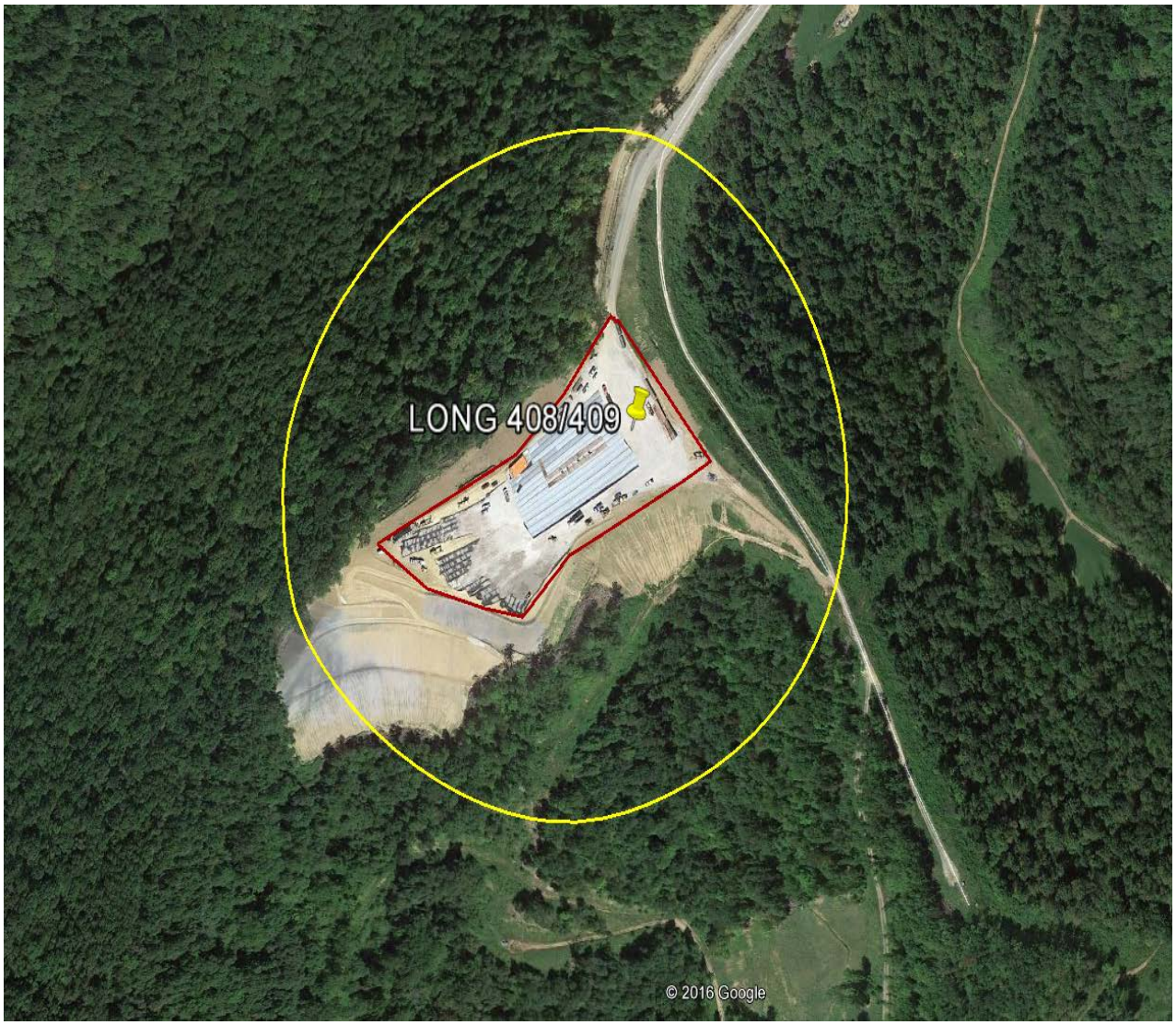
File: O:\Project\153430\153430-B1.dwg
Plot Date/Time: Nov 20, 2014 - 2:22pm
Plotted By: Evan.Schlegel

ATTACHMENT G – AREA MAP

Provide an Area Map showing the current or proposed location of the operation. On this map, identify plant or operation property lines, access roads and any adjacent dwelling, business, public building, school, church, cemetery, community or institutional building or public park within a 300' boundary circle of the collective emission units.

Please provide a 300' boundary circle on the map surrounding the proposed emission units collectively.

This information is required for all sources regardless of whether it is a construction, modification, or administrative update.



ENVIRO CLEAN CARDINAL

1015 N. Broadway, Suite 300
Oklahoma City, OK 73102
(405) 842-1066

www.envirocleanps.com

FIGURE TITLE	AREA MAP
DOCUMENT TITLE	G70-C APPLICATION
CLIENT	ASCENT RESOURCES, LLC
LOCATION	LONG 408/409 WELL PAD, WETZEL COUNTY, WEST VIRGINA

DATE	7/5/2016
SCALE	AS SHOWN
DESIGNED BY	AD
APPROVED BY	LWL
DRAWN BY	AD
PROJECT NUMBER	ARMAWV0001
FIGURE NUMBER	Attachment G

ATTACHMENT H – G70-C SECTION APPLICABILITY FORM

General Permit G70-C Registration
Section Applicability Form

General Permit G70-C was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, centrifugal compressors, reciprocating compressors, reciprocating internal combustion engines (RICEs), tank truck loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

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

GENERAL PERMIT G70-C APPLICABLE SECTIONS	
☒Section 5.0	Gas Well Affected Facility (NSPS, Subpart OOOO)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO)
☐Section 11.0	Centrifugal Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☐Section 12.0	Reciprocating Compressor Affected Facility (NSPS, Subpart OOOO)[2]
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines, Microturbines
☒Section 14.0	Tanker Truck Loading[3]
☐Section 15.0	Glycol Dehydration Units[4]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subpart OOOO control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 11 and 12 may also be subject to the applicable RICE requirements of Section 13.*

3 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

4 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

ATTACHMENT I – EMISSION UNITS / EMISSION REDUCTION DEVICES (ERD) TABLE

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
1S-11S	1E-11E	Eleven (11) GPU Burners	2014	N/A	1 MMBtu/hr each	Existing	N/A	N/A
12S-19S	12E-19E	Eight (8) Condensate Tanks	2015	Post 8/23/2011	210 bbl each	Existing	26C	N/A
20S-25S	20E-25E	Six (6) Produced Water Tanks	2015	Post 8/23/2011	210 bbl each	Existing	26C	N/A
26S	26E	Enclosed Vapor Combustor	2014	N/A	35.42 MMBtu/hr	Existing	N/A	N/A
27S	27E	Condensate Truck Loading	2015	N/A	600 bbl/day	Existing	26C	N/A
28S	28E	Produced Water Truck Loading	2015	N/A	600 bbl/day	Existing	26C	N/A
29S	29E	Flash Separator Heater	2014	N/A	1 MMBtu/hr	Existing	N/A	N/A
30S	30E	USA Compressor Engine- Cummins G8.3L	2014	5/1/2014	118 hp	Admin Mod	NSRC/30C	N/A
31S	31E	Fugitive Emissions	2014	N/A	N/A	Existing	N/A	N/A

[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] When required by rule
[4] New, modification, removal, existing
[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.
[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET

Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc.
Use extra pages for each associated source or equipment if necessary.

Source/Equipment: All equipment on Site

Leak Detection Method Used	☒ Audible, visual, and olfactory (AVO) inspections	☒ Infrared (FLIR) cameras	☐ Other (please describe)	☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	283	EPA	☒ Gas ☐ Liquid ☐ Both	2.35	0.01	233.13
Safety Relief Valves	☐ Yes ☒ No	32	EPA	☒ Gas ☐ Liquid ☐ Both	0.52	0.002	99.59
Open Ended Lines	☐ Yes ☒ No	171	EPA	☐ Gas ☐ Liquid ☒ Both	0.97	0.003	58.86
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	760	EPA	☐ Gas ☐ Liquid ☒ Both	0.53	0.002	28.11
Compressors	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Flanges	☐ Yes ☒ No	1188	EPA	☐ Gas ☐ Liquid ☒ Both	0.94	0.003	72.64
Other[1]	☐ Yes ☒ No	52	EPA	☐ Gas ☐ Liquid ☒ Both	1.41	0.005	81.32

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):
Estimated based on equipment at the facility.

Please indicate if there are any closed vent bypasses (include component):

Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck loading, etc.)

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

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

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device
47-103-02887	1/15/15	1/15/15	Combustion Device
47-103-02888	1/4/15	1/4/15	Combustion Device
47-103-02889	1/12/15	1/12/15	Combustion Device
47-103-02890	12/30/14	12/30/14	Combustion Device
47-103-02891	12/30/14	12/30/14	Combustion Device
47-103-02878	1/1/15	1/1/15	Combustion Device
47-103-02879	1/6/15	1/6/15	Combustion Device
47-103-02880	1/10/15	1/10/15	Combustion Device
47-103-02881	1/11/15	1/11/15	Combustion Device
47-103-02882	1/13/15	1/13/15	Combustion Device
47-103-02883	1/19/15	1/19/15	Combustion Device

Note: If future wells are planned and no API number is available please list as PLANNED.
If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.

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

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

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

Where,

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

ATTACHMENT L – STORAGE VESSEL DATA SHEET

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for ***each*** new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**

The following information is REQUIRED:

☒ Composition of the representative sample used for the simulation
☒ For each stream that contributes to flashing emissions:
- ☒ Temperature and pressure (inlet and outlet from separator(s))
- ☒ Simulation-predicted composition
- ☒ Molecular weight
- ☒ Flow rate

☒ Resulting flash emission factor or flashing emissions from simulation
☒ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions

Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name Condensate Storage	2. Tank Name Eight (8) 210-bbl Condensate Storage Tanks
3. Emission Unit ID number 12S-19S	4. Emission Point ID number 12S-19E
5. Date Installed , Modified or Relocated *(for existing tanks)* 2014 Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* No change. Submitting new application to convert from G70A to G70C	
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. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required. Included with Calculations.***	

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name Six (6) 210-bbl Produced Water Storage Tanks
3. Emission Unit ID number 20S-25S	4. Emission Point ID number 20S-25E
5. Date Installed , Modified or Relocated *(for existing tanks)* 2014 Was the tank manufactured after August 23, 2011? ☒ Yes ☐ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* No change. Submitting new application to convert from G70A to G70C	
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. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required. Included with Calculations.***	

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
N/A	N/A	N/A	N/A

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, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART Dc DATA SHEET

Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. ***The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.***

Emission Unit ID#[1]	Emission Point ID#[2]	Emission Unit Description (manufacturer, model #)	Year Installed/ Modified	Type[3] and Date of Change	Maximum Design Heat Input (MMBTU/hr)[4]	Fuel Heating Value (BTU/scf)[5]
1S-11S	1E-11E	Eleven (11) GPU Burners	2014	Existing	1.0 (each)	1263
29S	29E	Flash Separator Heater	2014	Existing	1.0	1263

1 Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

2 Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

3 New, modification, removal

4 Enter design heat input capacity in MMBtu/hr.

5 Enter the fuel heating value in BTU/standard cubic foot.

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID#[1]	30S
Engine Manufacturer/Model	USA Compressor Engine – Cummins 6390 G8.3
Manufacturers Rated bhp/rpm	118 bhp / 1800 RPM
Source Status[2]	MS
Date Installed/ Modified/Removed/Relocated[3]	12/2014
Engine Manufactured /Reconstruction Date[4]	5/1/2014
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SRB
APCD Type[7]	NSCR
Fuel Type[8]	PQ
H_2S (gr/100 scf)	N/A
Operating bhp/rpm	118 bhp / 1800 RPM
BSFC (BTU/bhp-hr)	8032
Hourly Fuel Throughput	750.18 ft^3/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	6.57 $MMft^3/yr$
Fuel Usage or Hours of Operation Metered	Yes ☒ No ☐

Calculation Methodology[9]	**Pollutant[10]**	**Hourly PTE (lb/hr)[11]**	**Annual PTE (tons/year)[11]**
MD	NO_x	0.26	1.14
MD	CO	0.52	2.28
MD	VOC	0.18	0.80
AP	SO_2	0.001	0.002
AP	PM_{10}	0.02	0.08
AP	Formaldehyde	0.02	0.09
AP	Total HAPs	0.03	0.13
EPA	GHG (CO_2e)	111	486

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. Microturbine generator engines should be designated MT-1, MT-2, MT-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	Relocated Source
REM	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation 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 IIII/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 as appropriate.

Provide a manufacturer's data sheet for all engines being registered.

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

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

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	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

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*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Engine Air Pollution Control Device (Emission Unit ID# 30S, use extra pages as necessary)		
Air Pollution Control Device Manufacturer's Data Sheet included? Yes ☒ No ☐		
☒ NSCR	☐ SCR	☐ Oxidation Catalyst
Provide details of process control used for proper mixing/control of reducing agent with gas stream:		
Manufacturer: Miratech	Model #: VXC-1408-04	
Design Operating Temperature: 1127 ºF	Design gas volume: 528 acfm	
Service life of catalyst:	Provide manufacturer data? ☒Yes ☐ No	
Volume of gas handled: 528 acfm at 1127 ºF	Operating temperature range for NSCR/Ox Cat: From 750 ºF to 1250 ºF	
Reducing agent used, if any:	Ammonia slip (ppm):	
Pressure drop against catalyst bed (delta P): 3 inches of H_2O		
Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:		
Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ? ☐ Yes ☒ No		
How often is catalyst recommended or required to be replaced (hours of operation)? N/A		
How often is performance test required? ☒ Initial ☐ Annual ☐ Every 8,760 hours of operation ☐ Field Testing Required ☐ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT,		

ATTACHMENT O – TANKER TRUCK LOADING DATA SHEET

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks. Use extra pages if necessary.

Truck Loadout Collection Efficiencies

The following applicable capture efficiencies of a truck loadout are allowed:

- For tanker trucks passing the MACT level annual leak test – 99.2%
- For tanker trucks passing the NSPS level annual leak test – 98.7%
- For tanker trucks not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for ***every*** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application.

Emission Unit ID#: 27S-28S	Emission Point ID#: 27E-28E	Year Installed/Modified: 2015
Emission Unit Description: Condensate and Produced Water Truck Loading		
Loading Area Data		
Number of Pumps: 2	Number of Liquids Loaded: 2	Max number of trucks loading at one (1) time: 1
Are tanker trucks pressure tested for leaks at this or any other location? ☒ Yes ☐ No ☐ Not Required If Yes, Please describe: N/A – Cargo vessels are pressure tested in accordance with DOT requirements, if applicable.		
Provide description of closed vent system and any bypasses.		
Are any of the following truck loadout systems utilized? ☐ Closed System to tanker truck passing a MACT level annual leak test? ☐ Closed System to tanker truck passing a NSPS level annual leak test? ☒ Closed System to tanker truck not passing an annual leak test and has vapor return?		

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

Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	24	24	24	24
Days/week	7	7	7	7

Bulk Liquid Data (use extra pages as necessary)

Liquid Name		Condensate	Produced Water
Max. Daily Throughput (1000 gal/day)		192	192
Max. Annual Throughput (1000 gal/yr)		3,066	10,961
Loading Method[1]		SUB	SUB
Max. Fill Rate (gal/min)		5.7	5.7
Average Fill Time (min/loading)		60	60
Max. Bulk Liquid Temperature (°F)		50	50
True Vapor Pressure[2]		7.53	7.53
Cargo Vessel Condition[3]		U	U
Control Equipment or Method[4]		ECD	ECD
Max. Collection Efficiency (%)		70%	70%
Max. Control Efficiency (%)		98%	98%
Max.VOC Emission Rate	Loading (lb/hr)	16.26	0.16
	Annual (ton/yr)	3.12	0.11

Max.HAP Emission Rate	Loading (lb/hr)	0.42	0.004
	Annual (ton/yr)	0.08	0.003
Estimation Method[5]		EPA	EPA

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 VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration

5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

ATTACHMENT P – GLYCOL DEHYDRATION UNIT DATA SHEET
N/A, no applicable equipment at the Facility.

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011?

☐ Yes ☒ No

Please list approximate number.

ATTACHMENT R – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS

Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary.

Emissions calculations must be performed using the most conservative control device efficiency.

The following five (5) rows are only to be completed if registering an alternative air pollution control device.

Emission Unit ID:	Make/Model:
Primary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: 26C	Installation Date: 2014 ☐ New ☐ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity 8,333.3 scfh 200,000 scfd	Maximum Design Heat Input (from mfg. spec sheet) 35.42 MMBTU/hr	Design Heat Content 1263 BTU/scf

Control Device Information

Type of Vapor Combustion Control?

☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

Manufacturer: National Oilwell Varco (NOV) Model: MEVC200	Hours of operation per year? 8760

List the emission units whose emissions are controlled by this vapor control device
Emission Point ID# 12E-19E, 20E-25E, 27E, 28E

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
12S-19S	Condensate Storage Tanks	27S	Condensate Truck Loading
20S-25S	Produced Water Storage Tanks	28S	Produced Water Truck Loading

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	23 feet	N/A feet	☒ Yes ☐ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
65.32 (scfm)	1263 BTU/ft^3	N/A (ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights Continuous Pilot	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
	13.6 scfh	17,500 BTU/hr	☐ Yes ☐ No

If automatic re-ignition is used, please describe the method.

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☒ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☐ Other:

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).* See attached specs

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

CONDENSER – N/A		
General Information		
Control Device ID#:	Installation Date: ☐ New ☐ Modified ☐ Relocated	
Manufacturer:	Model:	Control Device Name:
Control Efficiency (%):		
Manufacturer's required temperature range for control efficiency. °F		
Describe the warning and/or alarm system that protects against operation when unit is not meeting the design requirements:		
Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.		
Additional information attached? ☐ Yes ☐ No Please attach copies of manufacturer's data sheets.		
Is condenser routed to a secondary APCD or ERD? ☐ Yes ☐ No		

ADSORPTION SYSTEM – N/A		
General Information		
Control Device ID#:	Installation Date: ☐ New ☐ Modified ☐ Relocated	
Manufacturer:	Model:	Control Device Name:
Design Inlet Volume: scfm	Adsorbent charge per adsorber vessel and number of adsorber vessels:	
Length of Mass Transfer Zone supplied by the manufacturer:	Adsorber diameter: ft Adsorber area: ft^2	
Adsorbent type and physical properties:	Overall Control Efficiency (%):	
Working Capacity of Adsorbent (%):		
Operating Parameters		
Inlet volume: scfm @ °F		
Adsorption time per adsorption bed (life expectancy):	Breakthrough Capacity (lbs of VOC/100 lbs of adsorbent):	
Temperature range of carbon bed adsorber. °F - °F		
Control Device Technical Data		
Pollutants Controlled	Manufacturer's Guaranteed Control Efficiency (%)	
Describe the warning and/or alarm system that protects against operation when unit is not meeting the design requirements:		
Has the control device been tested by the manufacturer and certified?		
Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.		
Additional information attached? ☐ Yes ☐ No Please attach copies of manufacturer's data sheets, drawings, and performance testing.		

VAPOR RECOVERY UNIT – N/A			
General Information			
Emission Unit ID#:		Installation Date: ☐ New ☐ Modified ☐ Relocated	
Device Information			
Manufacturer: Model:			
List the emission units whose emissions are controlled by this vapor recovery unit (Emission Point ID#)			
Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
If this vapor recovery unit controls emissions from more than six (6) emission units, please attach additional pages.			

Additional information attached? ☐ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, and performance testing.

The registrant may claim a capture and control efficiency of 95 % (which accounts for 5% downtime) for the vapor recovery unit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup flare that meet the requirements of Section 8.1.2 of this general permit.

The registrant may claim a capture and control efficiency of 98% if the VRU has a backup VRU.

ATTACHMENT S – EMISSIONS CALCULATIONS

Provide detailed potential to emit (PTE) emission calculations for criteria and hazardous air pollutants (HAPs) for each emission point identified in the application. For hazardous air pollutants and volatile organic compounds (VOCs), the speciated emission calculations must be included.

Use the following guidelines to ensure complete emission calculations:

- All emission sources and fugitive emissions are included in the emission calculations, as well as all methods used to calculate the emissions.
- Proper emission point identification numbers and APCD and ERD identification numbers are used consistently in the emission calculations that are used throughout the application.
- A printout of the emission summary sheets is attached to the registration application.
- Printouts of any modeling must be included with the emission calculations. The modeling printout must show all inputs/outputs or assumptions that the modeled emissions are based upon.
- If emissions are provided from the manufacturer, the manufacturer's documentation and/or certified emissions must also be included.
- The emission calculations results must match the emissions provided on the emissions summary sheet.
- If calculations are based on a compositional analysis of the gas, attach the laboratory analysis. Include the following information: the location that the sample was taken (and whether the sample was taken from the actual site or a representative site); the date the sample was taken; and, if the sample is considered representative, the reasons that it is considered representative (same gas field, same formation and depth, distance from actual site, etc.).
- Provide any additional clarification as necessary. Additional clarification or information is especially helpful when reviewing modeling calculations to assist the engineer in understanding the basis of assumptions and/or inputs.

Please follow specific guidance provided on the emissions summary sheet when providing the calculations.

ATTACHMENT S-1
TABLE 1

FACILITY-WIDE POTENTIAL CRITERIA POLLUTANT EMISSIONS SUMMARY
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Emissions Source	Emission Point Identification	Criteria Pollutants [1]											
		NO_X		VOC		CO		PM		SO_2		Total HAPS	
		(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Cummins G8.3L Compressor Engine (118 Hp)	30E [2]	0.26	1.14	0.18	0.80	0.52	2.28	0.02	0.08	0.01	0.01	0.03	0.13
Production Unit Heater (1.0 MMBtu/hr)	1E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	2E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	3E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	4E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	5E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	6E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	7E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	8E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	9E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	10E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	11E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Flash Separator (1.0 MMBtu/hr)	29E [3]	0.08	0.35	0.01	0.02	0.07	0.29	0.01	0.03	0.01	0.01	0.002	0.01
Condensate Storage Tank (210-bbl)	12E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	13E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	14E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	15E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	16E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	17E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	18E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Condensate Storage Tank (210-bbl)	19E [4]	---	---	---	0.54	---	---	---	---	---	---	---	0.01
Produced Water Storage Tank (210-bbl)	20E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Produced Water Storage Tank (210-bbl)	21E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Produced Water Storage Tank (210-bbl)	22E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Produced Water Storage Tank (210-bbl)	23E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Produced Water Storage Tank (210-bbl)	24E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Produced Water Storage Tank (210-bbl)	25E [4]	---	---	---	0.01	---	---	---	---	---	---	---	0.001
Enclosed Combustion Device (35.42 MMBtu/hr)	26E [5]	2.41	10.55	1.75	4.45	13.11	57.40	---	---	0.06	0.26	0.04	0.11
Condensate Truck Loading	27E [6]	---	---	16.26	3.12	---	---	---	---	---	---	0.42	0.08
Produced Water Truck Loading	28E [7]	---	---	0.16	0.11	---	---	---	---	---	---	0.004	0.003
Fugitive VOC Emissions	31E [8]	---	---	1.54	6.72	---	---	---	---	---	---	0.01	0.02
Total Facility Emissions		**3.63**	**15.89**	**20.01**	**19.82**	**14.47**	**63.16**	**0.14**	**0.44**	**0.19**	**0.39**	**0.53**	**0.55**

Notes:

1 . Refer to Attachment S-1, Table 2 for HAP emissions, Attachment S-1, Table 3 for GHG emissions, and Attachment S-1, Table 4 for road emissions
2 . Refer to Attachment S-2 for engine(s) potential emissions calculations.
3 . Refer to Attachment S-3 for heater(s) potential emissions calculations.
4 . Refer to Attachment S-4 for storage tank(s) potential emissions calculations.
5 . Refer to Attachment S-5 for combustor(s) potential emissions calculations.
6 . Refer to Attachment S-6 for condensate truck loading potential emissions calculations.
7 . Refer to Attachment S-7 for produced water truck loading potential emissions calculations.
8 . Refer to Attachment S-8 for process piping fugitives potential emissions calculations.

ATTACHMENT S-1
TABLE 2

FACILITY-WIDE POTENTIAL HAP EMISSIONS SUMMARY
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Emissions Source	Emission Point Identification	Hazardous Air Pollutants [1]																			
		Formaldehyde		Acetaldehyde		Acrolein		Methanol		n-Hexane		Benzene		Toluene		Ethyl-Benzene		Xylene		Total HAPS	
		(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Cummins G8.3L Compressor Engine (118 Hp)	30E [2]	0.02	0.09	0.003	0.01	0.003	0.01	0.003	0.01	---	---	0.002	0.01	0.001	0.002	0.0001	0.0001	0.0002	0.001	0.03	0.13
Gas Production Unit (1.0 MMBtu/hr)	1E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	2E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	3E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	4E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	5E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	6E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	7E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	8E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	9E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	10E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Gas Production Unit (1.0 MMBtu/hr)	11E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Flash Separator (1.0 MMBtu/hr)	29E [3]	0.0001	0.0003	---	---	---	---	---	---	0.001	0.01	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.002	0.01
Condensate Storage Tank (210-bbl)	12E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	13E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	14E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	15E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	16E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	17E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	18E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Condensate Storage Tank (210-bbl)	19E [4]	---	---	---	---	---	---	---	---	---	0.01	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01
Produced Water Storage Tank (210-bbl)	20E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Produced Water Storage Tank (210-bbl)	21E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Produced Water Storage Tank (210-bbl)	22E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Produced Water Storage Tank (210-bbl)	23E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Produced Water Storage Tank (210-bbl)	24E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Produced Water Storage Tank (210-bbl)	25E [4]	---	---	---	---	---	---	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
Enclosed Combustion Device (35.42 MMBtu/hr)	26E [5]	---	---	---	---	---	---	---	---	0.02	0.06	0.02	0.04	0.004	0.01	0.0001	0.0001	0.0001	0.0001	0.04	0.11
Condensate Truck Loading	27E [6]	---	---	---	---	---	---	---	---	0.22	0.04	0.15	0.03	0.04	0.01	0.0001	0.0001	0.0001	0.0001	0.42	0.08
Produced Water Truck Loading	28E [7]	---	---	---	---	---	---	---	---	0.002	0.002	0.002	0.001	0.0004	0.0003	0.0001	0.0001	0.0001	0.0001	0.004	0.003
Fugitive VOC Emissions	31E [8]	---	---	---	---	---	---	---	---	0.004	0.02	0.001	0.003	0.001	0.003	0.0001	0.0002	0.0002	0.001	0.01	0.02
Total Facility Emissions		**0.02**	**0.09**	**0.003**	**0.01**	**0.003**	**0.01**	**0.003**	**0.01**	**0.27**	**0.26**	**0.17**	**0.12**	**0.05**	**0.03**	**0.001**	**0.002**	**0.001**	**0.002**	**0.53**	**0.55**

Notes:

1 . To be convservative, emissions less than 0.0001 for each HAP were rounded up to 0.0001 lb/hr and 0.0001 TPY.
2 . Refer to Attachment S-2 for engine(s) potential emissions calculations.
3 . Refer to Attachment S-3 for heater(s) potential emissions calculations.
4 . Refer to Attachment S-4 for storage tank(s) potential emissions calculations.
5 . Refer to Attachment S-5 for combustor(s) potential emissions calculations.
6 . Refer to Attachment S-6 for condensate truck loading potential emissions calculations.
7 . Refer to Attachment S-7 for produced water truck loading potential emissions calculations.
8 . Refer to Attachment S-8 for process piping fugitives potential emissions calculations.

ATTACHMENT S-1
TABLE 3

ESTIMATION OF FACILITY-WIDE GHG EMISSIONS
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

GHG Emission Source	Total GHG Emissions (m.t. CO_2e)	Total GHG Emissions (tons CO_2e)
Natural Gas Combustion	6,024	6,641
Tanks	756	834
Fugitives	520	574
Flares	23,385	25,777
Total Estimated Facility Emissions:	30,686	33,825

Conversion Factors		Global Warming Potential	
1.10231	ton/m.t.	CO_2	1
0.001	m.t./kg	CH_4	25
8,760	Hrs/yr	N_2O	298

CO_2 (mol %)	CH_4 (mol %)	C_2H_6 (mol %)	C_3H_8 (mol %)	C_4H_{10} (mol %)	C5+ (mol %)
0.10%	75.82%	15.97%	5.01%	1.82%	0.96%

Note:
Carbon Dioxide Equivalent (CO_2e) emissions are calculated in the tables below by multiplying emissions by global warming potentials for each pollutant.
Emissions estimates converted to short tons in the tables below using conversion factor from 40 CFR 98 Subpart A.
Global Warming Potentials obtained from 40 CFR 98 Subpart A, Table A-1.
Mol % values obtained from the gas analysis from a representative facility.

Natural Gas & Diesel Combustion Emissions

Emissions Source	Emission Point Identification	Rated Horsepower	Capacity (MMBtu/hr)	BSFC (Btu/hp-hr)	Operation (hr/yr)	Emissions Factors [1] CO_2 (kg/MMBtu)	CH_4 (kg/MMBtu)	N_2O (kg/MMBtu)	Emissions (m.t.) CO_2	CH_4	N_2O	Emissions (CO_2e) CO_2	CH_4	N_2O	Total Emissions (m.t. CO_2e)	(tons CO_2e)
Cummins G8.3L Compressor Engine (118 Hp)	30E	118	0.95	8,032	8,760	53.06	0.001	0.0001	440.53	0.008	0.0008	440.53	0.21	0.25	441	486
Gas Production Unit (1.0 MMBtu/hr)	1E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	2E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	3E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	4E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	5E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	6E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	7E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	8E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	9E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	10E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Gas Production Unit (1.0 MMBtu/hr)	11E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
Flash Separator (1.0 MMBtu/hr)	29E	---	1.0	---	8,760	53.06	0.001	0.0001	464.81	0.009	0.0009	464.81	0.22	0.26	465	513
														Total Natural Gas Combustion:	6,024	6,641

Notes:
1. Emission factors for GHG obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2.

Tank Sources

Emissions Source	Emission Point Identification	Annual Condensate Production (bbl/yr)	Annual Condensate Production (1,000 gal/yr)	Default Liquid CH_4 Content [1] (mol %)	Average API Gravity	Average Separator Pressure (psig)	Separator Temperature (°F)	Dissolved Gas Gravity (SG_g)	Actual VOC Gas/Oil Ratio (scf/bbl oil)	Emissions [2] CH_4 (m.t.)	Total Emissions (m.t. CO_2e)	(tons CO_2e)	Control Efficiency (%)	Total Controlled Emissions (m.t. CO_2e)	(tons CO_2e)
Condensate Storage Tank (210-bbl)	12E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	0.00	0.00	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	13E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	14E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	15E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	16E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	17E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	18E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Condensate Storage Tank (210-bbl)	19E	9,125	383	27.4	78	100	80	0.90	7.87	0.38	9.42	10.38	98%	0.19	0.21
Produced Water Storage Tank (210-bbl)	20E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
Produced Water Storage Tank (210-bbl)	21E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
Produced Water Storage Tank (210-bbl)	22E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
Produced Water Storage Tank (210-bbl)	23E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
Produced Water Storage Tank (210-bbl)	24E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
Produced Water Storage Tank (210-bbl)	25E	43,496	1,827	27.4	78	100	80	0.90	0.18	0.0004	0.01	0.01	98%	0.0002	0.0002
												Total Tanks:		2	2

Notes:
1. Default CH4 content for crude oil per API compendium Section 5.4 and Appendix B.
2. Emissions estimated using API Compendium, Section 5.4.

Truck Loading

Emissions Source	Emission Point Identification	Annual Condensate Production (bbl/yr)	Annual Condensate Production (1,000 gal/yr)	Default Liquid CH_4 Content [1] (mol %)	Emission Factor VOC (lb/1,000 gal)	Emissions VOC (tons)	VOC (m.t.)	Emissions [2] CH_4 (m.t.)	Total Emissions (m.t. CO_2e)	(tons CO_2e)
Condensate Truck Loading	27E	73,000	3,066	27.4	55.00	84.32	76.49	20.96	524	578
Produced Water Truck Loading	28E	260,975	10,961	27.4	6.77	37.12	33.68	9.23	231	254
								Total Loading:	755	832

Notes:
1. Default CH4 content for crude oil per API compendium Section 5.4 and Appendix B.
2. Emissions estimated using API Compendium, Section 5.5.

Fugitive Sources

Source Type/Service [1]	Number of Sources	Maximum Hours of Operation	CO_2 (mol %)	CH_4 (mol %)	Emission Factor CH_4 (m.t./hr/component)	Emissions [2] CO_2 (m.t.)	CH_4 (m.t.)	Emissions CO_2 (m.t. CO_2e)	CH_4 (m.t. CO_2e)	Total Emissions (m.t. CO_2e)	(tons CO_2e)
Valves - Gas/Vapor	283	8,760	0.0010	0.7582	0.0000045	0.0292	8.46	0.0292	211.46	211.49	233.13
Relief Valves - Gas/Vapor	32	8,760	0.0010	0.7582	0.000017	0.0125	3.61	0.0125	90.33	90.34	99.59
Flanges - Gas	950	8,760	0.0010	0.7582	0.00000039	0.00851	2.46	0.00851	61.55	61.56	67.85
Open-Ended Lines- Gas	137	8,761	0.0010	0.7582	0.000002	0.00628	1.82	0.00628	45.44	45.44	50.09
Connectors- Gas	608	8,762	0.0010	0.7582	0.0000002	0.00279	0.81	0.00279	20.20	20.20	22.27
Other-Gas	42	8,763	0.0010	0.7582	0.0000088	0.00841	2.43	0.00841	60.81	60.82	67.04
Flanges - Light Liquid	238	8,760	0.0010	0.7582	0.00000011	0.00060	0.17	0.00060	4.34	4.34	4.78
Open-Ended Lines- Light Liquid	34	8,761	0.0010	0.7582	0.0000014	0.00110	0.32	0.00110	7.95	7.95	8.77
Connectors- Light Liquid	152	8,762	0.0010	0.7582	0.00000021	0.00073	0.21	0.00073	5.30	5.30	5.84
Other-Light Liquid	10	8,763	0.0010	0.7582	0.0000075	0.00179	0.52	0.00179	12.96	12.96	14.28
									Total Fugitives:	520	574

Notes:
1. Number of each component and type of service estimated based on a similar station.
2. Emission estimated using API Compendium, Section 6.0, Tables 6-12 and 6-21.

Flares/Combustion Devices

Emissions Source	Emission Point Identification	Burner Rating (MMBtu/hr)	Annual Gas Usage [1] (scf/yr)	CO_2 (mol %)	CH_4 (mol %)	Emission Factor N_2O (m.t./MMscf)	Emissions [2] CO_2 (m.t.)	CH_4 (m.t.)	N_2O (m.t.)	Emissions CO_2 (m.t. CO_2e)	CH_4 (m.t. CO_2e)	N_2O (m.t. CO_2e)	Total Emissions (m.t. CO_2e)	(tons CO_2e)
Enclosed Combustion Device (35.42 MMBtu/hr)	26E	35.4	304,195,294	0.0010	0.7582	5.90E-07	21,178	88	0.00018	21,178	2,207	0.053	23,385	25,777
												Total Flare Emissions:	23,385	25,777

Notes:
1. Annual gas usage calculated using the gas heating value of 1,263 Btu/scf.
2. Emissions estimated using API Compendium, Section 4.6 for Flare Emissions.

ATTACHMENT S-1
TABLE 4

FACILITY-WIDE POTENTIAL ROAD EMISSIONS SUMMARY
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Emissions Source	Emission Point Identification	Pollutants					
		$PM_{2.5}$		PM_{10}		PM_{TOT}	
		(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Unpaved Roads	ROADS [1]	0.07	0.29	0.66	2.87	2.22	9.72
Total Facility Emissions		**0.07**	**0.29**	**0.66**	**2.87**	**2.22**	**9.72**

Notes:

1. Refer to Attachment S-9 for unpaved road source(s) potential emissions calculations.

ATTACHMENT S-2

POTENTIAL EMISSIONS SUMMARY
CUMMINS G8.3L COMPRESSOR ENGINE (30E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Horsepower	Emission Factors [2]	Potential Emission Rate [3]	
			(lb/hr)	(T/yr)
NO_X	118	1.00	0.26	1.14
VOC	118	0.70	0.18	0.80
CO	118	2.00	0.52	2.28
PM	118	0.01941	0.02	0.08
SO_2	118	0.000588	0.001	0.002
FORMALDEHYDE	118	0.0205	0.02	0.09
ACETALDEHYDE	118	0.00279	0.003	0.01
ACROLEIN	118	0.00263	0.002	0.01
METHANOL	118	0.00306	0.003	0.01
BENZENE	118	0.00158	0.001	0.01
TOLUENE	118	0.000558	0.001	0.002
ETHYL-BENZENE	118	0.0000248	<0.0001	0.0001
XYLENES	118	0.000195	0.0002	0.001

Notes:

1. Emissions of HAPs other than formaldehyde are assumed to be negligible and not reportable.
2. Emission Factors obtained from manufacturer's data and AP-42.

NO_X =	1.00	g/hp-hr manufacturer's data.
VOC =	0.70	g/hp-hr manufacturer's data.
CO =	2.00	g/hp-hr manufacturer's data.
PM =	0.01941	lb/MMBtu AP-42 Table 3.2-3.
SO_2 =	0.000588	lb/MMBtu AP-42 Table 3.2-3.
formaldehyde =	0.0205	lb/MMBtu AP-42 Table 3.2-3.
Acetaldehyde =	0.00279	lb/MMBtu AP-42 Table 3.2-3
Acrolein =	0.00263	lb/MMBtu AP-42 Table 3.2-3
Methanol =	0.00306	lb/MMBtu AP-42 Table 3.2-3
Benzene =	0.00158	lb/MMBtu AP-42 Table 3.2-3
Toluene =	0.000558	lb/MMBtu AP-42 Table 3.2-3
Ethyl-Benzene =	0.0000248	lb/MMBtu AP-42 Table 3.2-3
Xylenes =	0.000195	lb/MMBtu AP-42 Table 3.2-3

3. Potential emissions based on emission factors, maximum horsepower, a brake specific fuel consumption of 8,032 btu/hp-hr, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 1

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (1E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 2

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (2E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 3

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (3E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 4

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (4E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 5

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (5E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 6

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (6E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 7

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (7E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 8

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (8E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 9

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (9E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 10

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (10E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 11

POTENTIAL EMISSIONS SUMMARY
GAS PRODUCTION UNIT (11E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-3
TABLE 12

POTENTIAL EMISSIONS SUMMARY
FLASH SEPARATOR (29E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant [1]	Emission Factors [2] (lb/MMSCF)	Potential Emission Rates [3]	
		(lb/hr)	(T/yr)
NO_X	100.0	0.08	0.35
VOC	5.5	0.004	0.02
CO	84.0	0.07	0.29
PM	7.6	0.01	0.03
SO_2	0.6	0.0005	0.002
Benzene	0.0021	<0.0001	<0.0001
Formaldehyde	0.075	<0.0001	0.0003
n-Hexane	1.8	0.001	0.01
Toluene	0.0034	<0.0001	<0.0001

Notes:

1. HAP emissions include Benzene, Formaldehyde, n-Hexane, and Toluene.
2. Emission factors obtained from AP-42 Section 1.4 (7/98), Table 1.4-1 through 1.4-3 for commercial boilers.
3. Potential emissions based on AP-42 emission factors, maximum firing rate of 1.0 MMBtu/hr, 1,263 Btu/scf fuel heating value, and 8,760 hours of operation per year.

ATTACHMENT S-4
TABLE 1

POTENTIAL EMISSIONS SUMMARY
CONDENSATE AND PRODUCED WATER STORAGE TANKS
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

				Potential VOC Emissions [1]					Potential HAP Emissions				
Source	Source ID	Annual Throughput (gallons/year)	Tank Capacity (gallons)	Annual Breathing Losses [2] (lbs)	Annual Working Losses [2] (lbs)	Annual Flash Losses [3] (T/yr)	Enclosed Combustion Device Capture Efficiency [4] (%)	Total Annual Emissions [5]	Benzene Emissions [6] (T/yr)	Toluene Emissions [6] (T/yr)	Ethylbenzene Emissions [6] (T/yr)	Xylenes Emissions [6] (T/yr)	n-Hexane Emissions [6] (T/yr)
Condensate Storage Tank (210-bbl)	12E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	13E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	14E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	15E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	16E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	17E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	18E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Condensate Storage Tank (210-bbl)	19E	383,250	8,820	1,289.54	3,194.04	24.94	98%	0.54	0.01	0.001	<0.0001	<0.0001	0.01
Produced Water Storage Tank (210-bbl)	20E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001
Produced Water Storage Tank (210-bbl)	21E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001
Produced Water Storage Tank (210-bbl)	22E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001
Produced Water Storage Tank (210-bbl)	23E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001
Produced Water Storage Tank (210-bbl)	24E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001
Produced Water Storage Tank (210-bbl)	25E	1,826,825	8,820	1,289.54	5,613.04	0.31	98%	0.01	0.0001	<0.0001	<0.0001	<0.0001	0.0001

Notes:

1. Based on the following maximum annual throughput values:

Condensate = 73,000-bbls/yr
Produced Water = 260,975-bbls/

2. Annual breathing and working losses were determined using AP-42 Section 7 (11/06).
3. Annual flash losses were based on Promax simulation method. A copy of the Promax output file is available upon request.
4. Breathing, working and flash emissions from the storage tank(s) are routed to an enclosed combustion device which has a capture efficiency of 98%. Refer to Attachment S-5 for enclosed combustion device emissions calculations.
5. To be conservative, breathing and working losses for produced water were calculated using condensate, assuming 1% is emitted. Flash losses for produced water were calculated using ProMax.

Total Annual Emissions (T/yr) = [((Breathing Losses (lbs) + Working Losses (lbs)) / 2000) + Flash Losses (T/yr)] x [1 - Enclosed Combustion Device Capture Efficiency (%)]
Total Annual Emissions (T/yr) = [(((Breathing Losses (lbs) + Working Losses (lbs)) / 2000) x 1%) + Flash Losses (T/yr)] x [1 - Enclosed Combustion Device Capture Efficiency (%)]

6. Estimated HAP Composition (% by Weight) from Promax.

Benzene = 0.929%
Toluene = 0.249%
Ethylbenzene = 0.000%
Xylenes = 0.000%
n-Hexane = 1.380%

ATTACHMENT S-4
TABLE 2

POTENTIAL EMISSIONS SUMMARY
AP-42 SECTION 7 (EPA TANKS 4.0.9d) FIXED-ROOF TANK EMISSIONS
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Tank Identification	12E-19E	20E-25E
Actual Location	WV	WV
Location for Calculation Purposes	Charleston, West Virginia	Charleston, West Virginia
Contents of Tank	Gasoline (RVP 13.5)	Gasoline (RVP 13.5)
Tank/Roof Type	Dome	Dome
Underground?	Aboveground	Aboveground
Diameter, ft	12.0	12.0
Shell Height or Length, ft	10.0	10.0
Nominal Capacity, gal	8,820	8,820
Throughput, gallons/yr	383,250	1,826,825
Tank Paint Color	White	White
Tank Paint Condition	Good	Good
Effective Diameter, ft	12.0	12.0
Geometric Capacity, gal	8,460	8,460
Maximum Liquid Height, ft	10.0	10.0
Average Liquid Height, ft	5	5
Cone Tank Roof Slope, ft/ft	0.0625	0.0625
Dome Tank Roof Radius, ft	12.00	12.00
Dome Tank Roof Height, ft	1.608	1.608
Roof Outage, ft	0.823	0.823
Vapor Space Outage, ft	5.82	5.82
Vapor Space Volume, ft^3	659	659
Average Daily Minimum Ambient Temperature, F	44.22	44.22
Average Daily Maximum Ambient Temperature, F	65.75	65.75
Daily Total Solar Insolation Factor, Btu/ft^2/day	1251	1251
Daily Average Ambient Temperature, F	55.0	55.0
Tank Paint Solar Absorbance, dimensionless	0.170	0.170
Daily Vapor Temperature Range, R	21.5	21.5
Daily Average Liquid Surf. Temperature, F	56.7	56.7
Daily Minimum Liquid Surf. Temperature, F	51.3	51.3
Daily Maximum Liquid Surf. Temperature, F	62.0	62.0
Liquid Bulk Temperature	55.00	55.00
Vapor Molecular Weight, lb/lbmol	62.0	62.0
Antoine's Coefficient A	N/A	N/A
Antoine's Coefficient B	N/A	N/A
Antoine's Coefficient C	N/A	N/A
Type of Substance (for use in calculations)	Gas	Gas
Vapor Pressure at Daily Av. Liquid Surf. Temp., psia	6.811	6.811
Vapor Pressure at Daily Min. Liquid Surf. Temp., psia	6.151	6.151
Vapor Pressure at Daily Max. Liquid Surf. Temp., psia	7.526	7.526
Vapor Pressure Calculation Method	AP-42 Figure 7.1-14b: RVP=13.5 ASTM Slope=3	AP-42 Figure 7.1-14b: RVP=13.5 ASTM Slope=3
Vapor Density, lb/ft^3	0.076211	0.076211
Daily Vapor Pressure range, psi	1.376	1.376
Breather Vent Pressure Setting, psig	0.0300	0.0300
Breather Vent Vacuum Setting, psig	-0.0300	-0.0300
Breather Vent Pressure Setting Range, psi	0.0600	0.0600
Ambient Pressure, psia	14.3	14.3
Vapor Space Expansion Factor	0.2184	0.2184
Vented Vapor Saturation Factor	0.322	0.322
Annual Turnovers	45.30	215.93
Turnover Factor	0.83	0.31
Working Loss Product Factor	1.00	1.00
Standing Storage Loss, lb/yr	1289.53720	1289.53720
Working Loss, lb/yr	3194.04361	5613.04328
Total Losses, lb/yr	4483.58081	6902.58048
Standing Storage Loss, TPY	0.64477	0.64477
Working Loss, TPY	1.59702	2.80652
Total Losses, TPY	2.24179	3.45129

Based on AP-42, February 1996, Section 7.1.3.1.

ATTACHMENT S-5

POTENTIAL EMISSIONS SUMMARY
ENCLOSED COMBUSTION DEVICE (26C)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Pollutant	Emission Factors [1] (lb/MMBtu)	Potential Tank Losses [2] (lb/hr)	Potential Tank Losses [2] (T/yr)	Potential Loading Losses [3] (lb/hr)	Potential Loading Losses [3] (T/yr)	Enclosed Combustion Device Destruction Efficiency (%)	Total Potential Emission Rates [4] (lb/hr)	Total Potential Emission Rates [4] (T/yr)
NO_X	0.068	---	---	---	---	---	2.41	10.55
CO	0.370	---	---	---	---	---	13.11	57.40
VOC	---	49.13	215.17	38.31	7.53	98%	1.75	4.45
SO2 [5]	---	---	---	---	---	---	0.06	0.26
BENZENE	---	0.46	2.00	0.36	0.07	98%	0.02	0.04
TOLUENE	---	0.12	0.54	0.10	0.02	98%	0.004	0.01
ETHYL-BENZENE	---	0.0000	0.0000	0.0000	0.0000	98%	0.0000	0.0000
XYLENES	---	0.0000	0.0000	0.0000	0.0000	98%	0.0000	0.0000
n-HEXANE	---	0.68	2.97	0.53	0.10	98%	0.02	0.06

Notes:

1. Emission factors for NOx and CO obtained from AP-42 Table 13.5-1 (9/91) for industrial flares.
2. Potential tank emissions are estimated based on the breathing, working, and flash losses from the storage tank(s) and a 98% capture efficiency at the combustor (refer to Attachment S-4).
3. Potential loading emissions are estimated based on the losses from the truck loading and a 70% capture efficiency at the enclosed combustion device (refer to Attachment S-6).
4. Potential emissions for NOx and CO are based on AP-42 emission factors, an estimated heat value of 35.42 MMBtu/hr, and 8,760 hours of operation per year.
   Potential emissions for VOC are based on a 98% capture efficiency from the storage tank(s) , a 70% capture efficiency from truck loading, a 98% destruction efficiency from the enclosed combustion device, and 8,760 hours of operation per year.
5. Potential emissions for SO2 based on the calculations below. H2S was conservatively estimated at 10 ppm.

Pilot Gas Flow Rate:	34.73
Controlled Gas Flow Rate:	1.49
Total Gas Flow Rate:	36.21
H2S Concentration:	10
Standard PSI:	14.7
Gas Constant:	10.73
Std Temp:	528
H2S Volume Constant:	11.1351
H2S Volume:	0.36
PV=nRT	
lb mole H2S/hr=	0.0009

SO_2 (lb/hr) = $\frac{\text{lb mol } H_2S/\text{hr} \times 1 \text{ lb mol } SO_2/\text{lb mol } H_2S}{}$ = 0.06 lb SO_2/hr

ATTACHMENT S-6

POTENTIAL EMISSIONS SUMMARY
CONDENSATE TRUCK LOADING (27E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

									Uncontrolled VOC Emissions			Controlled VOC Emissions	
Material Name	Constituent	Saturation Factor [1] (S)	True Vapor Pressure (P)	MW of Vapors (M) (lb/lb-mole)	Temp of Loaded Liquid (°F)	Emission Factor [1] (lb VOC/10^3 gal)	Maximum Hourly Throughput [2] (gals)	Annual Throughput [3] (gals)	Hourly Emissions [4] (lb/hr)	Annual Emissions [5] (T/yr)	Enclosed Combustion Device Capture Efficiency [6] (%)	Hourly Emissions [7] (lb/hr)	Annual Emissions [7] (T/yr)
Condensate	VOC	0.6	7.53	62	55	6.774	8,000	3,066,000	54.19	10.38	70%	16.26	3.12

Notes:

1. Per AP-42, 5th Edition (6/08), Section 5.2, Equation 1

$$Emission\ Factor\left(\frac{lb\ VOC}{10^3 gal}\right) = \left(\frac{S \times P \times M}{°\mathrm{F} + 460}\right) \times 12.46$$

2. Maximum hourly throughput is the amount of condensate loaded out from the storage tank(s).
3. Annual Throughput is the amount of condensate loaded out from the storage tank(s).
4. Uncontrolled Hourly Emissions = Hourly Throughput / 1000 x Emission Factor
5. Uncontrolled Annual Emissions = Annual Throughput / 1000 x Emission Factor / 2000 lb/T
6. Emissions from truck loading are routed to 26C which has a capture efficiency of 70%.
7. Controlled Emissions = Uncontrolled VOC Emissions x (1 - Capture Efficiency)

Estimated HAP Composition (% by Weight)**

		Uncontrolled Emissions		Controlled Emissions	
Pollutant	**Wt%**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Benzene	0.929%	0.50	0.10	0.15	0.03
Toluene	0.249%	0.13	0.03	0.04	0.01
Ethylbenzene	0.000%	0.0000	0.0000	0.0000	0.0000
Xylenes	0.000%	0.0000	0.0000	0.0000	0.0000
n-Hexane	1.380%	0.75	0.14	0.22	0.04
Total HAPs	**2.558%**	**1.39**	**0.27**	**0.42**	**0.08**

** Estimated HAP Composition based on Promax output.

ATTACHMENT S-7

POTENTIAL EMISSIONS SUMMARY
PRODUCED WATER TRUCK LOADING (28E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

									Uncontrolled VOC Emissions			Controlled VOC Emissions	
Material Name	Constituent	Saturation Factor [1] (S)	True Vapor Pressure (P)	MW of Vapors (M) (lb/lb-mole)	Temp of Loaded Liquid (°F)	Emission Factor [1] (lb VOC/10^3 gal)	Maximum Hourly Throughput [2] (gals)	Annual Throughput [3] (gals)	Hourly Emissions [4] (lb/hr)	Annual Emissions [5] (T/yr)	Enclosed Combustion Device Capture Efficiency [6] (%)	Hourly Emissions [7] (lb/hr)	Annual Emissions [7] (T/yr)
Condensate [8]	VOC	0.6	7.53	62	55	6.774	8,000	10,960,950	0.54	0.37	70%	0.16	0.11

Notes:

1. Per AP-42, 5th Edition (6/08), Section 5.2, Equation 1

$$Emission\ Factor\left(\frac{lb\ VOC}{10^3 gal}\right) = \left(\frac{S \times P \times M}{°\mathrm{F} + 460}\right) \times 12.46$$

2. Maximum hourly throughput is the amount of produced water loaded out from the storage tank(s).
3. Annual Throughput is the amount of produced water loaded out from the storage tank(s).
4. Uncontrolled Hourly Emissions = Hourly Throughput / 1000 x Emission Factor
5. Uncontrolled Annual Emissions = Annual Throughput / 1000 x Emission Factor / 2000 lb/T
6. Emissions from truck loading are routed to 26C which has a capture efficiency of 70%.
7. Controlled Emissions = Uncontrolled VOC Emissions x (1 - Capture Efficiency)
8. Loading emissions for produced water were calculated using condensate, assuming 1% is emitted.

Estimated HAP Composition (% by Weight)**

		Uncontrolled Emissions		Controlled Emissions	
Pollutant	**Wt%**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Benzene	0.929%	0.01	0.003	0.002	0.001
Toluene	0.249%	0.001	0.001	0.0004	0.0003
Ethylbenzene	0.000%	0.0000	0.0000	0.0000	0.0000
Xylenes	0.000%	0.0000	0.0000	0.0000	0.0000
n-Hexane	1.380%	0.01	0.01	0.002	0.002
Total HAPs	**2.558%**	**0.01**	**0.01**	**0.004**	**0.003**

** Estimated HAP Composition based on Promax output.

ATTACHMENT S-8
TABLE 1

POTENTIAL EMISSIONS SUMMARY
PROCESS PIPING FUGITIVES (31E)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Component Type	Type of Service [1]	Number of Components [1]	Emission Factors (lb/hr-component) [2]	Percent VOC [3]	Potential VOC Emission Rates [4]	
					(lb/hr)	(T/yr)
Valves	Gas/Vapor	283	0.00992	19.10%	0.54	2.35
Relief Valves	Gas/Vapor	32	0.0194	19.10%	0.12	0.52
Flanges	Gas/Vapor	950.4	0.00086	19.10%	0.16	0.68
Open-Ended Lines	Gas/Vapor	136.8	0.0044	19.10%	0.11	0.50
Connectors	Gas/Vapor	608	0.00044	19.10%	0.05	0.22
Other	Gas/Vapor	41.6	0.019	19.10%	0.15	0.66
Flanges	Light Liquid	237.6	0.000243	100.00%	0.06	0.25
Open-Ended Lines	Light Liquid	34.2	0.00309	100.00%	0.11	0.46
Connectors	Light Liquid	152	0.000463	100.00%	0.07	0.31
Other	Light Liquid	10.4	0.0165	100.00%	0.17	0.75
Totals:	**---**	**2,486**	**---**	**---**	**1.54**	**6.72**

Notes:

1. Number of each component and type of service estimated based on a similar station.
2. Emission factors based on EPA's natural gas processing factors for process piping fugitive emissions.
3. Percent VOC for Gas/Vapor service based on gas analysis from a representative facility (refer to Attachment S-8, Table 2).
4. Emission rates based on 8,760 hours of operation per year.

Estimated HAP Composition (% by Weight)**

		Total Fugitive HAP Uncontrolled Emissions	
Pollutant	**Wt% [1]**	**(lb/hr)**	**(T/yr)**
Benzene	0.049%	0.001	0.003
Toluene	0.050%	0.001	0.003
Ethylbenzene	0.0028%	0.00004	0.0002
Xylenes	0.015%	0.0002	0.001
n-Hexane	0.242%	0.004	0.02
Total HAPs	**0.359%**	**0.01**	**0.02**
Total VOCs	**19.100%**	**1.54**	**6.72**

Based on Gas Analyses. An extended analysis was unavailable, therefore, GRI GlyCalc factors for production were used to estimate C6+ breakout

ATTACHMENT S-8
TABLE 2

GAS ANALYSIS
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Component [1]	Molecular Weight	Mol % [2]	Molar Weight [3]	Average Mass % [4]
Carbon Monoxide	**28.01**	0.000%	**0.000**	**0.000%**
Hydrogen Sulfide	**34.08**	0.000%	**0.000**	**0.000%**
Oxygen	**16.04**	0.000%	**0.000**	**0.000%**
Helium	**4**	0.000%	**0.000**	**0.000%**
Nitrogen	**28.02**	0.309%	**0.087**	**0.410%**
Carbon Dioxide	**44.01**	0.095%	**0.042**	**0.199%**
Methane	**16.04**	75.822%	**12.162**	**57.565%**
Ethane	**30.07**	15.967%	**4.801**	**22.726%**
Propane	**44.09**	5.015%	**2.211**	**10.465%**
i-Butane	**58.12**	0.638%	**0.371**	**1.755%**
n-Butane	**58.12**	1.185%	**0.689**	**3.260%**
i-Pentane	**72.15**	0.305%	**0.220**	**1.042%**
n-Pentane	**72.15**	0.258%	**0.186**	**0.882%**
Other Hexanes	**86.17**	0.256%	**0.221**	**1.046%**
n-Hexane	**86.17**	0.059%	**0.051**	**0.242%**
Heptanes	**100.2**	0.028%	**0.028**	**0.131%**
2,2,4-Trimethylpentane	**114.23**	0.011%	**0.012**	**0.058%**
Benzene	**78.11**	0.013%	**0.010**	**0.049%**
Toluene	**92.14**	0.011%	**0.011**	**0.050%**
Octanes +	**114.23**	0.019%	**0.022**	**0.104%**
e-Benzene	**106.17**	0.001%	**0.001**	**0.003%**
Xylenes	**106.17**	0.003%	**0.003**	**0.015%**
	Totals:	**100.00%**	**21.13**	**100.00%**
	[5] VOC Totals:	**7.80%**	**4.04**	**19.10%**

Notes:

1. Typical components listed in gas analysis for field gas.
2. Mol % values obtained from the gas analysis from a representative facility.
3. Molar weight = Molecular weight x Mol % /100.
4. Average mass % = Molar weight / Total molar weight.
5. VOC Totals include the following components (C3+):

Propane	n-Hexane
i-Butane	Heptanes
n-Butane	Benzene
i-Pentane	Toluene
n-Pentane	Octanes
Hexanes	e-Benzene
	Xylenes

ATTACHMENT S-9

POTENTIAL EMISSIONS SUMMARY
UNPAVED ROADS (ROADS)
LONG 408/409 WELL PAD
ASCENT RESOURCES – MARCELLUS, LLC

Name	Vehicle Miles Traveled [1]		Emission Factor [2]			Control Efficiency [3]	PM Emissions[4]					
			$PM_{2.5}$	PM_{10}	PM_{TOT}		$PM_{2.5}$		PM_{10}		PM_{TOT}	
	(VMT/hr)	(VMT/yr)	(lb/VMT)	(lb/VMT)	(lb/VMT)	(%)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Unpaved Roads	1.00	8,760.0	0.15	1.46	4.93	55%	0.07	0.29	0.66	2.87	2.22	9.72
Total							**0.07**	**0.29**	**0.66**	**2.87**	**2.22**	**9.72**

Notes:

1. Facility vehicle data based on estimates, GP5.1 and AP-42 Section 13.2.2 (11/06) defaults for industrial unpaved roads.

	Light Vehicles (Pick-up Trucks and Cars)	Heavy Trucks (Tanker Trucks)
Average vehicle weight (tons):	2.5	23.7
Number of wheels per vehicle type:	4	18
Average number of round trips/day:	6	6
Distance per round trip (miles/trip)	2	2
Number of days operational (days/yr):	365	365
Vehicle miles travelled VMT (miles/yr):	4380.0	4380.0

Vehicle miles traveled was calculated with the following equation:

$$VMT = \sum_{Vehicle\,Types} \left(\frac{avg.number\ of\ round\ trips}{day} \times \frac{vehicle\ miles\ traveled}{round\ trip} \times \frac{days\ of\ operation}{year} \right)$$

2. Emission factor obtained from AP-42 Section 13.2.2 Table 13.2.2-1 (11/06), formula (1a) and formula (2).

$$E_{ext} = E\left[\frac{(365 - P)}{365}\right]$$

$$E = k\left(\frac{s}{12}\right)^{a}\left(\frac{W}{3}\right)^{b} \quad (lb/VMT)$$

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation (lb/VMT)
E = emission factor (lb/VMT)
P = number of days in a year with at least 0.01 in of precipitation
s = surface material silt content (%)
W = mean vehicle weight (tons)
k, a, b = empirical constants

P (days/year): 150
s (%): 10
W (tons): 13.10

where: $W_{avg} = \left(\frac{W_{empty} + W_{loaded}}{2}\right)$

	Constants		
	PM-2.5	PM-10	PM-30 (TSP)
k:	0.15	1.5	4.9
a:	0.9	0.9	0.7
b:	0.45	0.45	0.45

3. Natural control efficiency based on moisture ratio and AP-42 Section 13.2.2 Figure 13.2.2-2 (11/06). Controlled emissions are based on the natural rainfall cycles and no plant control.

Moisture Ratio: 2 Estimated based on 0.4% controlled and 0.2% uncontrolled surface water content
Natural Control Efficiency (%): 55

4. Potential emissions based on AP-42 Section 13.2.2 Table 13.2.2-1 (11/06) emission factors and the listed control efficiecy.

$$Total\ Annual\ Emissions\ \left(T/_{yr}\right) = \left(\frac{VMT/_{yr} \times Emission\ Factor}{2000}\right) \times (1 - Control\ Efficiency)$$

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
30E	0.26	1.14	0.52	2.28	0.18	0.80	0.01	0.01	0.02	0.08	0.02	0.08	111	486
1E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
2E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
3E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
4E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
5E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
6E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
7E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
8E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
9E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
10E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
11E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
29E	0.08	0.35	0.07	0.29	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03	117	513
12E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
13E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
14E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
15E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
16E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
17E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
18E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21

ATTACHMENT T – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET														
List all sources of emissions in this table. Use extra pages if necessary.														
Emission Point ID#	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
19E	---	---	---	---	---	0.54	---	---	---	---	---	---	0.05	0.21
20E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
21E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
22E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
23E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
24E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
25E	---	---	---	---	---	0.01	---	---	---	---	---	---	0.00005	0.0002
26E	2.41	10.55	13.11	57.40	1.75	4.45	0.06	0.26	---	---	---	---	5,885	25,777
27E	---	---	---	---	16.26	3.12	---	---	---	---	---	---	132	578
28E	---	---	---	---	0.16	0.11	---	---	---	---	---	---	58	194
31E	---	---	---	---	1.54	6.72	---	---	---	---	---	---	131	574
TOTAL	**3.63**	**15.89**	**14.47**	**63.16**	**20.01**	**19.82**	**0.19**	**0.39**	**0.14**	**0.44**	**0.14**	**0.44**	**7,723**	**33,825**

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT T – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET														
List all sources of emissions in this table. Use extra pages if necessary.														
Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
30E	0.02	0.09	0.002	0.01	0.001	0.002	0.0001	0.0001	0.0002	0.001	---	---	0.03	0.13
1E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
2E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
3E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
4E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
5E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
6E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
7E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
8E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
9E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
10E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
11E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
29E	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	---	---	---	---	0.001	0.01	0.002	0.01
12E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
13E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
14E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
15E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
16E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
17E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
18E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01

ATTACHMENT T – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET														
List all sources of emissions in this table. Use extra pages if necessary.														
Emission Point ID#	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
19E	---	---	---	0.01	---	0.001	---	0.0001	---	0.0001	---	0.01	---	0.01
20E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
21E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
22E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
23E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
24E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
25E	---	---	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.0001	---	0.001
26E	---	---	0.02	0.04	0.004	0.01	0.0001	0.0001	0.0001	0.0001	0.02	0.06	0.04	0.11
27E	---	---	0.15	0.03	0.04	0.01	0.0001	0.0001	0.0001	0.0001	0.22	0.04	0.42	0.08
28E	---	---	0.002	0.001	0.0004	0.0003	0.0001	0.0001	0.0001	0.0001	0.002	0.002	0.004	0.003
31E	---	---	0.001	0.003	0.001	0.003	0.0001	0.0002	0.0002	0.001	0.004	0.02	0.01	0.02
TOTAL	**0.02**	**0.09**	**0.17**	**0.12**	**0.05**	**0.03**	**0.001**	**0.002**	**0.001**	**0.002**	**0.27**	**0.26**	**0.53**	**0.55**

Annual emissions shall be based on 8,760 hours per year of operation for all emission units except emergency generators.
According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

ATTACHMENT U – CLASS I LEGAL ADVERTISEMENT

Publication of a proper Class I legal advertisement is a requirement of the G70-C registration process. In the event the applicant's legal advertisement fails to follow the requirements of 45CSR13, Section 8 or the requirements of Chapter 59, Article 3, of the West Virginia Code, the application will be considered incomplete and no further review of the application will occur until this is corrected.

The applicant, utilizing the format for the Class I legal advertisement example provided on the following page, shall have the legal advertisement appear a minimum of one (1) day in the newspaper most commonly read in the area where the facility exists or will be constructed. The notice must be published no earlier than five (5) working days of receipt by this office of your application. The original affidavit of publication must be received by this office no later than the last day of the public comment period.

The advertisement shall contain, at a minimum, the name of the applicant, the type and location of the source, the type and amount of air pollutants that will be discharged (excluding fugitive emissions), the nature of the permit being sought, the proposed start-up date for the source, and a contact telephone number for more information.

The location of the source should be as specific as possible starting with: 1.) the street address of the source; 2.) the nearest street or road; 3.) the nearest town or unincorporated area, 4.) the county, and 5.) latitude and longitude coordinates in decimal format.

Types and amounts of pollutants discharged must include all regulated pollutants (Nitrogen Oxides, Carbon Monoxide, Particulate Matter-2.5, Particulate Matter-10, EVolatile Organic Compounds, Sulfur Dioxide, Formaldehyde, Benzene, Toluene, Ethylbenzene, Xylenes, Hexane, Total Hazardous Air Pollutants and their potential to emit or the permit level being sought in units of tons per year.

In the event the 30th day is a Saturday, Sunday, or legal holiday, the comment period will be extended until 5:00 p.m. on the following regularly scheduled business day.

A list of qualified newspapers that are eligible to publish legal ads may be found:

http://www.sos.wv.gov/elections/resource/Documents/Qualified%20Newspapers.pdf

PUBLIC NOTICE

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Ascent Resources – Marcellus, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-C General Permit Registration for a natural gas production facility located on 1220 Long Ridge Road, Wileyville, in Wetzel County, West Virginia. The latitude and longitude coordinates are: 39.58411, -80.67497.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Hazardous Air Pollutants (HAPs) = 0.55 tpy
Volatile Organic Compounds (VOCs) = 19.82 tpy
Carbon Monoxide (CO) = 63.16 tpy
Nitrogen Oxides (NOx) = 15.89 tpy
Particulate Matter (PM) = 0.44 tpy
Sulfur Dioxide (SO2) = 0.39 tpy
Carbon Dioxide Equivalents (CO2e) = 33,825 tpy

Startup of operation is planned to begin on or about the **1st** day of **August**, **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 **21st** day of July, 2016

By: Ascent Resources – Marcellus, LLC
Tim Cummings
VP-Operations
P.O. Box 13678
Oklahoma City, OK 73113

ATTACHMENT V – ADDITIONAL INFORMATION

- Manufacturer's spec sheet - Engine/Catalyst
- Manufacturer's spec sheet - Combustor
- Promax output
- Representative gas analyses

USA Compression Unit 6390 Cummins 8.3L Engine Emissions

Date of Manufacture	May 1, 2014	Engine Serial Number	73672628	Date Modified/Reconstructed	N/A
Driver Rated HP	118	Rated Speed in RPM	1800	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	6	Compression Ratio	10.5:1	Combustion Setting	Rich Burn
Displacement, in^3	505	Fuel Delivery Method	Carburetor	Combustion Air Treatment	Naturally Aspirated

Raw Engine Emissions (935 LHV BTU/SCF Fuel Gas with little to no H2S)

Fuel Consumption *7228 LHV BTU/bhp-hr or 8032 HHV BTU/bhp-hr*
Rated Altitude *1800 ft*
Maximum Air Inlet Temp *100 F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	13		3.38	14.81
Carbon Monoxide (CO)	8.6		2.24	9.80
Volatile Organic Compounds (VOC or NMHC)		2.96E-02	0.03	0.12
Formaldehyde (CH2O)		2.05E-02	0.02	0.09
Particulate Matter (PM) Filterable+Condensable		1.94E-02	1.84E-02	8.06E-02
Sulfur Dioxide (SO2)		5.88E-04	5.57E-04	2.44E-03

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)		1.10E+02	104	414
Methane (CH4)		2.30E-01	0.22	0.87

[1] g/bhp-hr are based on Cummins specifications at 935 LHV fuel gas.
Note that g/bhp-hr values are based on 100% Load Operation. It is recommended to add a safety margin to emissions for permitting to allow for operational flexibility and fuel gas composition variability.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-3).

Catalytic Converter Emissions

Catalytic Converter Make amd Model: *Miratech, VXC-1408-04*
Element Type: *3-Way, VX-RE-08XC*
Number of Elements in Housing: *1*
Air/Fuel Ratio Control *Compliance Controls-AFR1, TK2*

	% Reduction Required for JJJJ or Non-Attainment/General Permit	**lb/hr**	**TPY**
Nitrogen Oxides (NOx)	92	**0.27**	**1.18**
Carbon Monoxide (CO)	77	**0.51**	**2.25**
Volatile Organic Compounds (VOC or NMHC)	0	**0.03**	**0.12**
Formaldehyde (CH2O)	0	**0.02**	**0.09**
Particulate Matter (PM)	0	**1.84E-02**	**8.06E-02**
Sulfur Dioxide (SO2)	0	**5.57E-04**	**2.44E-03**

	% Reduction Required for JJJJ or Non-Attainment/General Permit	**lb/hr**	**Metric Tonne/yr**
Carbon Dioxide (CO2)	0	**104**	**414**
Methane (CH4)	0	**0.22**	**0.87**

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: TJ-11-1965

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cummins
Model Number:	G 8.3
Power Output:	118 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	528 acfm (cfm)
Exhaust Temperature:	1,127°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:	3.0 inches of WC (Fresh)
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
Diameter:	14 inches
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 Outputs (g/ bhp-hr)	Requested Emissions Targets
NOx	13.00	92%	1.00	1 g/bhp-hr
CO	8.60	77%	2.00	2 g/bhp-hr
NMNEHC	0.00	0%	0.70	.7 g/bhp-hr
Oxygen	0.5%			

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

Engine Performance Data

Cummins Inc

Columbus, Indiana 47202-3005
http://www.cummins.com

Industrial

G8.3

FR92228

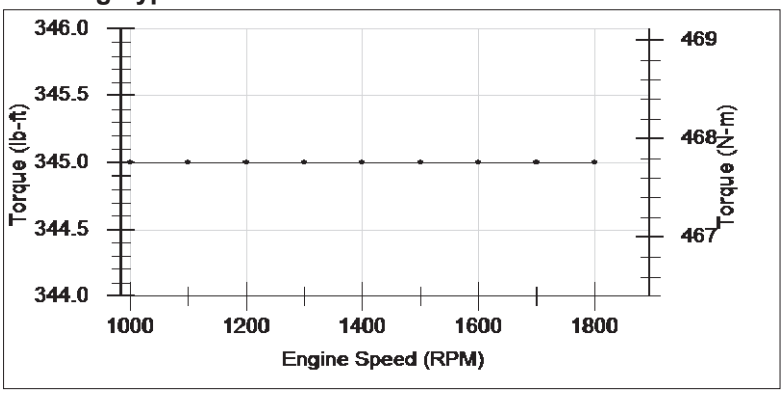
118 BHP (88 kW) @ 1800 RPM
344 lb-ft (466 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D551013CX03	**2482**	**13-May-2011**

Compression Ratio:	**10.5:1**	Displacement:	**505 in3 (8.3 L)**
Fuel System:	**Field Gas, Dry Processed Nat Gas**	Aspiration:	**Naturally Aspirated**
Emission Certification:	**Non-certified, Catalyst**		

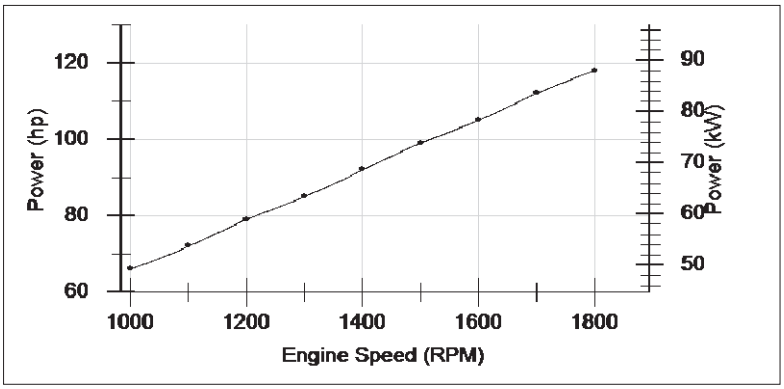
All data is based on the engine operating with fuel system, water pump, and 6 in H2O (1.49 kPa) inlet air restriction with 3 in (76 mm) inner diameter, and with 1 in Hg (3 kPa) exhaust restriction with 3 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR



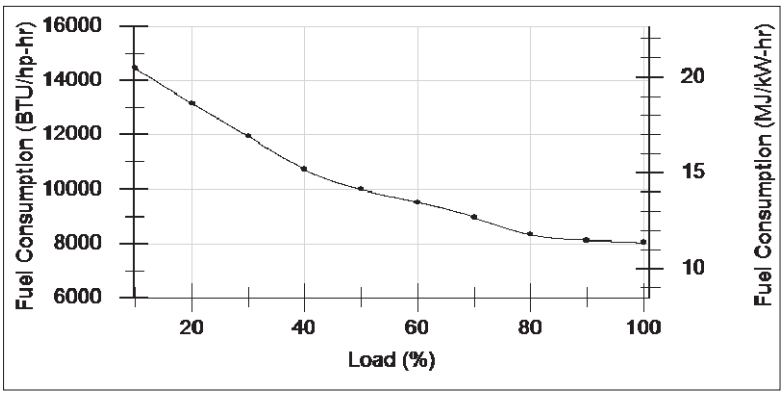
Torque Output

RPM	lb-ft	N-m
1,000	345	468
1,100	345	468
1,200	345	468
1,300	345	468
1,400	345	468
1,500	345	468
1,600	345	468
1,700	345	468
1,800	345	468



Power Output

RPM	hp	kW
1,000	66	49
1,100	72	54
1,200	79	59
1,300	85	63
1,400	92	69
1,500	99	74
1,600	105	78
1,700	112	84
1,800	118	88



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
118	88	100	8,032	11.36
106	79	90	8,114	11.48
94	70	80	8,311	11.76
83	62	70	8,957	12.67
71	53	60	9,520	13.47
59	44	50	9,981	14.12
47	35	40	10,724	15.17
35	26	30	11,943	16.9
24	18	20	13,159	18.62
12	9	10	14,465	20.46

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 935 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering with operating questions.

STATUS FOR CURVES AND DATA: Beta-(Measured data)

Tolerance: Within +/- 5%

CHIEF ENGINEER:

Alfred S Weber

Bold entries revised after 1-Mar-2010

Intake Air System

Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability)	15 delta deg F	8.3 delta deg C

Cooling System

Maximum coolant temperature for engine protection controls	215 deg F	102 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	212 deg F	100 deg C

Exhaust System

Maximum exhaust back pressure:	2 in-Hg	7 kPa
Recommended exhaust piping size (inner diameter):	3 in	76 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	10 psi	69 kPa
@ maximum rated speed	50 psi	345 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	10 psi	69 kPa

Fuel System

Minimum fuel inlet pressure:	0 psi	2 kPa
Maximum fuel inlet pressure:	1 psi	5 kPa

Performance Data

Engine low idle speed:	900 RPM
Maximum low idle speed:	1,800 RPM
Minimum low idle speed:	800 RPM
Engine high idle speed	1,800 RPM
Governor break speed:	
Maximum torque available at closed throttle low idle speed:	50 lb-ft / 68 N-m

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	118 hp	88 kW	89 hp	66 kW	59 hp	44 kW
Torque	344 lb-ft	466 N-m	260 lb-ft	353 N-m	172 lb-ft	233 N-m
Intake Manifold Pressure	-1 in-Hg	-3 kPa	-3 in-Hg	-9 kPa	-4 in-Hg	-14 kPa
Inlet Air Flow	166 ft3/min	78 L/s	137 ft3/min	65 L/s	106 ft3/min	50 L/s
Exhaust Gas Flow	528 ft3/min	249 L/s	423 ft3/min	200 L/s	317 ft3/min	150 L/s
Exhaust Gas Temperature	1,127 deg F	608 deg C	1,069 deg F	576 deg C	1,002 deg F	539 deg C
Heat Rejection to Coolant	5,596 BTU/min	98 kW	4,879 BTU/min	86 kW	4,173 BTU/min	73 kW
Heat Rejection to Ambient	282 BTU/min	5 kW	253 BTU/min	4 kW	211 BTU/min	4 kW
Heat Rejection to Exhaust	3,340 BTU/min	59 kW	2,587 BTU/min	45 kW	1,862 BTU/min	33 kW
Fuel Consumption	8,032 BTU/hp-hr	11 MJ/kW-hr	8,689 BTU/hp-hr	12 MJ/kW-hr	9,981 BTU/hp-hr	14 MJ/kW-hr
Air Fuel Ratio (dry)	15.5 vol/vol		15.9 vol/vol		16.1 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	2.25 g/hp-hr		2.84 g/hp-hr		4 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	13 g/hp-hr	17.43 g/kW-hr	14.1 g/hp-hr	18.91 g/kW-hr	15.1 g/hp-hr	20.25 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	8.6 g/hp-hr	11.53 g/kW-hr	9.2 g/hp-hr	12.34 g/kW-hr	9.9 g/hp-hr	13.28 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO2	452 g/hp-hr	606 g/kW-hr	498 g/hp-hr	668 g/kW-hr	578 g/hp-hr	775 g/kW-hr
O2	0.53 %		0.58 %		0.66 %	

Bold entries revised after 1-Mar-2010

Cranking System (Cold Starting Capability)

Unaided Cold Start:		
Minimum cranking speed	250 RPM	
Minimum ambient temperature for unaided cold start	0 deg F	-17.8 deg C
Breakaway torque at minimum unaided cold start temperature:	480 lb-ft	651 N-m
Cold starting aids available	Block Heater	
Maximum parasitic load at 10 deg F @		

Noise Emissions

Top	89.9 dBa
Right Side	91.2 dBa
Left Side	91.7 dBa
Front	90.3 dBa
Exhaust noise emissions	105.3 dBa

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed
(Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)

Aftercooler Heat Rejection - Heat Load on Aftercooler
BTU/min (kW)

Ambient Temp deg F (deg C)

Altitude ft (m)	**120 (49)**	**110 (43)**	**100 (38)**	**90 (32)**	**80 (27)**	**70 (21)**
0 (0)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
1000 (305)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
2000 (610)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
3000 (914)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
4000 (1219)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
5000 (1524)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
6000 (1829)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
7000 (2134)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
8000 (2438)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
9000 (2743)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
10000 (3048)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)

End of Report

Bold entries revised after 1-Mar-2010

NATIONAL OILWELL VARCO

QUOTATION

CLIENT: American Energy Partners, LP

SUBJECT: Mission Enclosed Vapor Combustor (MEVC200)

NOV PROPOSAL: H-14100-14-200 Rev.2

0	5/19/14	TW	RC	PM	Quotation
REV	DATE	BY	CHECKED	APPROVED	COMMENTS

NOV
10011 MEADOWGLEN LANE, 2ND FLOOR
HOUSTON, TX 77042
TEL: 1-713-395-5000 FAX: 1-713-395-5001

CONTENTS

1 COMMERCIAL AND TECHNICAL 3
1.1 Introduction 3
1.2 Prices 5
1.3 Technical Summary 5
1.4 Delivery 6
1.5 Commercial Clarifications/Exceptions 6
1.6 Quotation Validity 7
1.7 Service 7
2 ATTACHMENTS 7
2.1 NOV Documents 7

1 COMMERCIAL AND TECHNICAL

1.1 Introduction

In response to your inquiry, NOV is pleased to offer the following proposal for a NOV Mission Enclosed Vapor Combustor (MEVC). The model MEVC200 is capable of 18.42 MMBTU/HR, Medium Temperature Flares (MTF). NOV Mission offers a full line of reliable enclosed combustors for the ever changing requirements of today's regulation filled oil and gas industry. Mission's MEVC design incorporates years of experience with tank vapors with a combustor design which is highly effective, tested and certified "99%" for destruction of vent emissions from oil and condensate tank batteries, loading operations and storage facilities. NOV's stainless steel enclosed flare design is capable of meeting industry regulations while offering significant cost savings. Scalable to customer application, this flare is proven throughout the world. The following items will show the advantages and benefits to incorporating this equipment into the Storage Tank facility:

APPLICATIONS

- Associated gas
- Dehydrators
- Pipeline blow down
- Oil and condensate loading facilities
- Equipment maintenance
- Oil and condensate storage tanks

FEATURES AND BENEFITS:

- Meets EPA 40 CFR 60.00 regulations
- Remote location solar panel option available
- 98%+ destruction efficiency (independent 3rd party tested)
- Flexible & fully automated and programmable system (additional parameters optional)
- Quad O compliant ready
- Special custom application larger units available
- Low capital and operating costs
- Very high turndown ratio
- Scalable flow rates
- Field proven design
- Only requires 300 btu/ft3 gas to maintain combustion
- High Temperature Flares (HTF) with 99.99% DRE are also available

Thank you for this opportunity to quote on your combustor needs. Should you have any questions or concerns regarding the commercial terms, the scope of supply offered, or any technical points which may need clarification, please feel free to contact NOV at:

Contact	:	Pete Magnani
Email	:	pete.magnani@nov.com
Telephone	:	1-713-395-5000
Fax	:	1-713-395-5001
Address	:	10011 Meadowglen Lane, 2nd Floor Houston, TX 77042 USA

1.2 Prices

Base Unit Price

Item	Description	Quantity	Unit Price (USD)	Total Price (USD)
1	MEVC200. Enclosed Vapor Combustor Flow ≥ 40-200MSCFD. Inlet Pressure from 2oz/in2 minimum. 20ft height. 47" OD diameter, and 3" 150#RF connection. Includes the Data logging, pressure transmitter in lieu of pressure switch, and continuous pilot. This includes 14 25" stack extension. This is a DC Control Panel unit. All as described in 1.3 below.	1	$22,795.00	$22,795.00

Accessories

Part No.	Description	Unit Price (USD)
MEVC200-BP	Stainless Steel Bird Screen for MEVC200	$913.00
MEVC200-KOP	Stainless Steel Condensate Knock Out Pot for MEVC200	$1,500.00
MEVC200-WG	Galvanized Steel Wind Guard for MEVC200 Air Intake	$417.00
MEVC200-SP	Skid mounted solar panel and battery backup for MEVC200	$3,920.00

Spare Parts

Part No.	Description	Unit Price (USD)
MEVC-CP	Replacement Control Panel for MEVC100	$3,485.00
MEVC-PT	Replacement Pressure Transmitter for MEVC200	$535.00
MEVC-TC	Replacement Thermocouple for MEVC200	$115.00
MEVC-IC	Replacement Ignition Transformer for MEVC200	$360.00
MEVC-IE	Replacement Ignition Electrode for MEVC200	$25.00

All prices are quoted Ex-Works manufacturing facility and exclude all taxes, import duties, freight and/or insurance charges.

1.3 Technical Summary

- **Flare Gas Stream: 5.4 MW MTF:**
  - Type: Enclosed Tank Battery Flare
  - Composition: 2200 btu/ft3 gas
  - Temperature: Ambient to 100°F +/- 20 deg°F
  - Flow Rate: up to 200,000 scfd (based on 2200 BTU /ft3 gas) or 139.6 scfm
  - Auxiliary Fuel Requirements N/A
  - Burner Size 18.42 million BTU/hr (5.4 MW)
  - Inlet Pressure Requirements 2-4 oz/in2 (3.5-7.0 "w.c.)
  - Turndown Ratio 5:1
  - Data points recorded include combustion temperature, operation pressure, and run time
- **Mechanical:**
  - Design Wind Speed 100 mph
  - Ambient Temperature -20 deg F up to 110 deg F
  - Electrical Area Classification General Area Classification (non-hazardous)
  - Elevation Up to 3,000 ft ASL – please advise if higher elevation
- **Process:**
  - Smokeless Capacity 100% Sdf
  - Operating Temperature 1400 deg F to 2100 deg F (1500 deg F Nominal); Retention Time 0.3 sec.
  - Flare Inlet Pressure 2-4 oz/in2 (3.5-7.0 "w.c.)
- **Utilities:**
  - Pilot Gas Process Gas
  - Electricity 24VDC Panel/ 10A (Solar Option) Auxiliary Fuel N/A
  - Instrument air/gas 80 psig for valve actuation.
- **Emissions:**
  - Destruction Efficiency: 98% DRE

1.4 Delivery

The delivery for the Equipment listed in NOV Scope of Supply is as follows:

- Delivery:
  - 2-3 weeks ARO, Ex-Works Chattanooga, TN

1.5 Commercial Clarifications/Exceptions

1.5.1 Terms are net 30 days:
- 100% - Upon notice of readiness to ship.

1.5.2 Quoted prices exclude all taxes, import duties, freight and/or insurance charges.

1.5.3 Delivery to be confirmed upon acceptance of purchase order.

1.5.4 NOV Worldwide Terms and Conditions shall apply.

1.5.7 NOV standard documentation will apply.

1.6 Quotation Validity

Validity is 30 days from the date of this proposal.

1.7 Service

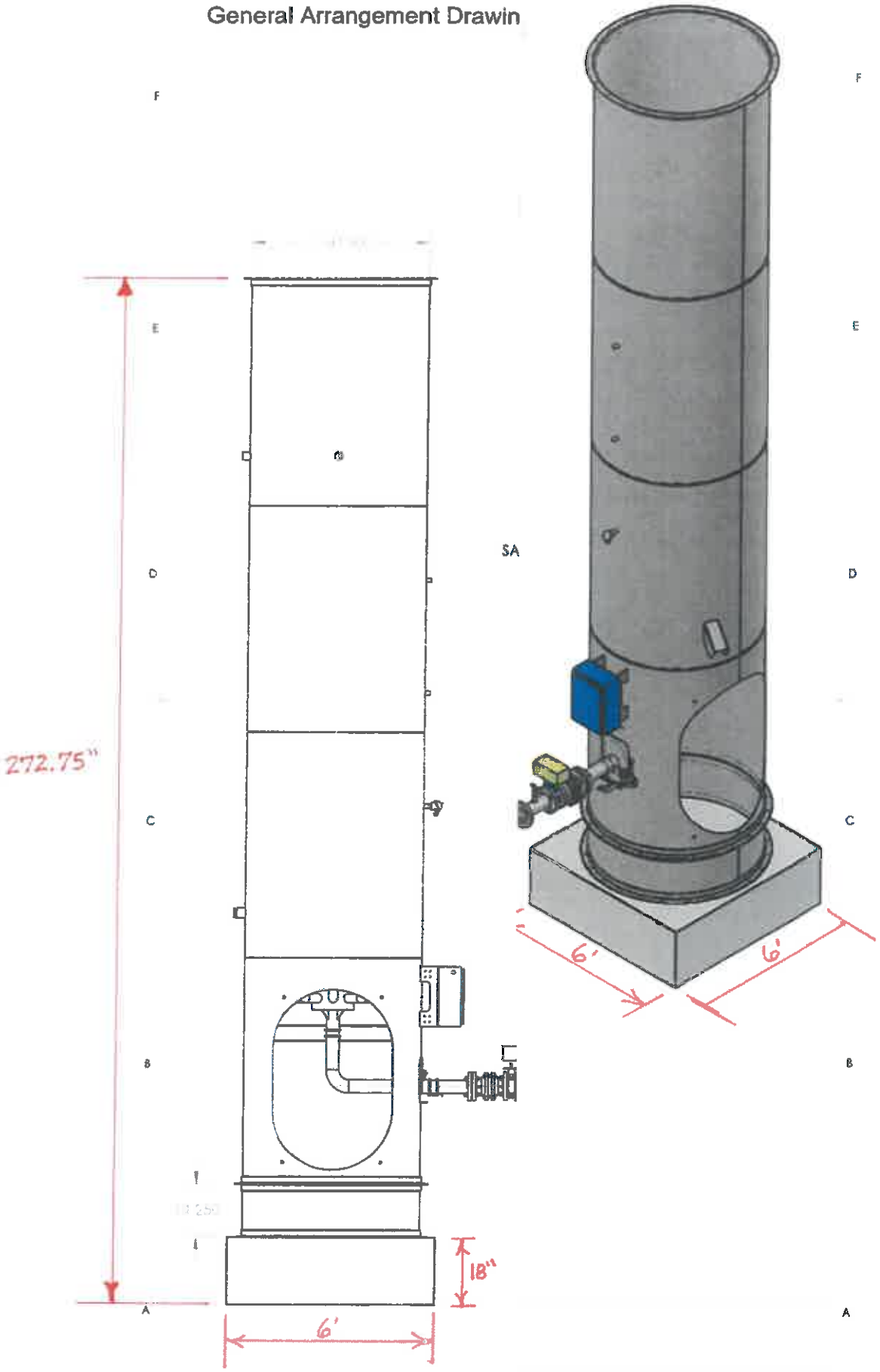
Available upon request.

2 ATTACHMENTS

2.1 NOV Documents

- NOV Terms and Conditions

General Arrangement Drawin



NO. REV

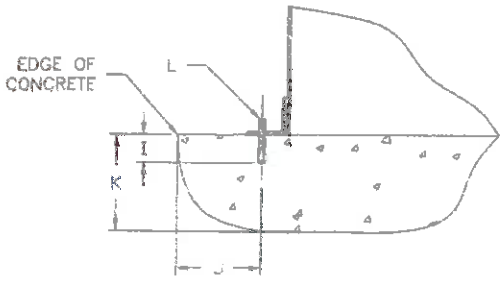
MEVC200 GAD

24 WEIGHT: 6551.88 SHEET 1 OF 1

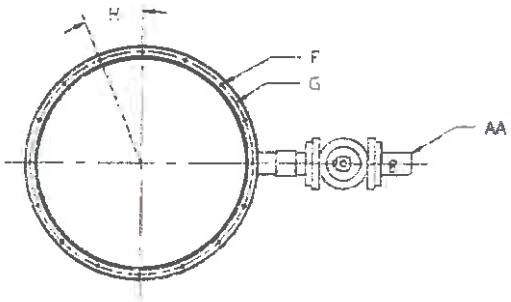
MEVC	CONNECTION (AA)	HEIGHT (A)	RING OD (B)	VESSEL OD (C)	(D)	(E)	(HOLE QTY)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
20	1 1/2" FNPT	143 1/4"	22.13"	19" OD	32.03"	18.650"	12	ø.438"	20.75"	30°	3 1/2" MIN.	6" MIN.	12" MIN.	3/8" ANCHOR
100	3" MNPT	196 1/2"	37.13"	33" OD	42.715"	19.375"	16	ø.438"	35.37"	22.5°	3 1/2" MIN.	6" MIN.	12" MIN.	3/8" ANCHOR
200	3"–150# RF	240 1/2"	51.13"	47" OD	49.350"	26.000"	24	ø.438"	51.13"	7.5°	3 1/2" MIN.	6" MIN.	12" MIN.	3/8" ANCHOR

272.75"

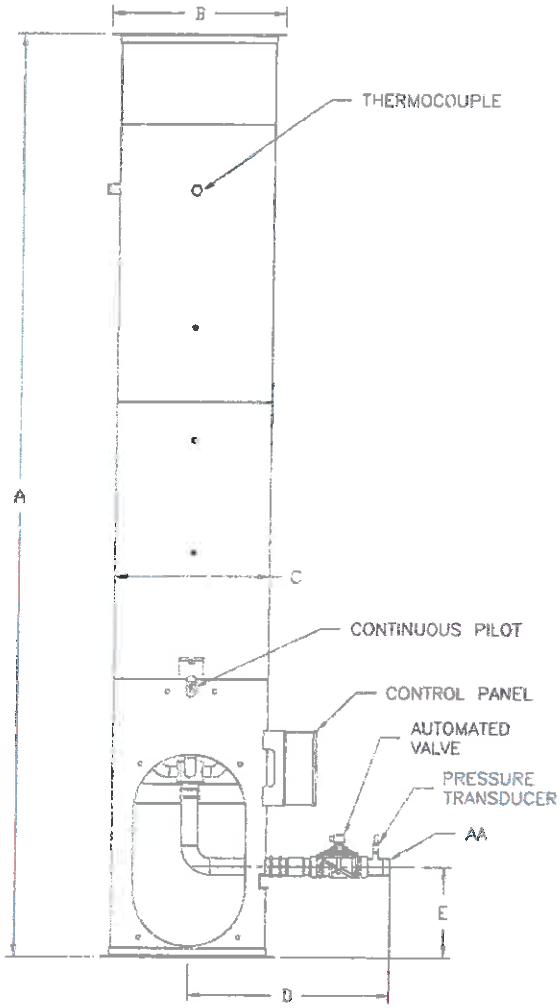
?



CONCRETE FOOTING DETAIL



MOUNTING RING DETAIL



ELEVATION DETAIL

GENERAL NOTES

1. GENERAL REPRESENTATION SHOWN, EXACT DETAILS MAY DIFFER SLIGHTLY.

3RD ANGLE PROJECTION
DO NOT SCALE, IF IN DOUBT ASK

ENGINEER	---
DRAWN BY	D. LE
JOB NO.	---
USED ON	---

LINEAR TOLERANCES (U.O.S.)

DEC. PLACE – NONE	± 1/8"[3]
– .X	± N/A
– .XX	± N/A
– .XXX	± N/A
SCALE	NTS
DIMENSIONS IN	INCHES [mm]
INSPECTION DETAILS	
DIMENSIONAL/VISUAL	100%

REV	DESCRIPTION	DATE	DRG	CHK	APP
01	FOR REVIEW	12/11/2013	DL	RC	RR

NATIONAL OILWELL VARCO

10011 Meadowglen Ln, 2nd floor
Houston, TX 77042 U.S.A.
TEL. 1(713)395–5000 FAX: 1(713)395–5001
WWW.NOV.COM/MISSION

TITLE: ENCLOSED VAPOR COMBUSTOR
MEVC20 / MEVC100 / MEVC200

DRAWING NO. MEVC-A-100 | SHT 1 OF 1 | REV 01

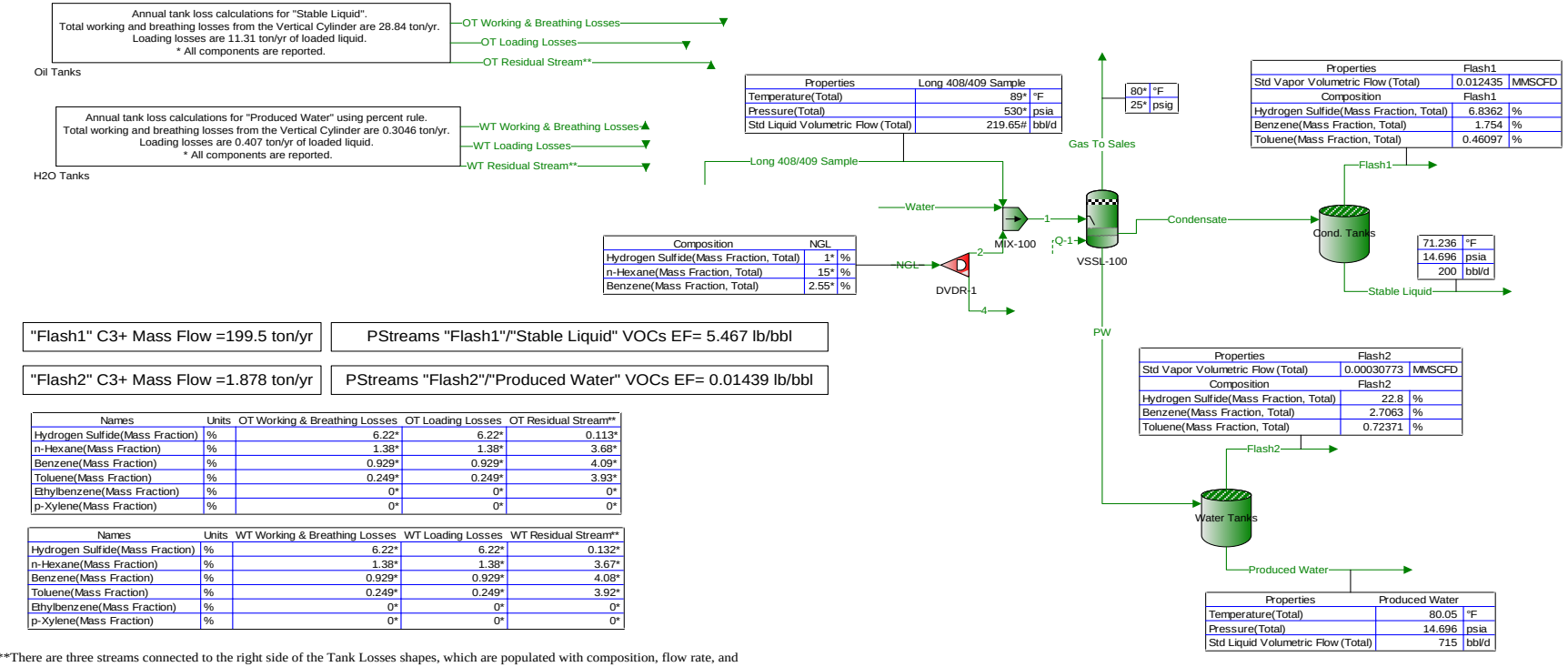
Anchor Analysis

272.75" **Worst Case Wind Speed 140~~mph~~ 120**
240.5' Tall Combustion Utility Flare

Wind, F =	qz*G*Cf*Af =	2290.0 lb (ASCE 6-28)	
qz =		42.9 psf	
Kz =		0.9	
Kzt =		1.0	
Kd =		1.0	
V =		140.0 mph	
G =		0.85	
Cf =		0.8	
Af =		78.5 ft^2	
Weight =		1600.0 lb	
Ps height =		15.00 ft	
Moverturning =		34350 ft*lb	
Base =		2.83 ft, sqr	
.9*Mresisting =		2037.6 ft*lb	
Uplift =		11418.0 lb	
Down Force =		12218.0 lb	
Vmax =		2290.0 lb	
Bolt C.L. Diameter =		4.0 ft	
# Bolts =		24.0	
Tbolt =		1431.3 lb	LRFD
Vbolt =		95.4 lb	LRFD

From Simpson Anchor Designer use (24) 3/8" x 2-1/2" Embed Strong Bolt 2 OR 3/8" SET XP epoxy bolts w/ 4" min. embed

***CONCRETE FOOTING BY OTHERS.**



"Flash1" C3+ Mass Flow =199.5 ton/yr

PStreams "Flash1"/"Stable Liquid" VOCs EF= 5.467 lb/bbl

"Flash2" C3+ Mass Flow =1.878 ton/yr

PStreams "Flash2"/"Produced Water" VOCs EF= 0.01439 lb/bbl

Names	Units	OT Working & Breathing Losses	OT Loading Losses	OT Residual Stream**
Hydrogen Sulfide(Mass Fraction)	%	6.22*	6.22*	0.113*
n-Hexane(Mass Fraction)	%	1.38*	1.38*	3.68*
Benzene(Mass Fraction)	%	0.929*	0.929*	4.09*
Toluene(Mass Fraction)	%	0.249*	0.249*	3.93*
Ethylbenzene(Mass Fraction)	%	0*	0*	0*
p-Xylene(Mass Fraction)	%	0*	0*	0*

Names	Units	WT Working & Breathing Losses	WT Loading Losses	WT Residual Stream**
Hydrogen Sulfide(Mass Fraction)	%	6.22*	6.22*	0.132*
n-Hexane(Mass Fraction)	%	1.38*	1.38*	3.67*
Benzene(Mass Fraction)	%	0.929*	0.929*	4.08*
Toluene(Mass Fraction)	%	0.249*	0.249*	3.92*
Ethylbenzene(Mass Fraction)	%	0*	0*	0*
p-Xylene(Mass Fraction)	%	0*	0*	0*

**There are three streams connected to the right side of the Tank Losses shapes, which are populated with composition, flow rate, and temperature of the Working and Breathing loss, Loading loss, and residual streams. The residual stream is the total mass flow rate of the designated stream less the Working and Breathing Losses. Since these streams are set to be saturated vapor, the pressure may be different from the pressure specified in the shape in order to achieve the saturated condition.

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99100
Run Date:	12/17/2012
Run Time:	13:14
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/16/2012
Field:	Component Analysis	Sample Time:	10:30
		Collected By:	Bowens
Station:	L.S. Hoyt 402 1H	Effective Date:	12/16/2012
Meter:		Sample Pressure:	76.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	75.2959	
Ethane	15.3443	4.09
Propane	5.3256	1.46
I-Butane	0.7289	0.24
N-Butane	1.5018	0.47
I-Pentane	0.3874	0.14
N-Pentane	0.3996	0.14
Nitrogen	0.3392	
CO2	0.0990	
Oxygen	0.0000	
Hexanes+	0.5783	0.25
Total:	100.0000	6.79

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1307.9756
BTU/SCF (Saturated):	1286.1473
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99614
Z Factor (Saturated):	0.99610

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1307.9756
BTU/SCF (Saturated):	1286.1473
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99614
Z Factor (Saturated):	0.99610

Calculated Specific Gravities			
Ideal Grav.:	0.7453	Real Grav.:	0.7479
Molecular Weight:			21.5842

Gross Heating Values are Based on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

Ave. of all 6 wells for 408/409 Application (7)

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99101
Run Date:	12/17/2012
Run Time:	13:28
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/15/2012
Field:	Component Analysis	Sample Time:	9:40
		Collected By:	Bowers
Station:	L.S. Hoyt 402 2H	Effective Date:	12/15/2012
Meter:		Sample Pressure:	87.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	75.7563	
Ethane	15.2528	4.07
Propane	5.1763	1.42
I-Butane	0.6799	0.22
N-Butane	1.3354	0.42
I-Pentane	0.3822	0.14
N-Pentane	0.3638	0.13
Nitrogen	0.3184	
CO2	0.0949	
Oxygen	0.0000	
Hexanes+	0.6400	0.28
Total:	100.0000	6.68

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1301.6473
BTU/SCF (Saturated):	1279.9282
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99619
Z Factor (Saturated):	0.99615

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1301.6473
BTU/SCF (Saturated):	1279.9282
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99618
Z Factor (Saturated):	0.99615

Calculated Specific Gravities			
Ideal Grav.:	0.7409	Real Grav.:	0.7434
Molecular Weight:			21.4598

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99099
Run Date:	12/17/2012
Run Time:	13:14
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/15/2012
Field:	Component Analysis	Sample Time:	10:00
		Collected By:	Bowens
Station:	L.S. Hoyt 402 3H	Effective Date:	12/15/2012
Meter:		Sample Pressure:	90.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	77.2416	
Ethane	15.0017	4.00
Propane	4.7544	1.31
I-Butane	0.6131	0.20
N-Butane	1.1004	0.35
I-Pentane	0.2940	0.11
N-Pentane	0.2116	0.08
Nitrogen	0.3159	
CO2	0.1304	
Oxygen	0.0000	
Hexanes+	0.3369	0.15
Total:	100.0000	6.20

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1266.0459
BTU/SCF (Saturated):	1244.9457
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99643
Z Factor (Saturated):	0.99639

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1266.0459
BTU/SCF (Saturated):	1244.9457
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99643
Z Factor (Saturated):	0.99639

Calculated Specific Gravities			
Ideal Grav.:	0.7188	Real Grav.:	0.7211
Molecular Weight:			20.8201

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

3

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99102
Run Date:	12/17/2012
Run Time:	13:28
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/16/2012
Field:	Component Analysis	Sample Time:	11:15
		Collected By:	Bowers
Station:	L.S. Hoyt 402 4H	Effective Date:	12/16/2012
Meter:		Sample Pressure:	82.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	78.8606	
Ethane	14.2332	3.80
Propane	4.2341	1.16
I-Butane	0.5827	0.19
N-Butane	0.9497	0.30
I-Pentane	0.2562	0.09
N-Pentane	0.1666	0.06
Nitrogen	0.3576	
CO2	0.1216	
Oxygen	0.0086	
Hexanes+	0.2291	0.10
Total:	100.0000	5.70

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1240.5892
BTU/SCF (Saturated):	1219.9308
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99661
Z Factor (Saturated):	0.99657

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1240.5892
BTU/SCF (Saturated):	1219.9308
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99661
Z Factor (Saturated):	0.99657

Calculated Specific Gravities			
Ideal Grav.:	0.7033	Real Grav.:	0.7054
Molecular Weight:			20.3644

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

4

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99103
Run Date:	12/17/2012
Run Time:	13:29
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/15/2012
Field:	Component Analysis	Sample Time:	16:15
		Collected By:	Bowers
Station:	L.S. Hoyt 402 5H	Effective Date:	12/15/2012
Meter:		Sample Pressure:	66.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	71.9554	
Ethane	20.0050	5.34
Propane	5.5821	1.53
I-Butane	0.5845	0.19
N-Butane	1.0371	0.33
I-Pentane	0.2052	0.07
N-Pentane	0.1504	0.05
Nitrogen	0.2134	
CO2	0.0306	
Oxygen	0.0128	
Hexanes+	0.2235	0.10
Total:	100.0000	7.61

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1307.8561
BTU/SCF (Saturated):	1286.0244
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99613
Z Factor (Saturated):	0.99609

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1307.8561
BTU/SCF (Saturated):	1286.0244
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99612
Z Factor (Saturated):	0.99609

Calculated Specific Gravities			
Ideal Grav.:	0.7425	Real Grav.:	0.7451
Molecular Weight:			21.5056

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

5

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	99106
Run Date:	12/17/2012
Run Time:	14:19
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	HG Energy, LLC	Sample Date:	12/15/2012
Field:	Component Analysis	Sample Time:	12:15
		Collected By:	Bowers
Station:	L.S. Hoyt 402 6H	Effective Date:	12/15/2012
Meter:		Sample Pressure:	70.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	73.8982	
Ethane	16.3702	4.37
Propane	5.7893	1.59
I-Butane	0.8034	0.26
N-Butane	1.4911	0.47
I-Pentane	0.4201	0.15
N-Pentane	0.3161	0.11
Nitrogen	0.3264	
CO2	0.0754	
Oxygen	0.0000	
Hexanes+	0.5098	0.22
Total:	100.0000	7.17

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1320.4021
BTU/SCF (Saturated):	1298.3580
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99605
Z Factor (Saturated):	0.99601

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1320.4021
BTU/SCF (Saturated):	1298.3580
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99604
Z Factor (Saturated):	0.99600

Calculated Specific Gravities			
Ideal Grav.:	0.7525	Real Grav.:	0.7552
Molecular Weight:			21.7955

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.

6