

Enervest Operating, LLC
300 Capitol Street, Suite 200
Charleston, WV 25301

October 1, 2015

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

Re: Enervest Operating, LLC, Ravenscliff, West Virginia
WPHC-214 Natural Gas Production Facility G70-A Permit Application

Dear Director Durham:

Enclosed are one (1) original hard copy and two (2) CD-ROMs of a G70-A General Air Permit Application for the construction of a natural gas-fired RICE engine at the WPHC-214 Natural Gas Production Well Site. A check for \$4,500 is enclosed for the application fee.

If you have any questions concerning this permit application, please contact Mr. Michael Dearing at (304) 414-8171.

Sincerely,



James McKinney
Senior Vice President and General Manager EVOC

cc: Grant Morgan, ERM – grant.morgan@erm.com

Enclosures:

Enervest Operating, LLC

G70-A General Air Permit Application WPHC-214 Well Pad Natural Gas Production Site

Ravencliff, West Virginia

Prepared By:



**ENVIRONMENTAL RESOURCES MANAGEMENT, Inc.
Hurricane, West Virginia**

October 2015

INTRODUCTION

Enervest Operating, LLC (Enervest) submits this G70-A Class II Permit Application to the WVDEP's Department of Air Quality for the WPHC-214 natural gas production site located in Wyoming County, West Virginia. This application addresses the operational activities associated with the production of natural gas at the WPHC-214 Site.

FACILITY DESCRIPTION

The WPHC-214 Site natural gas production site operates in Wyoming County, WV and consists of two (2) coal-bed methane natural gas wells. Natural gas and produced water is extracted from underground deposits. The natural gas will be transported from the wells to on-site compression for delivery to the gas sales line. The produced water is removed from site by tanker trucks, on an as needed basis.

The applicant seeks to authorize the operation of:

- One (1) 145 bhp Caterpillar natural gas compressor engine;
- One (1) 24 bhp Kubota natural gas powered pumpjack engine;
- One (1) 65 bhp Arrow natural gas powered pumpjack engine;
- Two (2) 50 barrel (bbl) produced water tanks;
- One (1) 40 bbl produced water tank;
- Two (2) 210 bbl produced water tanks; and
- One (1) Tank Truck Loading Operation

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

STATEMENT OF AGGREGATION

The WPHC-214 Site facility will be located in Wyoming County, WV and operated by Enervest. 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 facilities. Enervest will operate the WPHC-214 Site facility with the same industrial grouping as nearby facilities, and some of these facilities are under common control. Enervest is subject to the aggregation of stationary emission for two wellhead locations and one compressor locations since these facilities meet the definition of contiguous or adjacent facilities. Enervest is not subject to further aggregation because any additional sites to be considered do not meet the definition of contiguous or adjacent facilities

The WPHC-214 Site facility will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by Enervest that share the same two-digit major SIC code of 13 for Crude Petroleum and Natural Gas Extraction. Therefore, the WPHC-214 pad does share the same SIC codes as the surrounding wells and compressor stations.

Enervest is the sole operator of the WPHC-214 Site facility. Other production sites or compressor stations are operated by Enervest in the area. Therefore, Enervest does qualify as having nearby operations under common control.

The WPHC-214 natural gas production site is comprised of two (2) standalone wellheads and one (1) production compressor engine. These nearby sites are expected to meet the definition of adjacent properties since they are located within ¼ mile of the centralized compressor site. Other Enervest operated sites in the area do not meet the definition of contiguous or adjacent properties since they are not located within ¼ mile of the WPHC-214 Site, do not share common boundaries, and do not have intermingled processes.

Based on the above reasoning, Enervest is only subject to the aggregation of stationary emission sources at the WPHC-214 natural gas production site, included in the attached permit application.

REGULATORY DISCUSSION

This section outlines the State and Federal air quality regulations that could be reasonably expected to apply to the WPHC-214 Site 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 WVDEP G70-A permit application forms.

The West Virginia State Regulations address applicable state (i.e. State Implementation Plan) rules as well as federal regulations, including Prevention of Significant Deterioration or 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 WPHC-214 Site 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

No indirect heat exchangers that combust natural gas will be operated or installed at the WPHC-214 Site.

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 WPHC-214 Site facility are subject to this requirement. Based on the nature of the process at the wellpad, the presence of objectionable odors is unlikely.

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

The WPHC-214 Site does not combust refuse.

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

Natural gas combustion devices will be operated in accordance with the sulfur dioxide concentration limitation. Pipeline quality natural gas will only be used at the WPHC-214 facility.

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

This G70-A permit application is being submitted for the operational activities associated with Enervest'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

Federal construction permitting programs regulate new and modified sources of attainment pollutants. The G70-A 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 WPHC-214 Site facility will not exceed major source emission thresholds established by these permitting programs. Enervest 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 either program.

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

45 CSR 16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section. There are no applicable requirements of NSPS in this G70-A 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 HAP, and 100 tpy of all other regulated pollutants.

The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility. The facility is not 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-A general permit.

FEDERAL REGULATIONS

The following NSPS included in the G70-A permit are not applicable to the WPHC-214 Site facility:

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

Caterpillar G3306NA Compressor Engine:

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-A permit.

The natural gas compressor engine that will be installed at the WPHC-214 Site is not subject to the requirements of this Rule. The compressor engine (S01) is a spark ignition internal combustion engine that was manufactured in 1990 and has not undergone modification or reconstruction. One of the pump jack engines

(S03) was an existing engine at the time Enervest acquired these assets. This pump jack engine was manufactured in December 2003 and has not undergone reconstruction or modification. The requirements of 40 CFR 60 Subpart JJJJ does not apply to S01 and S03.

The Kutoba DG972 (S02) natural gas power pump jack engine is subject to the requirements of 40 CFR 60 Subpart JJJJ. The engine was manufactured in 2014 and has not been reconstructed or modified. The engine qualifies as a 4 stroke lean burn Spark Ignition (SI) Internal Combustion Engine (ICE). The displacement of the engine is 962 cubic centimeters With a brake horsepower rating of 24, this engine is subject to the requirements of 60.4231(a). The emission limitations for this engine are as follows:

- $HC + NO_x = 8.0 \text{ g/KW-hr}$

Enervest will comply with this limitation by keeping a maintenance plan and records of conducted maintenance to demonstrate compliance, as required by §60.4243(a)(2)(i).

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

This facility was in operation prior NSPS OOOO after taking effect and no construction or reconstruction has taken place that would impact affected facility status. The natural gas-fired RICE engine is located at the well site and is conditionally exempt from compressor affected facility status. Based upon this information, this facility does not qualify as an affected facility under this Rule.

No additional NSPS are currently applicable to this facility.

The following NESHAP included in the G70-A permit are applicable to the WPHC-214 Site facility:

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

Caterpillar G3306NA Compressor Engine:

The Caterpillar G3306NA Compressor Engine is subject to the requirements of 40 CFR 63 Subpart ZZZZ. The engine was manufactured in June of 1990 and has not been reconstructed or modified. The engine qualifies as a 4 stroke rich burn Spark Ignition (SI) Internal Combustion Engine (ICE). The engine is not classified as a black start or emergency engine. With a brake horsepower rating of 145, this engine is subject to the requirements of 63.6603(a), as outlined in

Table 2d.10. The requirements for non-emergency, non-black start 4SRB stationary RICE with less than 500 hp are as follows:

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

Arrow L-795 Pumpjack Engine:

The Arrow L-795 natural gas power pump jack engine is subject to the requirements of 40 CFR 63 Subpart ZZZZ. The engine was manufactured in December 2003 and has not been reconstructed or modified. The engine qualifies as a 2 stroke lean burn Spark Ignition (SI) Internal Combustion Engine (ICE). The engine is not classified as a black start or emergency engine. With a brake horsepower rating of 65, this engine is subject to the requirements of 63.6603(a), as outlined in Table 2d.6. The requirements for non-emergency, non-black start 2SLB stationary RICE is as follows:

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



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

APPLICATION FOR GENERAL PERMIT REGISTRATION
 CONSTRUCT, MODIFY, RELOCATE OR ADMINISTRATIVELY UPDATE
 A STATIONARY SOURCE OF AIR POLLUTANTS

- CONSTRUCTION MODIFICATION RELOCATION CLASS I ADMINISTRATIVE UPDATE
 CLASS II ADMINISTRATIVE UPDATE

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

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

SECTION I. GENERAL INFORMATION

1. Name of applicant (as registered with the WV Secretary of State's Office): Enervest Operating, LLC		2. Federal Employer ID No. (FEIN): 76-0460809	
3. Applicant's mailing address: 300 Capitol Street, Suite 200 Charleston, WV 25301		4. Applicant's physical address: Trough Fork Road, Ravenscliff, WV 25913	
5. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
6. WV BUSINESS REGISTRATION. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - IF YES, provide a copy of the Certificate of Incorporation/ Organization / Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A. - IF NO, provide a copy of the Certificate of Authority / Authority of LLC / Registration (one page) including any name change amendments or other Business Certificate as Attachment A.			

SECTION II. FACILITY INFORMATION

7. Type of plant or facility (stationary source) to be constructed, modified, relocated or administratively updated (e.g., coal preparation plant, primary crusher, etc.): Class II Oil and Natural Gas Production Facility	8a. Standard Industrial Classification Classification (SIC) code: 1311	AND	8b. North American Industry System (NAICS) code: 211111
9. DAQ Plant ID No. (for existing facilities only): N/A	10. List all current 45CSR13 and other General Permit numbers associated with this process (for existing facilities only): N/A		

A: PRIMARY OPERATING SITE INFORMATION

<p>11A. Facility name of primary operating site: WPHC-214 Well Pad Natural Gas Production Facility</p>	<p>12A. Address of primary operating site: Mailing: 300 Capitol Street, Suite 200 Charleston, WV 25301 Physical: Trough Fork Road, Ravencloff, WV</p>	
<p>13A. Does the applicant own, lease, have an option to buy, or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - IF YES, please explain: The applicant leases the site. - IF NO, YOU ARE NOT ELIGIBLE FOR A PERMIT FOR THIS SOURCE.</p>		
<p>14A. <input type="checkbox"/> For Modifications or Administrative Updates at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits, please provide directions to the proposed new site location from the nearest state road. Include a MAP as Attachment F. From Bolt, WV: From WV-99 W, turn left onto Bolt Road / Raven Cliff Road. Travel for 1.3 miles where the road becomes Farmers Lane and then immediately Trough Fork Road. After 4.1 miles, Trough Fork Road becomes Ravencloff Road. Travel 1.9 miles and turn right onto Glen Fork Road. After 0.6 miles take a sharp right on Co Hwy1/1. A dirt access road off of Youth Camp Road is used to access the remote facility.</p>		
<p>15A. Nearest city or town: Ravencloff</p>	<p>16A. County: Wyoming</p>	<p>17A. UTM Coordinates: Northing (KM): 417.6245 Easting (KM): 4,567.9798 Zone: 17S</p>
<p>18A. Briefly describe the proposed new operation or change (s) to the facility: The WPHC-214 Well Pad natural gas production site is a proposing to add a 145bhp Caterpillar G3306NA natural gas compressor engine.</p>		<p>19A. Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits): Latitude: 37.73246 Longitude: -81.49028</p>

SECTION III. ATTACHMENTS AND SUPPORTING DOCUMENTS

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

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

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

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

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

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

SECTION IV. CERTIFICATION OF INFORMATION

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

FOR A CORPORATION (domestic or foreign)

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

FOR A PARTNERSHIP

I certify that I am a General Partner

FOR A LIMITED LIABILITY COMPANY

I certify that I am a General Partner or General Manager

FOR AN ASSOCIATION

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

FOR A JOINT VENTURE

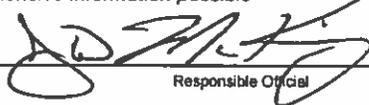
I certify that I am the President, General Partner or General Manager

FOR A SOLE PROPRIETORSHIP

I certify that I am the Owner and Proprietor

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

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

Signature  Date 10/9/15
(please use blue ink) Responsible Official

Name & Title James McKinney, Sr. Vice President and General Manager
(please print or type)

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

Applicant's Name Enervest Operation, LLC

Phone & Fax _____
Phone Fax

Email _____

ATTACHMENT A

BUSINESS CERTIFICATE



STATE OF WEST VIRGINIA
State Tax Department, Tax Account Administration Div
P. O. Box 2666
Charleston, WV 25330-2666



Earl Ray Tomblin, Governor

Craig A. Griffith, Tax Commissioner

ENERVEST OPERATING LLC EASTERN DIVI
300 CAPITOL ST STE 200
CHARLESTON WV 25301-1794

Letter Id: L1745620096
Issued: 05/27/2011
Account #: 1051-6031

00027-402016000



RE: Business Registration Certificate

The West Virginia State Tax Department would like to thank you for registering your business. Enclosed is your Business Registration Certificate. This certificate shall be permanent until cessation of business or until suspended, revoked or cancelled. Changes in name, ownership or location are considered a cessation of business; a new Business Registration Certificate and applicable fees are required. Please review the certificate for accuracy.

This certificate must be prominently displayed at the location for which issued. Engaging in business without conspicuously posting a West Virginia Business Registration Certificate in the place of business is a crime and may subject you to fines per W.Va. Code § 11-9.

When contacting the State Tax Department, refer to the appropriate account number listed on the back of this page. The taxes listed may not be all the taxes for which you are responsible. Account numbers for taxes are printed on the tax returns mailed by the State Tax Department. Failure to timely file tax returns may result in penalties for late filing.

Should the nature of your business activity or business ownership change, your liability for these and other taxes will change accordingly.

To learn more about these taxes and the services offered by the West Virginia State Tax Department, visit our web site at www.wvtax.gov.

Enclosure

atL006 v.4

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**ENERVEST OPERATING LLC EASTERN DIVISION
300 CAPITOL ST 200
CHARLESTON, WV 25301-1794**

BUSINESS REGISTRATION ACCOUNT NUMBER: 1051-6031

This certificate is issued on: **05/27/2011**

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

**TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of
this certificate displayed at every job site within West Virginia.**

ATTACHMENT B

PROCESS DESCRIPTION

Attachment B

Process Description

This permit application is being filed for Enervest Operating, LLC (Enervest), and addresses operational activities associated with the WPHC-214 natural gas production site. The WPHC-214 well site operates as a coalbed methane well. Incoming raw natural gas from the two (2) wells is first routed through the separator where produced water and gas separation occurs. Natural gas from the wells is routed to one (1) 145 bhp Caterpillar G3306NA (S01) natural gas power compressor engine for compression and delivery to the sales line.

Water realized at coalbed methane wells differ from produced fluids in shale gas formations. The presence of coal seams can cause a perched water table, depending upon the depth of the formation, permeability to the formation, and porosity of the coal seam. Based upon these factors, coalbed methane wells can realize large amounts of water. It is important to note that the realized water at a coalbed methane well is not the same as a reservoir fluid or brine water.

Produced water at the WPHC-214 B site routed to one (1) of two (2) produced water storage tanks (S04 & S05). At the WPHC-214 C site, produced water is routed to one (1) of two (2) produced water storage tanks (S06 & S07). At the WPHC wellhead compressor, another produced water storage tank (S08) is operated to remove any additional fluids entrained within the gas. Fluids from each of these storage tanks are removed from site by tanker trucks. Tank unloading operations are uncontrolled at the WPHC-214 natural gas production facility.

Natural gas powered pump jacks (S02 & S03) are utilized at this site to overcome the hydrostatic head pressure within the well casing. During normal operations, the reservoir pressure of the coalbed is not high enough to allow gas and water to flow through the water column that continuously exists within the well. In order to realize a sustainable gas supply, these pump jacks extract the water column from the well, reducing the hydrostatic head generated by the water column and allowing the methane gas to flow to the surface. The separators operated at the well site are set at or near atmospheric pressure. Produced water is transported to storage tanks under gravity flow from the separators. The lack of a pressure differential between the separators and the fluid tanks makes it infeasible for flashing emissions to be realized at the tanks for this well site. In order to quantify emission from tank operations, Enervest has

included EPA Tanks simulations within this permit application that makes an assumption that 1 percent of condensate is realized at the tanks. Enervest asserts that this is a conservative estimation based upon imperfect fluid separation. This estimate can also be considered conservative because of the type of production well, a coalbed methane well, where reservoir condensate does not exist.

A process flow diagram is included as Attachment D.

ATTACHMENT C

DESCRIPTION OF FUGITIVE EMISSIONS

Attachment C

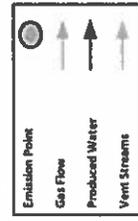
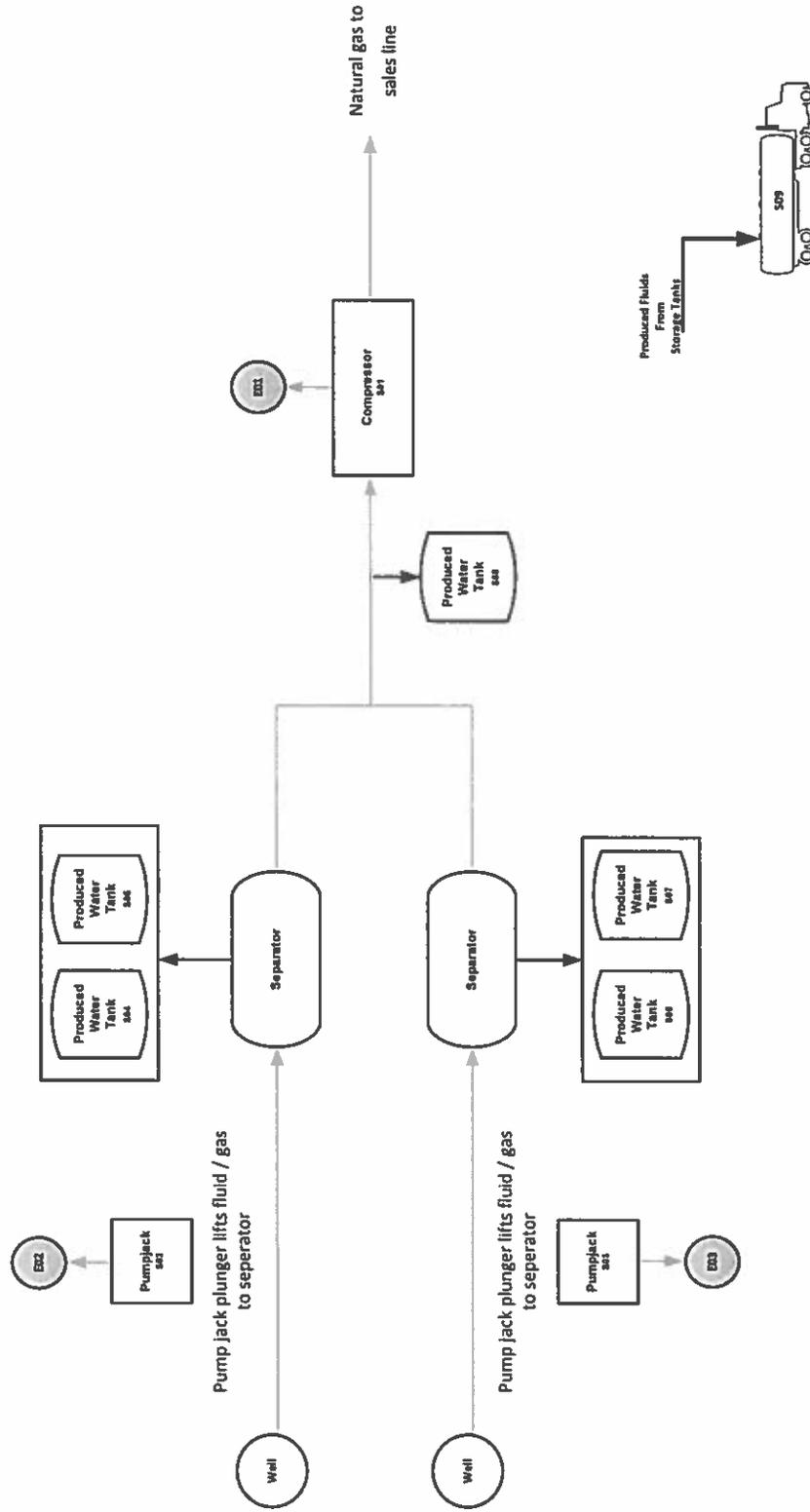
G70-A General Permit Description of Fugitive Emissions

This permit application is being filed for Enervest Operating, LLC (Enervest) and addresses operational activities associated with the WPHC-214 Well Pad natural gas production site. Fugitive emissions on the site are generated from a number of sources, including an unpaved haul road and equipment leaks. These fugitive emission sources cannot reasonably be controlled by air pollution control devices. Emission levels for fugitive emissions were calculated using AP-42 emission factors and 40 CFR 98 Subpart W factors and equipment counts. A summary of the fugitive emissions on the WPHC-214 Well Pad natural gas production site can be found in Attachment O – Emissions Summary Sheet.

ATTACHMENT D

PROCESS FLOW DIAGRAM

Attachment D
WPHC-214 Well Pad - Natural Gas Production
Process Flow Diagram

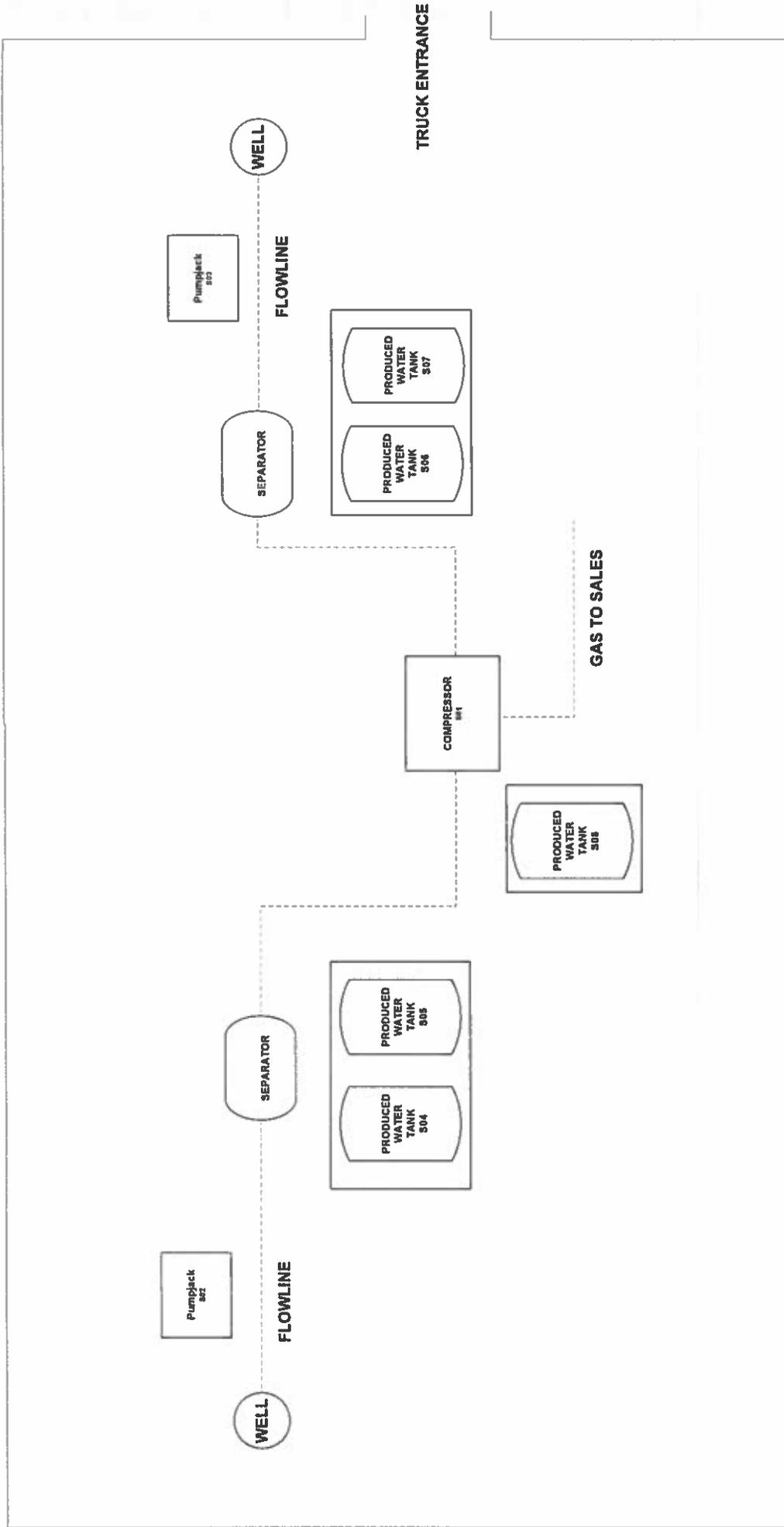


ATTACHMENT E

PLOT PLAN

Attachment E
Plot Plan

WPHC-214 Well Pad Natural Gas Production Site

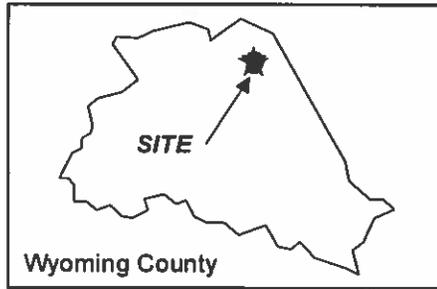


ATTACHMENT F

AREA MAP



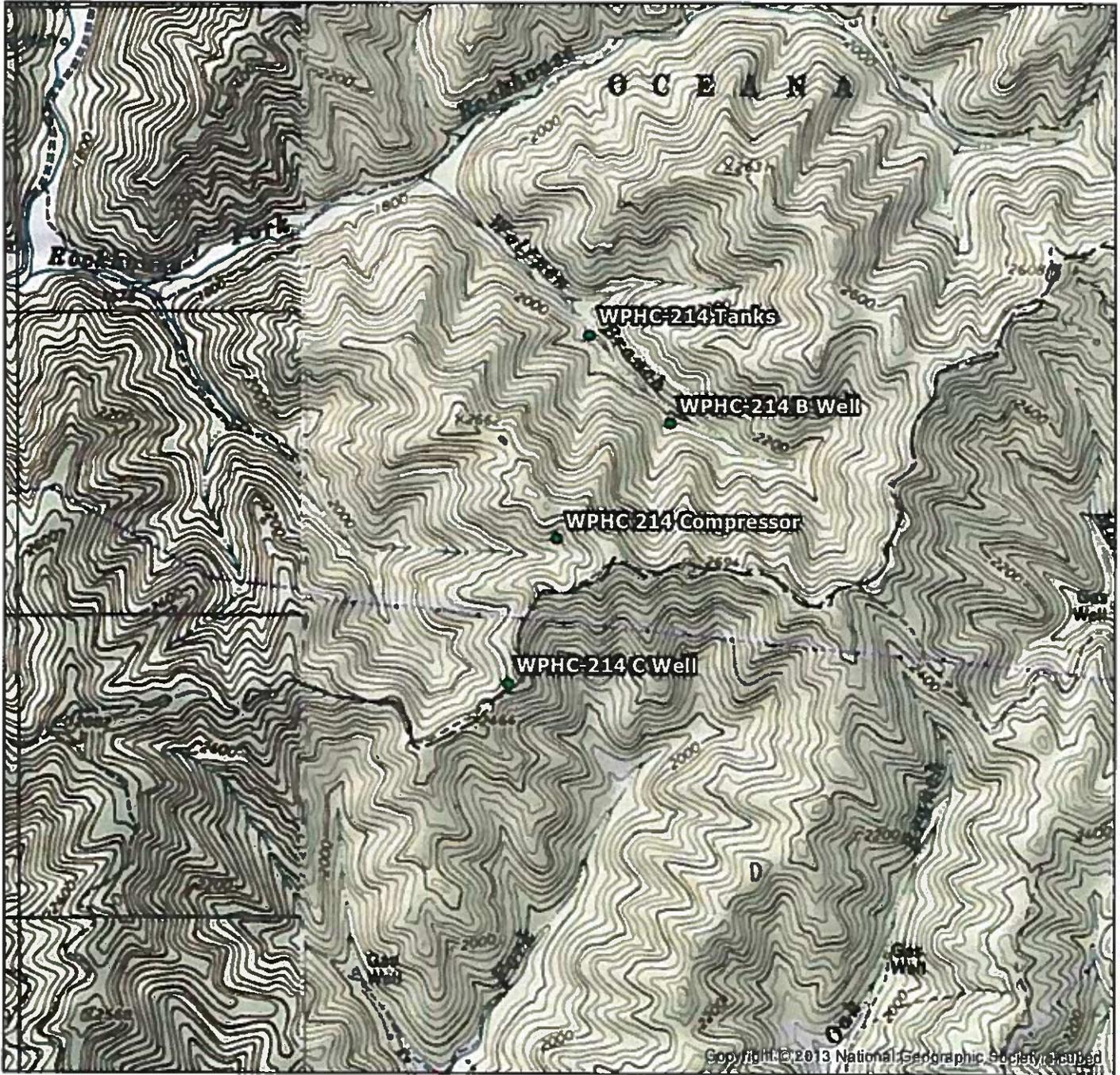
West Virginia



Wyoming County



LAT. 37.732463 LON. -81.490288
 WYOMING COUNTY
 WEST VIRGINIA



Copyright © 2013 National Geographic Society, Inc.

USGS 1:24K 7.5' Quadrangle:
 McGraws, WV

SITE LOCATION MAP

Enervest Operating, LLC
 Enervest – WPHC-214
 Enervest Operating, LLC
 Wyoming, West Virginia

GIS Review: GM

CHK'D: GM

0314163



ERM

Drawn By:
 SRV-9/23/15

Environmental Resources Management

ATTACHMENT F

J:\USProjects\SiteLocationMap\Enervest Energy_MXD\Site_Location_Map3.mxd - 10/2/2015\BRV

ATTACHMENT G

EQUIPMENT DATA SHEETS AND REGISTRATION SECTION APPLICABILITY FORM

**General Permit G70-A Registration
Section Applicability Form**

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

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

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

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

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

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

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

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
S01	E01	Caterpillar G3306NA	2015	145 bhp	New	NA
S02	E02	Kubota DG972	Dec. 2014	24 bhp	Existing	NA
S03	E03	Arrow L-795	Pre- August 2011 ¹	65 bhp	Existing	NA
S04	E04	Produced Water Tank	Pre- August 2011 ¹	40 bbl	Existing	NA
S05	E05	Produced Water Tank	Pre- August 2011 ¹	210 bbl	Existing	NA
S06	E06	Produced Water Tank	Pre- August 2011 ¹	50 bbl	Existing	NA
S07	E07	Produced Water Tank	Pre- August 2011 ¹	210 bbl	Existing	NA
S08	E08	Produced Water Tank	Pre- August 2011 ¹	50 bbl	Existing	NA
S09	E09	Tank Truck Loading Operations	Pre- August 2011 ¹	560 bbl/day	Existing	NA

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

¹ Enverest Operating, LLC acquired these existing CBM assets in 2012. Records of installation dates are were not available from previous operator; however the construction date is believed to be long before the NSPS OOOO applicability date. The

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

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

Please provide the API number(s) for each NG well at this facility:
47-109-02901
47-109-02900

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

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

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

Where,

047 = State code. The state code for WV is 047.

001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).

00001 = Well number. Each well will have a unique well number.

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

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

Emission Unit (Source) ID No. ¹		S01		S02		S03	
Emission Point ID No. ²		E01		E02		E03	
Engine Manufacturer and Model		Caterpillar G3306 NA		Kutoba DG972		Arrow L-795	
Manufacturer's Rated bhp/rpm		145 bhp / 1,800 rpm		24 bhp / 3600 rpm		65 bhp / 600 rpm	
Source Status ³		NS		ES		ES	
Date Installed/Modified/Removed ⁴		2015		2015		Prior to 2012 Acquisition	
Engine Manufactured/Reconstruction Date ⁵		1990		12/2014		12/31/2003	
Is this engine subject to 40CFR60, Subpart JJJJ?		NO		Yes		No	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60, Subpart JJJJ? (Yes or No) ⁶		NO		NO		NO	
Is this engine subject to 40CFR63, Subpart ZZZZ? (yes or no)		YES		NO		YES	
Engine, Fuel and Combustion Data	Engine Type ⁷	RB4S		LB4S		LB2S	
	APCD Type ⁸	None		None		None	
	Fuel Type ⁹	PQ		PQ		PQ	
	H ₂ S (gr/100 scf)	0.25		0.25		0.25	
	Operating bhp/rpm	145 bhp / 1,800 rpm		24 bhp / 3600 rpm		65 bhp / 600 rpm	
	BSFC (Btu/bhp-hr)	7,543		9,075		11,000	
	Fuel throughput (ft ³ /hr)	1,072		214		701	
	Fuel throughput (MMBtu/yr)	9.4		1.9		6.2	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference ¹⁰	Potential Emissions ¹¹	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
Vendor Guarantee / AP-42	NO _x	7.71	33.76	0.89	33.76	2.27	9.93
Vendor Guarantee / AP-42	CO	0.45	1.96	0.07	0.30	0.28	1.21
Vendor Guarantee / AP-42	VOC	0.05	0.22	0.03	0.11	0.09	0.38
AP-42	SO ₂	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
AP-42	PM ₁₀	0.01	0.05	<0.01	0.01	<0.01	0.03
Vendor Guarantee	Formaldehyde	0.07	0.32	0.01	0.05	0.04	0.17
MRR ¹²	Proposed Monitoring:	Enervest will comply with all monitoring requirements set forth in the issued permit.					
	Proposed Recordkeeping:	Enervest will comply with all recordkeeping requirements set forth in the issued permit.					
	Proposed Reporting	Enervest will comply with all reporting requirements set forth in the issued permit.					

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}	--	--	--	--
	heavy liquid VOC ⁸	--	--	--	--
	Non-VOC ⁹	--	--	--	--
Valves ¹⁰	Gas VOC	42	N/A	N/A	8,320
	Light Liquid VOC	--	--	--	--
	Heavy Liquid VOC	--	--	--	--
Safety Relief Valves ¹¹	Non-VOC	--	--	--	--
	Gas VOC	0	N/A	N/A	2
	Non VOC	--	--	--	--
Open-ended Lines ¹²	VOC	1	N/A	N/A	440
	Non-VOC	--	--	--	--
	VOC	--	--	--	--
Sampling Connections ¹³	Non-VOC	--	--	--	--
	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Compressors	VOC	--	--	--	--
	Non-VOC	--	--	--	--
	VOC	--	--	--	--
Flanges	Non-VOC	--	--	--	--
	VOC	178	N/A	N/A	3,920
	Non-VOC	--	--	--	--
Other	VOC	--	--	--	--
	Non-VOC	--	--	--	--
	VOC	--	--	--	--

1 - 13 See notes on the following page.

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name 210 bbl Produced Water Storage Tank
3. Emission Unit ID number S07	4. Emission Point ID number E07
5. Date Installed or Modified (<i>for existing tanks</i>) Pre August 2011	6. Type of change: <input type="checkbox"/> New construction <input type="checkbox"/> New stored material <input checked="" type="checkbox"/> Other (Aggregation of New Engine Requires Permitting of Pad)
7A. Description of Tank Modification (<i>if applicable</i>)	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) N/A	

II. TANK INFORMATION (required)

8. Design Capacity (<i>specify barrels or gallons</i>). Use the internal cross-sectional area multiplied by internal height. 210 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 10
10A. Maximum Liquid Height (ft.) 10	10B. Average Liquid Height (ft.) 5
11A. Maximum Vapor Space Height (ft.) 2	11B. Average Vapor Space Height (ft.) 7
12. Nominal Capacity (<i>specify barrels or gallons</i>). This is also known as "working volume." 8,820	
13A. Maximum annual throughput (gal/yr) 453,600	13B. Maximum daily throughput (gal/day) 1,243
14. Number of tank turnovers per year 52	15. Maximum tank fill rate (gal/min) 0.86
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input checked="" type="checkbox"/> dome roof <input type="checkbox"/> other (describe) <input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION (*check which one applies*)

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets	
<input type="checkbox"/> Refer to the responses to items 19 – 26 in section VII	

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

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets	
<input type="checkbox"/> Refer to the responses to items 27 – 33 in section VII	

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

26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: <input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft ²):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 65		29. Annual Avg. Maximum Temperature (°F): 70	
30. Annual Avg. Minimum Temperature (°F): 55		31. Avg. Wind Speed (mph): 5	
32. Annual Avg. Solar Insulation Factor (BTU/ft ² -day): 1,202		33. Atmospheric Pressure (psia): 14.11	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 65	34A. Minimum (°F): 55	34B. Maximum (°F): 70	
35. Avg. operating pressure range of tank (psig): 5.9	35A. Minimum (psig): 5.4	35B. Maximum (psig): 6.5	
36A. Minimum liquid surface temperature (°F): 47		36B. Corresponding vapor pressure (psia): 5.4	
37A. Avg. liquid surface temperature (°F): 50		37B. Corresponding vapor pressure (psia): 5.9	
38A. Maximum liquid surface temperature (°F): 56		38B. Corresponding vapor pressure (psia): 6.5	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name 50 bbl Produced Water Storage Tanks
3. Emission Unit ID number S06 & S08	4. Emission Point ID number E06 & E08
5. Date Installed or Modified <i>(for existing tanks)</i> Pre August 2011	6. Type of change: <input type="checkbox"/> New construction <input type="checkbox"/> New stored material <input checked="" type="checkbox"/> Other (Aggregation of New Engine Requires Permitting of Pad)
7A. Description of Tank Modification <i>(if applicable)</i>	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) N/A	

II. TANK INFORMATION (required)

8. Design Capacity <i>(specify barrels or gallons)</i> . Use the internal cross-sectional area multiplied by internal height. 50 bbl	
9A. Tank Internal Diameter (ft.) 6.50	9B. Tank Internal Height (ft.) 10
10A. Maximum Liquid Height (ft.) 9	10B. Average Liquid Height (ft.) 5
11A. Maximum Vapor Space Height (ft.) 10	11B. Average Vapor Space Height (ft.) 5
12. Nominal Capacity <i>(specify barrels or gallons)</i> . This is also known as "working volume." 2,100	
13A. Maximum annual throughput (gal/yr) 30,240	13B. Maximum daily throughput (gal/day) 83
14. Number of tank turnovers per year 15	15. Maximum tank fill rate (gal/min) 0.06
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof <input checked="" type="checkbox"/> dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 19 – 26 in section VII

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

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 27 – 33 in section VII

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

26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: <input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft ²):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 65		29. Annual Avg. Maximum Temperature (°F): 70	
30. Annual Avg. Minimum Temperature (°F): 55		31. Avg. Wind Speed (mph): 5	
32. Annual Avg. Solar Insulation Factor (BTU/ft ² -day): 1,202		33. Atmospheric Pressure (psia): 14.11	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 65	34A. Minimum (°F): 55	34B. Maximum (°F): 70	
35. Avg. operating pressure range of tank (psig): 5.9	35A. Minimum (psig): 5.4	35B. Maximum (psig): 6.5	
36A. Minimum liquid surface temperature (°F): 47		36B. Corresponding vapor pressure (psia): 5.4	
37A. Avg. liquid surface temperature (°F): 50		37B. Corresponding vapor pressure (psia): 5.9	
38A. Maximum liquid surface temperature (°F): 56		38B. Corresponding vapor pressure (psia): 6.5	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name 210 bbl Produced Water Storage Tank
3. Emission Unit ID number S05	4. Emission Point ID number E05
5. Date Installed or Modified (<i>for existing tanks</i>) Pre August 2011	6. Type of change: <input type="checkbox"/> New construction <input type="checkbox"/> New stored material <input checked="" type="checkbox"/> Other (Aggregation of New Engine Requires Permitting of Pad)
7A. Description of Tank Modification (<i>if applicable</i>)	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) N/A	

II. TANK INFORMATION (required)

8. Design Capacity (<i>specify barrels or gallons</i>). Use the internal cross-sectional area multiplied by internal height. 210 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 10
10A. Maximum Liquid Height (ft.) 10	10B. Average Liquid Height (ft.) 5
11A. Maximum Vapor Space Height (ft.) 2	11B. Average Vapor Space Height (ft.) 7
12. Nominal Capacity (<i>specify barrels or gallons</i>). This is also known as "working volume." 8,820	
13A. Maximum annual throughput (gal/yr) 239,400	13B. Maximum daily throughput (gal/day) 656
14. Number of tank turnovers per year 28	15. Maximum tank fill rate (gal/min) 0.5
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof <input checked="" type="checkbox"/> dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION (*check which one applies*)

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 19 – 26 in section VII

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

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 27 – 33 in section VII

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

26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: <input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft ²):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 65		29. Annual Avg. Maximum Temperature (°F): 70	
30. Annual Avg. Minimum Temperature (°F): 55		31. Avg. Wind Speed (mph): 5	
32. Annual Avg. Solar Insulation Factor (BTU/ft ² -day): 1,202		33. Atmospheric Pressure (psia): 14.11	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 65	34A. Minimum (°F): 55	34B. Maximum (°F): 70	
35. Avg. operating pressure range of tank (psig): 5.9	35A. Minimum (psig): 5.4	35B. Maximum (psig): 6.5	
36A. Minimum liquid surface temperature (°F): 47		36B. Corresponding vapor pressure (psia): 5.4	
37A. Avg. liquid surface temperature (°F): 50		37B. Corresponding vapor pressure (psia): 5.9	
38A. Maximum liquid surface temperature (°F): 56		38B. Corresponding vapor pressure (psia): 6.5	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name 40 bbl Produced Water Storage Tank
3. Emission Unit ID number S04	4. Emission Point ID number E04
5. Date Installed or Modified (<i>for existing tanks</i>) Pre August 2011	6. Type of change: <input type="checkbox"/> New construction <input type="checkbox"/> New stored material <input checked="" type="checkbox"/> Other (Aggregation of New Engine Requires Permitting of Pad)
7A. Description of Tank Modification (<i>if applicable</i>)	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) N/A	

II. TANK INFORMATION (required)

8. Design Capacity (<i>specify barrels or gallons</i>). Use the internal cross-sectional area multiplied by internal height. 40 bbl	
9A. Tank Internal Diameter (ft.) 6	9B. Tank Internal Height (ft.) 9
10A. Maximum Liquid Height (ft.) 8	10B. Average Liquid Height (ft.) 5
11A. Maximum Vapor Space Height (ft.) 9	11B. Average Vapor Space Height (ft.) 4
12. Nominal Capacity (<i>specify barrels or gallons</i>). This is also known as "working volume." 1,680	
13A. Maximum annual throughput (gal/yr) 23,360	13B. Maximum daily throughput (gal/day) 67
14. Number of tank turnovers per year 14	15. Maximum tank fill rate (gal/min) 0.05
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical ___ horizontal ___ flat roof ___ cone roof <input checked="" type="checkbox"/> dome roof ___ other (describe) <input type="checkbox"/> External Floating Roof ___ pontoon roof ___ double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof ___ vertical column support ___ self-supporting <input type="checkbox"/> Variable Vapor Space ___ lifter roof ___ diaphragm <input type="checkbox"/> Pressurized ___ spherical ___ cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION (*check which one applies*)

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 19 – 26 in section VII

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

<input checked="" type="checkbox"/> Refer to enclosed TANKS Summary Sheets
<input type="checkbox"/> Refer to the responses to items 27 – 33 in section VII

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

26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded		26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: <input type="checkbox"/> 5 ft. wide <input type="checkbox"/> 6 ft. wide <input type="checkbox"/> 7 ft. wide <input type="checkbox"/> 5 x 7.5 ft. wide <input type="checkbox"/> 5 x 12 ft. wide <input type="checkbox"/> other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft ²):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based: Charleston, WV			
28. Daily Avg. Ambient Temperature (°F): 65		29. Annual Avg. Maximum Temperature (°F): 70	
30. Annual Avg. Minimum Temperature (°F): 55		31. Avg. Wind Speed (mph): 5	
32. Annual Avg. Solar Insulation Factor (BTU/ft ² -day): 1,202		33. Atmospheric Pressure (psia): 14.11	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F): 65	34A. Minimum (°F): 55	34B. Maximum (°F): 70	
35. Avg. operating pressure range of tank (psig): 5.9	35A. Minimum (psig): 5.4	35B. Maximum (psig): 6.5	
36A. Minimum liquid surface temperature (°F): 47		36B. Corresponding vapor pressure (psia): 5.4	
37A. Avg. liquid surface temperature (°F): 50		37B. Corresponding vapor pressure (psia): 5.9	
38A. Maximum liquid surface temperature (°F): 56		38B. Corresponding vapor pressure (psia): 6.5	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From:			
To:			

TANK TRUCK LOADING EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID: S09	2. Emission Point ID: E09	3. Year Installed/ Modified: Pre August 2011		
4. Emission Unit Description: Produced Water Truck Loading				
5. Loading Area Data: Adjacent to tanks				
5A. Number of pumps: 1	5B. Number of liquids loaded: 1	5C. Maximum number of tank trucks loading at one time: 2		
6. Describe cleaning location, compounds and procedure for tank trucks: Transfer point is kept clear of debris. Lines are kept in good working order.				
7. Are tank trucks pressure tested for leaks at this or any other location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, describe:				
8. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

9. Bulk Liquid Data (<i>add pages as necessary</i>):			
Liquid Name	Produced Water		
Max. daily throughput (1000 gal/day)	23.52		
Max. annual throughput (1000 gal/yr)	777.84		
Loading Method ¹	SUB		
Max. Fill Rate (gal/min)	5.7		
Average Fill Time (min/loading)	30		
Max. Bulk Liquid Temperature (°F)	50		
Truc Vapor Pressure ²	8.13		
Cargo Vessel Condition ³	U		
Control Equipment or Method ⁴	NA		
Minimum collection efficiency (%)	NA		
Minimum control efficiency (%)	NA		
<i>* Continued on next page</i>			

Maximum Emission Rate	Loading (lb/hr)	<0.001		
	Annual (ton/yr)	0.02		
Estimation Method ⁵		EPA		
Notes:				
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 <i>Air Pollution Control Device Sheets as Attachment "H"</i>): CA = Carbon Adsorption VB = Dedicated Vapor Balance (closed system) ECD = Enclosed Combustion Device F = Flare TO = Thermal Oxidation or Incineration				
⁵ EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)				

10. Proposed Monitoring, Recordkeeping, Reporting, and Testing	
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
<p>MONITORING Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment/operation/air pollution control device.</p> <p>The loadout operation will be visual monitored during the procedure.</p>	<p>RECORDKEEPING Please describe the proposed recordkeeping that will accompany the monitoring.</p> <p>Records will be kept of the amount of liquids transferred, as well as the frequency of the operation.</p>
<p>REPORTING Please describe the proposed frequency of reporting of the recordkeeping.</p> <p>Reporting of records will be performed as required by permit standards.</p>	<p>TESTING Please describe any proposed emissions testing for this process equipment/air pollution control device.</p> <p>Testing will be performed as required by applicable standards.</p>
<p>11. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty:</p> <p>N/A</p>	

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}	--	--	--	--
	heavy liquid VOC ⁸	--	--	--	--
	Non-VOC ⁹	--	--	--	--
Valves ¹⁰	Gas VOC	42	N/A	N/A	8,320
	Light Liquid VOC	--	--	--	--
	Heavy Liquid VOC	--	--	--	--
	Non-VOC	--	--	--	--
	Gas VOC	0	N/A	N/A	2
Safety Relief Valves ¹¹	Non VOC	--	--	--	--
	VOC	1	N/A	N/A	440
Open-ended Lines ¹²	Non-VOC	--	--	--	--
	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Sampling Connections ¹³	VOC	--	--	--	--
	Non-VOC	--	--	--	--
Compressors	VOC	--	--	--	--
	Non-VOC	--	--	--	--
	VOC	178	N/A	N/A	3,920
Other	Non-VOC	--	--	--	--
	VOC	--	--	--	--
	Non-VOC	--	--	--	--

¹⁻¹³ See notes on the following page.

ATTACHMENT H

AIR POLLUTION CONTROL DEVICE SHEET

NOT APPLICABLE

ATTACHMENT I

SUPPORTING EMISSIONS CALCULATIONS

Natural Gas Compressor Engine - Caterpillar G3306NA 145 bhp - (S01)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions (lb/hr)	Max. Annual Emissions (tpy)
VOC's	0.16	g/bhp-hr	Vendor Guarantee	145	7,543	1,080	8,760	0.05	0.22
Hexane	1.11E-03	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	0.00	0.005
Formaldehyde	0.23	g/bhp-hr	Vendor Guarantee	145	7,543	1,080	8,760	0.07	0.32
Benzene	1.58E-03	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	0.002	0.008
Toluene	5.58E-04	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	<0.001	0.003
Ethylbenzene	2.48E-05	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	<0.001	<0.001
Xylene	1.84E-04	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	<0.001	<0.001
CO	1.40	g/bhp-hr	Vendor Guarantee	145	7,543	1,080	8,760	0.45	1.98
NOx	24.11	g/bhp-hr	Vendor Guarantee	145	7,543	1,080	8,760	7.71	33.76
PM filterable	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	0.01	0.05
PM Condensable	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	0.01	0.05
SO ₂	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	145	7,543	1,080	8,760	<0.001	0.003
CO ₂	492.00	g/bhp-hr	Vendor Guarantee	145	7,543	1,080	8,760	157.30	688.99
CH ₄	0.001	kg CH ₄ / MMBtu	40 CFR Subpart C	145	7,543	1,080	8,760	0.003	0.012
N ₂ O	0.0001	kg N ₂ O / MMBtu	40 CFR Subpart C	145	7,543	1,080	8,760	<0.001	0.001
Total HAP's								0.08	0.33
Total CO ₂ e								157.48	689.66

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-3 - Uncontrolled Emission Factors for 4-Stroke Rich Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8,760 hr/yr.
- CO₂ equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=298
- Vendor Guarantee Emissions are provided by Caterpillar.

Example Equations:

Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/10⁶ scf) + Heating Value of Natural Gas (Btu/scf) x Boiler Rating (MMBtu/hr)

Natural Gas Compressor Engine - Kubota DG972 24 bhp - (S02)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions (lb/hr)	Max. Annual Emissions (tpy)
VOC's	0.118	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	0.03	0.11
Hexane	1.11E-03	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	0.001
Formaldehyde	5.28E-02	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	0.01	0.05
Benzene	4.40E-04	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
Toluene	4.08E-04	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
Ethylbenzene	3.97E-05	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
Xylene	1.84E-04	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
CO	0.32	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	0.07	0.30
NOx	4.08	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	0.89	3.89
PM filterable	7.71E-05	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
PM condensable	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	0.002	0.009
SO ₂	5.88E-04	lb/MMBtu	AP-42 Chapter 3.2	24	9,075	1,080	8,760	<0.001	<0.001
CO ₂	53.06	kg CO ₂ / MMBtu	40 CFR Subpart C	24	9,075	1,080	8,760	29.13	127.57
CH ₄	0.001	kg CH ₄ / MMBtu	40 CFR Subpart C	24	9,075	1,080	8,760	<0.001	0.002
N ₂ O	0.0001	kg N ₂ O / MMBtu	40 CFR Subpart C	24	9,075	1,080	8,760	<0.001	<0.001
Total HAPs								0.01	0.05
Total CO ₂ e								29.16	127.70

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-2 - Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8,760 hr/yr.
- CO₂ equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=298

Example Equations:

Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/10⁶ scf) × Heating Value of Natural Gas (Btu/scf) × Boiler Rating (MMBtu/hr)

Natural Gas Compressor Engine - Arrow L-795 65 bhp - (S03)

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Basis / Source	Engine Rating (bhp)	Fuel Consumption (Btu/bhp-hr)	Heat Value of Natural Gas (Btu/scf)	Annual Operating Hours	Max. Hourly Emissions (lb/hr)	Max. Annual Emissions (tpy)
VOC's	0.12	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.09	0.38
Hexane	4.45E-04	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	<0.001	0.001
Formaldehyde	5.28E-02	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.04	0.17
Benzene	1.94E-03	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.00	0.006
Toluene	9.69E-04	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	<0.001	0.003
Ethylbenzene	1.08E-04	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	<0.001	<0.001
Xylene	2.68E-04	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	<0.001	<0.001
CO	0.39	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.28	1.21
NOx	3.17	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	2.27	9.93
PM filterable	3.84E-02	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.03	0.12
PM condensable	9.91E-03	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	0.01	0.03
SO ₂	5.68E-04	lb/MMBtu	AP-42 Chapter 3.2	65	11,000	1,080	8,760	<0.001	0.002
CO ₂	53.06	kg CO ₂ / MMBtu	40 CFR Subpart C	65	11,000	1,080	8,760	95.62	418.80
CH ₄	0.001	kg CH ₄ / MMBtu	40 CFR Subpart C	65	11,000	1,080	8,760	0.002	0.008
N ₂ O	0.0001	kg N ₂ O / MMBtu	40 CFR Subpart C	65	11,000	1,080	8,760	<0.001	<0.001
Total HAPs								0.04	0.18
Total CO ₂ e								95.71	419.23

Notes:

- Emission rates displayed above represent the max. hourly and max. annual emissions for one NG compressor.
- Greenhouse Gas Emissions are calculated using 40 CFR 98 Subpart C Table C-1 and C-2 emission factors.
- AP-42, Chapter 3.2, Table 3.2-1 - Uncontrolled Emission Factors for 2-Stroke Lean Burn Engines
- Max. Annual Emissions based upon Max. Hourly Emissions @ 8,760 hr/yr.
- CO₂ equivalency solved for using Global Warming Potentials found in 40 CFR 98 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=298

Example Equations:

Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/10⁶ scf) + Heating Value of Natural Gas (Btu/scf) x Boiler Rating (MMBtu/hr)

Produced Water Tanks - 50 bbl (S06 & S08)

Pollutant	Max/Hourly Emissions using E&P Tanks (lb/hr)	Max. Yearly Emissions using E&P Tanks (tons/yr)
VOCs	0.76	0.17

Notes:

- Emission rates for Produced Water Tanks S06 and S08 were calculated using EPA Tanks software. EPA Tanks output sheets for the WPHC-214 Well Pad are attached.
- Emissions were calculated using Engineering Estimates to establish input to the EPA Tanks software. Enerveest has applied an industry standard assumption that 1% of the produced water realized in the tank will be condensate, based upon imperfect fluid separation. Enerveest believes that this is a conservative estimation, since the WPHC 214 Well Pad is a coalbed methane well.
- The emission rates displayed above are pre-control device emissions.
- CO₂ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=288
- For emission calculation purposes, the total throughput produced water tanks is represented as the total throughput through one tank. Emission rates displayed above represent emissions from the operation of one tank.

Produced Water Tanks - 40 bbl (S04)

Pollutant	Max. Hourly Emissions using EAP Tanks (lb/hr)	Max. Yearly Emissions using EAP Tanks (tons/yr)
VOCs	0.03	0.14

Notes:

- Emission rates for Produced Water Tank S04 was calculated using EPA Tanks software. EPA Tanks output sheets for the WPHC-214 Well Pad are attached.
- Emissions were calculated using Engineering Estimates to establish input to the EPA Tanks software. Enervest has applied an industry standard assumption that 1% of the produced water realized in the tank will be condensate, based upon imperfect fluid separation. Enervest believes that this is a conservative estimation, since the WPHC-214 Well Pad is a coalbed methane well.
- The emission rates displayed above are pre-control device emissions.
- CO₂ equivalency solved for using Global Warming Potentials found in 40CFR98 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=298

Produced Water Tanks - 210 bbl (S05)

Pollutant	Max. Hourly Emissions using EAP Tanks (t/ahr)	Max. Yearly Emissions using EAP Tanks (tons/yr)
VOCs	0.14	0.81

Notes:

- Emission rates for Produced Water Tanks S05 was calculated using EPA Tanks software. EPA Tanks output sheets for the WPHC-214 Well Pad are attached.
- Emissions were calculated using Engineering Estimates to establish input to the EPA Tanks software. Enervest has applied an industry standard assumption that 1% of the produced water realized in the tank will be condensate, based upon imperfect fluid separation. Enervest believes that this is a conservative estimation, since the WPHC-214 Well Pad is a coiled methane well.
- The emission rates displayed above are pre-control device emissions.
- CO₂ equivalency solved for using Global Warming Potentials found in 40CFR88 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=288

Produced Water Tanks - 210 bbl (S07)

Pollutant	Max. Hourly Emissions using E&P Tanks (lb/hr)	Max. Yearly Emissions using E&P Tanks (tons/yr)
VOCs	0.12	0.62

Notes:

- Emission rates for Produced Water Tank S07 was calculated using EPA Tanks software. EPA Tanks output sheets for the WPHC-214 Well Pad are attached.
- Emissions were calculated using Engineering Estimates to establish input to the EPA Tanks software. Enervest has applied an industry standard assumption that 1% of the produced water realized in the tank will be condensate, based upon imperfect fluid separation. Enervest believes that this is a conservative estimation, since the WPHC-214 Well Pad is a coalbed methane well.
- The emission rates displayed above are pre-control device emissions.
- CO₂ equivalency solved for using Global Warming Potentials found in 40CFR99 Table A-1 (Updated January 2014). GWP CO₂=1, GWP CH₄=25, GWP N₂O=288

Fugitive Leaks

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

¹ Table W-1B to 40CFR98 Subpart W

Well Specific Equipment Counts	
Facility Equipment Type	Count on Site
Wellheads	2
Separators	2
Meters/Piping	2
Compressors	3
In-line Heaters	0
Dehydrators	0

Gas Compositions			
Propanes	Butanes	Hexanes	CO ₂
3.62	1.12	0.12	0.18
44.00	58.00	72.00	44.00

Facility Equipment Type	Total Count	Emission Rate (puff/comp/comp) ²	Fugitive Emissions										
			Hours of Operation	VOCs (lb/hr)	VOCs (ton/yr)	HAPs (lb/hr)	HAPs (ton/yr)	CO ₂ (lb/hr)	CO ₂ (ton/yr)	CH ₄ (lb/hr)	CH ₄ (ton/yr)	Total CO _{2e} (lb/hr)	Total CO _{2e} (ton/yr)
Valves	42	0.027	8760	0.01	0.03	<0.001	0.00	<0.001	<0.001	0.04	0.17	0.45	4.16
Connections	178	0.003	8760	0.004	0.02	<0.001	<0.001	<0.001	<0.001	0.02	0.08	0.45	1.98
Open-ended Lines	1	0.06	8760	<0.001	0.06	<0.001	<0.001	<0.001	<0.001	0.06	0.01	0.05	0.22
Pressure Relief Valves	0	0.04	8760	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Emissions:			0.01	0.08	0.06	0.002	0.002	0.00	0.06	0.25	1.45	0.34	

² Table W-1A to 40CFR98 Subpart W

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

Tank Loading Operations S018 - S019

Unit ID	S018	Description	Produced Water Loading	S. Storage Factor	0.6	P _o pct	0.24	LEV (lb/ft ² -hr)	18.02	Temperature (°F)	50	Temperature (°F)	110	L (lb/ft ² -hr)	0.08	Throughput (kg/day)	778	VOC (lb/yr)	0.02	HAP (lb/yr)	0.000	CO ₂ (lb/yr)	0.000	CH ₄ (lb/yr)	0.001
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Total Emissions from Produced Water Truck Loading Operations

Pollutant	Max. Hourly Emissions (lb/hr)	Max Annual Emissions (lb/yr)
VOCs	<0.001	0.02
HAPs	<0.001	<0.001
CO ₂	<0.001	<0.001
CH ₄	<0.001	<0.001
Total CO ₂ e	0.000	0.01

Gas Stream	Major Pollutants
Methane	0.02
Ethane	0.22
Propane	0.40
Butane	0.23
Pentane	0.08
Hexane	0.02
Carbon Dioxide	0.000

Fugitive Emissions from Unpaved Haul Roads

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

where
 k Particle size multiplier¹
 a Silt content of road surface material (%)
 p Number of days per year with precipitation

Item Number	Description	Number of Wheels	W Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)	PM Emissions (lb/hr)	PM Emissions (tons/yr)	PM-10 Emissions (lb/hr)	PM-10 Emissions (tons/yr)	PM-2.5 Emissions (lb/hr)	PM-2.5 Emissions (tons/yr)
1	Employee Vehicles	4	3	10	1.00	1	200	NA	0	1.52	0.15	0.39	0.04	0.04	0.004
2	Liquids Hauling	14	30	10	1.00	1	185	NA	NA	4.28	0.40	1.09	0.10	0.11	0.01
Totals:										5.80	0.55	1.48	0.14	0.15	0.01

Notes:

- ¹ - Particle Size Multiplier used from AP-42 13.2.2 - Final Version 11/2006
- ² - Silt Content of Road Surface uses Sand and Gravel Processing Plant Road from AP-42 13.2.2 - Final Version 11/2008
- ³ - Number of days per year with precipitation > 0.01 in3 found using AP-42 13.2.2.1 - Final Version 11/2008

Example Calculations:

Emissions (lb/Vehicle Mile Traveled) - $E = k \times (a/12)^a \times (W/3)^b$

Size Specific Emissions (lb/VMT) - $E_{ss} = E[(365-p)/365]$

Equation 1a from AP-42 13.2.2 - Final Version 11/2006

Equation 2 from AP-42 13.2.2 - Final Version 11/2006

Total WPHC-214 Well Pad Emission Levels

Emission Sources	VOCs		Total HAPs		CO		NO _x		PM		SO ₂		CO ₂		CH ₄		N ₂ O		CO ₂ e				
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	
Caterpillar G3306NA 145 bhp - (501)	0.05	0.22	0.08	0.33	0.45	1.96	7.71	33.76	0.01	0.05	<0.001	0.003	157.30	688.99	0.003	0.01	<0.001	<0.001	157.46	689.66			
Kubota DG972 24 bhp - (502)	0.03	0.11	0.01	0.05	0.07	0.30	0.89	3.89	<0.001	0.01	<0.001	<0.001	29.13	127.57	<0.001	0.00	<0.001	<0.001	29.16	127.70			
Arrow L 795 65 bhp - (503)	0.09	0.38	0.04	0.18	0.28	1.21	2.27	9.93	0.03	0.01	<0.001	0.002	95.62	418.80	0.002	0.01	<0.001	<0.001	95.71	419.23			
Produced Water Tanks 50 bbl (508)	0.76	0.17																					
Produced Water Tank 50 bbl (506)	0.76	0.17																					
Produced Water Tank 40 bbl (504)	0.03	0.14																					
Produced Water Tank 210 bbl (505)	0.14	0.61																					
Produced Water Tank 210 bbl (507)	0.12	0.62																					
Fugitive Leaks	0.01	0.05	<0.001	0.002									<0.001	0.00	0.06	0.25			1.45	6.34			
Tank Unloading Operations	<0.001	0.02	<0.001	<0.001									<0.001	<0.001	<0.001	<0.001			0.003	0.01			
Haul Roads									5.803	0.55													
Totals	1.98	2.49	0.13	0.56	0.79	3.47	10.88	47.58	5.84	0.61	0.000	0.005	282.05	1235.36	0.06	0.28	0.000	0.001	283.78	1,242.95			

Emission Sources	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Caterpillar G3306NA 145 bhp - (501)	0.07	0.32	0.00	0.01	<0.001	0.003	<0.001	<0.001	<0.001	<0.001
Kubota DG972 24 bhp - (502)	0.01	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arrow L 795 65 bhp - (503)	0.04	0.17	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	<0.001	<0.001
Produced Water Tanks 50 bbl (508)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Produced Water Tank 50 bbl (506)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Produced Water Tank 40 bbl (504)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Produced Water Tank 210 bbl (505)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Produced Water Tank 210 bbl (507)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fugitive Leaks			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tank Unloading Operations	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Haul Roads										
Totals	0.12	0.54	0.002	0.008	0.000	0.006	0.000	0.000	0.000	0.000

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

Identification

User Identification: Enervest WHPC 214 - S04 (40 bbl)
City:
State: West Virginia
Company: EnerVest
Type of Tank: Vertical Fixed Roof Tank
Description: 580 bbl per year throughput

Tank Dimensions

Shell Height (ft): 9.00
Diameter (ft): 6.00
Liquid Height (ft): 8.00
Avg. Liquid Height (ft): 5.00
Volume (gallons): 1,680.00
Turnovers: 0.15
Net Throughput(gal/yr): 243.60
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition: Good
Roof Color/Shade: White/White
Roof Condition: Good

Roof Characteristics

Type: Dome
Height (ft): 0.00
Radius (ft) (Dome Roof): 6.00

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

Enervest WHPC 214 - S04 (40 bbl) - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min.	Max.		Avg	Min.	Max.					
Gasoline (RVP 13)	All	56.67	51.31	62.04	55.00	6.5261	5.8901	7.2156	62.0000			62.00	Option 4: RVP=13, ASTM Slope=3

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

Enverest WHPC 214 - S04 (40 bbl) - Vertical Fixed Roof Tank

Annual Emission Calculations	
Standing Losses (lb)	270 2555
Vapor Space Volume (cu ft)	124 7334
Vapor Density (lb/cu ft)	0 0730
Vapor Space Expansion Factor	0 2053
Vented Vapor Saturation Factor	0 3959
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft)	124 7334
Tank Diameter (ft)	8 0000
Vapor Space Outage (ft)	4 4115
Tank Shell Height (ft)	9 0000
Average Liquid Height (ft)	5 0000
Roof Outage (ft)	0 4115
Roof Outage (Dome Roof)	
Roof Outage (ft)	0 4115
Dome Radius (ft)	6 0000
Shell Radius (ft)	3 0000
Vapor Density	
Vapor Density (lb/cu ft)	0 0730
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Daily Avg. Liquid Surface Temp. (deg R)	516 3441
Daily Average Ambient Temp. (deg F)	54 9633
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10 731
Liquid Bulk Temperature (deg R)	514 6733
Tank Paint Solar Absorptance (Shell)	0 1700
Tank Paint Solar Absorptance (Roof)	0 1700
Daily Total Solar Insolation Factor (Btu/sqft day)	1,250 5728
Vapor Space Expansion Factor	
Vapor Space Expansion Factor	0 2053
Daily Vapor Temperature Range (deg R)	21 4367
Daily Vapor Pressure Range (psia)	1 3255
Breather Vent Press. Setting Range (psia)	0 0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	5 8901
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	7 2156
Daily Avg. Liquid Surface Temp. (deg R)	516 3441
Daily Min. Liquid Surface Temp. (deg R)	510 9799
Daily Max. Liquid Surface Temp. (deg R)	521 7082
Daily Ambient Temp. Range (deg R)	21 5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor	0 3959
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Space Outage (ft)	4 4115
Working Losses (lb)	
Working Losses (lb)	2 3488
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Annual Net Throughput (gal/yr)	243 6000
Annual Turnovers	0 1450
Turnover Factor	1 0000
Minimum Liquid Volume (gal)	1,640 0000
Maximum Liquid Height (ft)	8 0000
Tank Diameter (ft)	8 0000
Working Loss Product Factor	1 0000
Total Losses (lb)	272 6023

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

Emissions Report for: Annual**Enervest WHPC 214 - S04 (40 bbl) - Vertical Fixed Roof Tank**

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 13)	2.35	270.26	272.60

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

Identification

User Identification: EnerVest - WPHC 214 Pad - S07 (210 bbl)
City:
State: West Virginia
Company: EnerVest
Type of Tank: Vertical Fixed Roof Tank
Description: 10,800 bbl per year PW throughput

Tank Dimensions

Shell Height (ft): 10.00
Diameter (ft): 12.00
Liquid Height (ft): 10.00
Avg. Liquid Height (ft): 5.00
Volume (gallons): 8,820.00
Turnovers: 0.51
Net Throughput(gal/yr): 4,536.12
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition: Good
Roof Color/Shade: White/White
Roof Condition: Good

Roof Characteristics

Type: Dome
Height (ft): 0.00
Radius (ft) (Dome Roof): 12.00

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

EnerVest - WPHC 214 Pad - S07 (210 bbl) - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min.	Max.		Avg	Min.	Max.					
Gasoline (RVP 13)	All	56.67	51.31	62.04	55.00	6.5261	5.6901	7.2156	62.0000			92.00	Option 4 RVP=13, ASTM Slope=3

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

EnerVest - WPHC 214 Pad - S07 (210 bbl) - Vertical Fixed Roof Tank

Annual Emission Calculations	
Standing Losses (lb)	1 193 7785
Vapor Space Volume (cu ft)	658 5754
Vapor Density (lb/cu ft)	0 0730
Vapor Space Expansion Factor	0 2053
Vented Vapor Saturation Factor	0 3318
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft)	658 5754
Tank Diameter (ft)	12 0000
Vapor Space Outage (ft)	5 8231
Tank Shell Height (ft)	10 0000
Average Liquid Height (ft)	5 0000
Roof Outage (ft)	0 8231
Roof Outage (Dome Roof)	
Roof Outage (ft)	0 8231
Dome Radius (ft)	12 0000
Shell Radius (ft)	6 0000
Vapor Density	
Vapor Density (lb/cu ft)	0 0730
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Daily Avg. Liquid Surface Temp. (deg R)	518 3441
Daily Average Ambient Temp. (deg F)	54 9833
Ideal Gas Constant R (psia-cuft / (lb-mol-deg R))	10 731
Liquid Bulk Temperature (deg R)	514 6733
Tank Paint Solar Absorptance (Shell)	0 1700
Tank Paint Solar Absorptance (Roof)	0 1700
Daily Total Solar Insulation Factor (Btu/cuft day)	1 250 5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor	0 2053
Daily Vapor Temperature Range (deg R)	21 4567
Daily Vapor Pressure Range (psia)	1 3255
Breather Vent Press. Setting Range (psia)	0 0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	5 8901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	7 2156
Daily Avg. Liquid Surface Temp. (deg R)	518 3441
Daily Min. Liquid Surface Temp. (deg R)	510 9799
Daily Max. Liquid Surface Temp. (deg R)	521 7082
Daily Ambient Temp. Range (deg R)	21 5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor	0 3318
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Space Outage (ft)	5 8231
Working Losses (lb)	
Working Losses (lb)	43 7002
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Annual Net Throughput (gal/yr)	4 536 1200
Annual Turnovers	0 5143
Turnover Factor	1 0000
Maximum Liquid Volume (gal)	8 820 0000
Maximum Liquid Height (ft)	10 0000
Tank Diameter (ft)	12 0000
Working Loss Product Factor	1 0000
Total Losses (lb)	1 239 4768

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

Emissions Report for: Annual

EnerVest - WPHC 214 Pad - S07 (210 bbl) - Vertical Fixed Roof Tank

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 13)	43.70	1,195.78	1,239.48

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

Identification

User Identification: Enervest WHPC 214 - S06 & S08 (50 bbl)
City:
State: West Virginia
Company: EnerVest
Type of Tank: Vertical Fixed Roof Tank
Description: 720 bbl per year throughput

Tank Dimensions

Shell Height (ft): 10.00
Diameter (ft): 6.50
Liquid Height (ft): 9.00
Avg. Liquid Height (ft): 5.00
Volume (gallons): 2,100.00
Turnovers: 0.15
Net Throughput (gal/yr): 302.40
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition: Good
Roof Color/Shade: White/White
Roof Condition: Good

Roof Characteristics

Type: Dome
Height (ft): 0.00
Radius (ft) (Dome Roof): 6.50

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

Enervest WHPC 214 - S06 & S08 (50 bbl) - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min	Max		Avg	Min	Max					
Gasoline (RVP 13)	All	50.67	51.31	62.04	55.00	6.5261	5.6901	7.2156	62.0000			92.00	Option 4 RVP=13, ASTM Slope=3

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

Enervest WHPC 214 - S06 & S08 (50 bbl) - Vertical Fixed Roof Tank

Annual Emission Calculations	
Standing Losses (lb)	342.9825
Vapor Space Volume (cu ft)	180.7098
Vapor Density (lb/cu ft)	0.0730
Vapor Space Expansion Factor	0.2053
Vented Vapor Saturation Factor	0.3468
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft)	180.7098
Tank Diameter (ft)	8.5000
Vapor Space Outage (ft)	5.4458
Tank Shell Height (ft)	10.0000
Average Liquid Height (ft)	5.0000
Roof Outage (ft)	0.4458
Roof Outage (Dome Roof)	
Roof Outage (ft)	0.4458
Dome Radius (ft)	8.5000
Shell Radius (ft)	3.2500
Vapor Density	
Vapor Density (lb/cu ft)	0.0730
Vapor Molecular Weight (lb/lb-mole)	62.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	8.5281
Daily Avg. Liquid Surface Temp. (deg R)	518.3441
Daily Average Ambient Temp. (deg F)	54.9833
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R))	10.731
Liquid Bulk Temperature (deg R)	514.6733
Tank Paint Solar Absorptance (Shell)	0.1700
Tank Paint Solar Absorptance (Roof)	0.1700
Daily Total Solar Irradiation Factor (Btu/sqft day)	1,250.5728
Vapor Space Expansion Factor	
Vapor Space Expansion Factor	0.2053
Daily Vapor Temperature Range (deg R)	21.4567
Daily Vapor Pressure Range (psia)	1.3255
Breather Vent Press. Setting Range (psia)	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	8.5281
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	5.6901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	7.2158
Daily Avg. Liquid Surface Temp. (deg R)	518.3441
Daily Min. Liquid Surface Temp. (deg R)	510.9789
Daily Max. Liquid Surface Temp. (deg R)	521.7082
Daily Ambient Temp. Range (deg R)	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor	0.3468
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	8.5281
Vapor Space Outage (ft)	5.4458
Working Losses (lb)	
Vapor Molecular Weight (lb/lb-mole)	62.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	8.5281
Annual Net Throughput (gal/yr)	302.4000
Annual Turnovers	0.1450
Turnover Factor	1.0000
Maximum Liquid Volume (gal)	2,100.0000
Maximum Liquid Height (ft)	8.0000
Tank Diameter (ft)	8.5000
Working Loss Product Factor	1.0000
Total Losses (lb)	345.8758

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

Emissions Report for: Annual

Enervest WHPC 214 - S06 & S08 (50 bbl) - Vertical Fixed Roof Tank

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 13)	2.91	342.66	345.68

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

Identification

User Identification: EnerVest - WPHC 214 Pad - S05 (210 bbl)
City:
State: West Virginia
Company: EnerVest
Type of Tank: Vertical Fixed Roof Tank
Description: 5700 bbl per year PW throughput

Tank Dimensions

Shell Height (ft): 10.00
Diameter (ft): 12.00
Liquid Height (ft): 10.00
Avg. Liquid Height (ft): 5.00
Volume (gallons): 8,820.00
Turnovers: 0.27
Net Throughput(gal/yr): 2,384.00
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: White/White
Shell Condition: Good
Roof Color/Shade: White/White
Roof Condition: Good

Roof Characteristics

Type: Dome
Height (ft): 0.00
Radius (ft) (Dome Roof): 12.00

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

EnerVest - WPHC 214 Pad - S05 (210 bbl) - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min	Max		Avg	Min	Max					
Gasoline (RVP 13)	All	56.67	51.31	62.04	55.00	6.5261	5.6901	7.2156	62.0000			92.00	Option 4 RVP=13, ASTM Slope=3

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

EnerVest - WPHC 214 Pad - S05 (210 bbl) - Vertical Fixed Roof Tank

Annual Emission Calculations	
Standing Losses (lb)	1,195 7785
Vapor Space Volume (cu ft)	658 5754
Vapor Density (lb/cu ft)	0 0730
Vapor Space Expansion Factor	0 2053
Verted Vapor Saturation Factor	0 3318
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft)	658 5754
Tank Diameter (ft)	12 0000
Vapor Space Outage (ft)	5 8231
Tank Shell Height (ft)	10 0000
Average Liquid Height (ft)	5 0000
Roof Outage (ft)	0 8231
Roof Outage (Dome Roof)	
Roof Outage (ft)	0 8231
Dome Radius (ft)	12 0000
Shell Radius (ft)	6 0000
Vapor Density	
Vapor Density (lb/cu ft)	0 0730
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Daily Avg. Liquid Surface Temp. (deg R)	516 3441
Daily Average Ambient Temp. (deg F)	54 9633
Ideal Gas Constant R (psia cuft / (lb-mol-deg R))	10 731
Liquid Bulk Temperature (deg R)	514 6733
Tank Paint Solar Absorptance (Shell)	0 1700
Tank Paint Solar Absorptance (Roof)	0 1700
Daily Total Solar Insulation Factor (Btu/sqft day)	1,250 5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor	0 2053
Daily Vapor Temperature Range (deg R)	21 4367
Daily Vapor Pressure Range (psia)	1 3255
Breather Vent Press. Setting Range (psia)	0 0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	5 8901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	7 2156
Daily Avg. Liquid Surface Temp. (deg R)	516 3441
Daily Min. Liquid Surface Temp. (deg R)	510 9799
Daily Max. Liquid Surface Temp. (deg R)	521 7082
Daily Ambient Temp. Range (deg R)	21 5333
Verted Vapor Saturation Factor	
Verted Vapor Saturation Factor	0 3318
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Vapor Space Outage (ft)	5 8231
Working Losses (lb)	
Working Losses (lb)	23 0834
Vapor Molecular Weight (lb/lb-mole)	62 0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	6 5261
Annual Net Throughput (gal/yr)	2,394 0000
Annual Turnovers	0 2714
Turnover Factor	1 0000
Maximum Liquid Volume (gal)	6,820 0000
Maximum Liquid Height (ft)	10 0000
Tank Diameter (ft)	12 0000
Working Loss Product Factor	1 0000
Total Losses (lb)	1,218 8419

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

Emissions Report for: Annual

EnerVest - WPHC 214 Pad - S05 (210 bbl) - Vertical Fixed Roof Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 13)	23.06	1,195.78	1,218.84

ATTACHMENT J

CLASS I LEGAL ADVERTISEMENT

Attachment J

AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Enervest Operating, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a General Permit Registration for a natural gas production operation located on Trough Fork Road, Ravencliff, in Wyoming County, West Virginia. The latitude and longitude coordinates are: 37.73246, -81.49028.

The applicant estimates the potential to discharge the following regulated air pollutants on a facility-wide basis will be:

Volatile Organic Compounds (VOCs) = 2.49 tpy
Hazardous Air Pollutants (HAPs) = 0.56 tpy
Formaldehyde = 0.54 tpy
Benzene = 0.01 tpy
Carbon Monoxide (CO) = 3.47 tpy
Nitrogen Oxides (NO_x) = 47.58 tpy
Particulate Matter (PM) = 0.61 tpy
Carbon Dioxide Equivalents (CO₂e) = 1,242.95 tpy

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the XX day of October, 2015.

By: Enervest Operating, LLC
James McKinney
Sr. Vice President and General Manager
300 Capitol Street, Suite 200
Charleston, WV 25301

ATTACHMENT K

ELECTRONIC SUBMITTAL

NOT APPLICABLE

ATTACHMENT L

GENERAL PERMIT REGISTRATION APPLICATION FEE

PAYEE NAME	PAYEE NO.	CHECK DATE	CHECK NUMBER	AMOUNT
WVDEP	21315	Oct-09-2015	1797	***\$4,000.00*

Reference	Inv date	Invoice No.	Invoice Amt	Prior Pmt	Discount	Amount Paid
1510-AP-5	10/01/15	20151001A	4000.00	0.00		4000.00
WPHC-214 COMPRESSOR G70 APPLICATION FEE, NSPS FEE & NESHAP FEE						

Safeguard LITHO USA 7/13 W135F001778M

PAYEE. DETACH THIS STATEMENT BEFORE DEPOSITING

DOCUMENT INCLUDES VISIBLE FIBERS, CHEMICAL REACTIVE PROPERTIES AND FEATURES A FOIL HOLOGRAM



EVOC REGULATORY SERVICES INC
 1001 FANNIN SUITE 800
 HOUSTON, TX 77002-6707
 713-659-3500



AMEGY BANK NA
 PORTER, TX

35-1125
 1130

No. **1797**

VOID AFTER 180 DAYS

CHECK NUMBER	DATE	PAY EXACTLY
1797	Oct-09-2015	***\$4,000.00*

PAY TO THE ORDER OF **\$4,000dols00cts**

TO THE ORDER OF

WVDEP
 DIVISION OF AIR QUALITY
 601 57TH ST SE
 CHARLESTON, WV 25304

Polly Schett
 VP of Finance



ATTACHMENT M

SITTING CRITERIA WAIVER

NOT APPLICABLE

Attachment L

G70-A General Permit Application Fee

An application fee of \$4,500.00 is being submitted by Enervest Operating, LLC with this G70-A General Permit Application. This includes the \$500 application fee, a \$1,000 NSPS fee, and a \$2,500 NESHAP fee, as required by WV 45 CSR 22.

ATTACHMENT N

SAFETY DATA SHEETS (SDS)

NOT APPLICABLE

ATTACHMENT O

EMISSION SUMMARY SHEETS

**Attachment O
G70-A EMISSION SUMMARY SHEET**

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
E01	Upward Vertical Stack	S01	Compressor Engine	N/A	N/A	Total VOCs NO _x CO PM Total HAPs Formaldehyde CO ₂ CH ₄ CO _{2e}	0.05 7.71 0.45 0.01 0.08 0.07 157.30 <0.01 157.46	0.22 33.76 1.96 0.05 0.33 0.32 688.99 0.01 689.66	0.05 7.71 0.45 0.01 0.08 0.07 157.30 <0.01 157.46	0.22 33.76 1.96 0.05 0.33 0.32 688.99 0.01 689.66	Gas/Vapor	AP-42 Vendor
E02	Upward Vertical Stack	S02	Pump jack Engine	N/A	N/A	Total VOCs NO _x CO PM Total HAPs Formaldehyde CO ₂ CH ₄ CO _{2e}	0.03 0.89 0.07 <0.01 0.01 0.01 29.13 <0.01 29.16	0.11 3.89 0.30 0.01 0.05 0.05 127.57 <0.01 127.7	0.03 0.89 0.07 <0.01 0.01 0.01 29.13 <0.01 29.16	0.11 3.89 0.30 0.01 0.05 0.05 127.57 <0.01 127.7	Gas/Vapor	AP-42
E03	Upward Vertical Stack	S03	Pump jack Engine	N/A	N/A	Total VOCs NO _x CO PM Total HAPs Formaldehyde CO ₂ CH ₄ CO _{2e}	0.09 2.27 0.28 0.03 0.04 0.04 95.62 <0.01 95.71	0.38 9.93 1.21 0.01 0.18 0.17 418.8 <0.01 419.23	0.09 2.27 0.28 0.03 0.04 0.04 95.62 <0.01 95.71	0.38 9.93 1.21 0.01 0.18 0.17 418.8 <0.01 419.23	Gas/Vapor	AP-42
E04	Upward Vertical Stack	S04	Produced Water Tank	N/A	N/A	Total VOCs	0.03	0.14	0.03	0.14	Gas/Vapor	AP-42
E05	Upward Vertical Stack	S05	Produced Water Tank	N/A	N/A	Total VOCs	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42
E06	Upward Vertical Stack	S06	Produced Water Tank	N/A	N/A	Total VOCs	0.76	0.17	0.76	0.17	Gas/Vapor	AP-42

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶
		ID No.	Source	ID No.	Device Type		lb/hr	ton/yr	lb/hr	ton/yr		
E07	Upward Vertical Stack	S07	Produced Water Tank	N/A	N/A	Total VOCs	0.76	0.17	0.76	0.17	Gas/Vapor	AP-42

The EMISSION SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSIONS SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

¹ Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

² List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases

³ Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

G70-A FUGITIVE EMISSIONS SUMMARY SHEET

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	--	--	--	--	--
Unpaved Haul Roads	PM	5.80	0.55	5.80	0.55	AP-42
	PM-10	1.48	0.14	1.48	0.14	
	PM-2.5	0.15	0.01	0.15	0.01	
Equipment Leaks	Total VOC CH ₄ CO ₂ e	0.01	0.05	0.01	0.05	40CFR98 Subpart W
		0.06	0.25	0.06	0.06	
		1.45	6.34	1.45	6.34	
Other	NA	NA	NA	NA	NA	NA

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.
² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
⁴ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; M = modeling; O = other (specify).

AFFIDAVIT OF PUBLICATION
BECKLEY NEWSPAPERS
BECKLEY, WEST VIRGINIA 25801

10/08/2015

STATE OF WEST VIRGINIA
COUNTY OF RALEIGH, to wit:

I, Tara Meyer, being duly sworn upon my oath, do depose and say that I am Legal Advertising Clerk for Beckley Newspapers, a corporation, publisher of the newspaper entitled The Register-Herald, an Independent newspaper; that I have been duly authorized by the board of directors of such corporation to execute this affidavit of publication; that such newspaper has been published for more than one year prior to publication of the annexed notice described below; that such newspaper is regularly published daily for at least fifty weeks during the calendar year, in the municipality of Beckley, Raleigh County, West Virginia: that such newspaper is a newspaper of "general circulation" as that term is defined in article three, chapter fifty-nine of the Code of West Virginia, 1931, as amended, within the publication area of areas of the aforesaid municipality and county; that such newspaper averages in length four or more pages, exclusive of any cover, per issue; that such newspaper is circulated to the general public at a definite price of consideration; that such newspaper is a newspaper to which the general public resorts for passing events of a political, religious, commercial and social nature, and for current happenings, announcements, miscellaneous reading matter, advertisements and other notices; that the annexed notice

of AIR QUALITY PERMIT NOTICE / NOTICE OF APPLICATION

(Description of notice)

was duly published in said newspaper once a week for 1 successive weeks (Class 1), commencing with the issue of 10/08/2015 and ending with the issue of 10/08/2015, that said annexed notice was published on the following dates: 10/08/2015, and that the cost of publishing said annexed notice as aforesaid was \$ 48.22

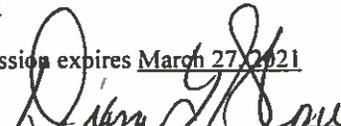
Signed

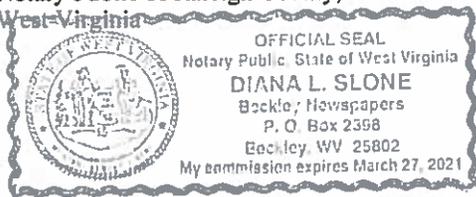


Tara Meyer
Legal Advertising Clerk
Beckley Newspapers

Taken, subscribed and sworn to before me in my said county this day:
10/08/2015

My commission expires March 27, 2021


Notary Public of Raleigh County,
West Virginia



COPY OF PUBLICATION

**AIR QUALITY
PERMIT NOTICE
Notice of
Application**

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Any questions regarding this permit application should be directed to the DAQ at (304) 928-0498, extension 1227, during normal business hours.

Dated this the 8th day of October, 2015.

By: Enervest Operating, LLC
James McKinney
Senior Vice President and General Manager
300 Capitol Street, Suite 200
Charleston, WV 25301
10-8-THU-1-RH; L 3527