



---

**west virginia** department of environmental protection

---

Division of Air Quality  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304  
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

## **ENGINEERING EVALUATION / FACT SHEET**

### BACKGROUND INFORMATION

Application No.: R13-3132  
Plant ID No.: 103-00074  
Applicant: Gastar Exploration USA, Inc.  
Facility Name: Yoho Pad  
Location: Wetzel County  
NAICS Code: 211111  
Application Type: Construction  
Received Date: October 1, 2013  
Engineer Assigned: Roy F. Kees, PE  
Fee Amount: \$2,000.00  
Date Received: October 4, 2013  
Complete Date: November 12, 2013  
Due Date: February 12, 2013  
Applicant Ad Date: October 2, 2013  
Newspaper: *The Wetzel Chronicle*  
UTM's: Easting: 514.882 km    Northing: 4383.341 km    Zone: 17  
Description: Application for a well pad located in Wetzel County consisting of one (1) condensate tank, one (1) produced water tank, one (1) gas production unit and one (1) vapor combustor.

### DESCRIPTION OF PROCESS

Gastar Exploration USA, Inc. drilled this well in 2009 and it was shut in. The well is now going to be placed into production. The well will produce natural gas, condensate, and produced water. There will be a gas production unit with a three-phase separator and a 0.75 mmBtu/hr heater. The natural gas will flow into a pipeline. Produced water and condensate will flow to two tanks for storage. Vapors from the tanks will flow to a vapor combustor for control. The condensate and produced water will be trucked from the property.

## SITE INSPECTION

A site inspection of the proposed facility was conducted by Doug Hammell of the enforcement section on October 8, 2013. The site is appropriate for the proposed facility. Closest residence and bldg. are ~600 ft away. Williams Ohio Valley Midstream has a compressor station located very close to the well site.

*From State Route 2 North, take a right onto State Route 7 at New Martinsville. Stay on State Route 7 until making a right onto State Route 20. Travel about 1.5 miles on State Route 20 and make a right onto Thomas Lane. The well pad is on the right side of the road.*

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Gastar included in Attachment N of the permit application air emissions calculations for the equipment at the Yoho natural gas production facility. The following will summarize the calculation methodologies used by Gastar to calculate the potential-to-emit (PTE) of the proposed equipment.

### Gas-Fired Line Heaters/Thermoelectric Generators

Criteria Pollutant emissions from the natural gas production unit heater (GPU) were based on the emission factors provided for natural gas combustion as given in AP-42 (AP-42 is a database of emission factors maintained by USEPA) Section 1.4. Emissions of Greenhouse Gases (GHGs) were based on Tables C-1 and C-2 of 40 CFR 98 - Federal GHG Reporting Rule.

Hourly emissions were based on the maximum design heat input (MDHI) of each unit and annual emissions were based on an annual operation of 8,760 hours. A heat content of the gas of 900 Btu/scf was used in the calculations.

### Storage Tanks

Working and breathing emissions from the 22,000 gallon condensate storage and 22,000 gallon produced water storage tanks were based on the TANKS 4.09d program as provided under AP-42, Section 7. Flashing emissions were calculated using the Vasquez-Beggs Gas/Oil Correlation Method, with is acceptable given the API Gravity of 56.7. Input and summary sheets for TANKS and Vasquez-Beggs were included in the permit application. An aggregate annual throughput of 536,500 gallons of condensate and produced water was used in the calculations for the storage tanks. These numbers are based on maximum historic data.

Fact Sheet R13-3132  
Gastar Exploration USA, Inc.  
Yoho Pad

## Truck Loading

Air emissions from condensate truck loading operations occur as fugitive emissions generated by displacement of vapors when loading trucks. The emission factor used to generate the VOC emissions is based on AP-42 Table 5.2-1. The equation used to generate the VOC emissions is based on AP-42 Table 5.2-1 with submerged fill loading (which the permit will require). Additionally, worst-case annual emissions were based on a maximum loading rate of 536,500 gal/year of condensate and produced water.

## Emissions Summary

Based on the above estimation methodology, which is determined to be appropriate, the PTE of the Yoho Pad natural gas production facility is given in the following table:

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
1E	GPU Burner 0.75 mmBtu/hr	Nitrogen Oxides	0.10	0.44
		Carbon Monoxide	0.08	0.37
		Volatile Organic Compounds	0.01	0.03
		Sulfur Dioxide	0.01	0.01
		Particulate Matter -10	0.01	0.04
		Total HAPs	<0.01	<0.01
		CO <sub>2</sub> e	-----	530
2E	Vapor Combustor (1C) Tanks TK1 & TK2	Nitrogen Oxides	0.20	0.87
		Carbon Monoxide	0.17	0.73
		Volatile Organic Compounds	0.85	3.73
		Sulfur Dioxide	0.01	0.01
		Particulate Matter -10	0.02	0.07
		Total HAPs	0.03	0.13
		CO <sub>2</sub> e	-----	483
3E&4E	Cond & P.W. Truck Loading	Volatile Organic Compounds	19.15	0.64
		Total HAPs	0.68	0.02

Facility Totals:

Fact Sheet R13-3132  
Gastar Exploration USA, Inc.  
Yoho Pad

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
Nitrogen Oxides	0.30	1.31
Carbon Monoxide	0.25	1.10
Volatile Organic Compounds	21.96	12.93
Sulfur Dioxide	0.02	0.02
Particulate Matter -10	1.86	0.19
Total HAPs	0.78	0.46
CO <sub>e</sub>	-----	1,131.96

### REGULATORY APPLICABILITY

The proposed Gastar natural gas production facility is subject to substantive requirements in the following state and federal air quality rules and regulations: 45CSR2, 45CSR6 and 45CSR13. Each applicable rule (and ones that have reasoned non-applicability), and Gastar's compliance therewith, will be discussed in detail below.

**45CSR2: *To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers***

The GPU Heater (GPU) has been determined to meet the definition of a "fuel burning unit" under 45CSR2 and are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the unit is less than 10 mmBtu/hr, it is not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the line heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the unit (and the use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

**45CSR6:        *To Prevent and Control Air Pollution from the Combustion of Refuse***

Gastar has one (1) vapor combustor at the facility. The vapor combustor is subject to section 4, emission standards for incinerators. The vapor combustor has an allowable emission rate of 0.11 pounds of particulate matter per hour (assuming a natural gas density of 0.044 lb/ft<sup>3</sup>). The vapor combustor has negligible amounts of particulate matter emissions per hour. Therefore, the facility's vapor combustor should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the vapor combustor and the hours of operation. The facility will also monitor the flame of the vapor combustors and record any malfunctions that may cause no flame to be present during operation.

**45CSR13:        *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation***

The construction of the Yoho Pad natural gas production facility has a potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY and, therefore, pursuant to §45-13-2.24, the facility is defined as a "stationary source" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, Gastar is required to obtain a permit under 45CSR13 for the construction and operation of the natural gas production facility.

As required under §45-13-8.3 ("Notice Level A"), Gastar placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on October 2, 2013 in *The Wetzel Chronicle* and the affidavit of publication for this legal advertisement was submitted on October 10, 2013.

**45CSR22        *Air Quality Management Fee Program***

The Yoho Facility is not subject to 45CSR30. The facility is subject to 40CFR60 Subpart OOOO, however they are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided they are not required to obtain a permit for a reason other than their status as an area source, therefore, the facility is not subject and will pay its annual fees through the Rule 22 program.

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

Subpart OOOO applies to facilities that commence construction, reconstruction, or modification after August 23, 2011 (October 15, 2012 for well completions). Since the Yoho Pad will begin operation after August 23, 2011 it is subject to the requirements of Subpart OOOO. The tanks at the Yoho Pad are controlled by a 98% efficient vapor combustor and do not have the potential to emit more than 6 tpy of VOC's, therefore, Gastar is not required by Subpart OOOO to reduce emissions by 95%. The site will also include pneumatic controllers that were ordered and installed after August 23, 2011. The continuous bleed controllers will be low-bleed, therefore meeting the applicable provisions of Subpart OOOO. The gas well at the Yoho pad will not be an affected facility subject to Subpart OOOO since the well was drilled in 2009 and will not be hydraulically fractured upon re-opening.

**Non Applicability Determinations**

**45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides**

Pursuant to the exemption given under §45-10-10.1, as the MDHI of the GPU Heater (GPU) is less than 10 mmBtu/hr, the units are not subject to the substantive sections of 45CSR10.

**45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.**

The facility-wide potential-to-emit of the Yoho natural gas production facility is below the levels that would define the source as "major" under 45CSR14 and, therefore, the construction evaluated herein is not subject to the provisions of 45CSR14.

## SOURCE AGGREGATION

“Building, structure, facility, or installation” is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

The Yoho Pad is located in Wetzel County and will be operated by Gastar, who is owner and operator. Several different entities are involved in the production, gathering, and transmission of gas. The Operators are the parties who drill and operate the wells. The Shippers are the owners of the gas who may or may not be the same entity as the Operator. There are also parties who own and operate the gathering system pipelines and compression station, called Gatherers. In addition, there are parties that own and operate the gas processing plants.

1. The Yoho Well Pad will operate under SIC code 1311(Crude Petroleum and Natural Gas). The downstream gas compressor station will operate under SIC code 1389 (Oil and Gas Field Services, Not Classified Elsewhere). Therefore, both share the same two-digit major SIC code of 13. Therefore, the two (2) facilities do belong to the same industrial grouping.
2. The Yoho Well Pad is operated by Gastar Exploration, Ltd. The midstream compressor station located adjacent to the Yoho wells is solely operated by Williams Ohio Valley Midstream. Therefore, the production wells that send natural gas to the Yoho Compressor Station are owned and operated by Gastar Exploration, Ltd. Williams has no ownership stake in any production well that may send natural gas to the Yoho Compressor Station. In addition, no work forces are shared between the two (2) companies. Futuristically, Williams will not have ownership or control of future wellhead activities. The producers are and will be responsible for any decisions to produce or shut-in wellhead facilities and no control over the equipment installed, owned, and operated by Williams. Therefore, these facilities are not under common control.
3. The Yoho Compressor Station is located in close proximity to the initial production well, which is only separated by an access road. The location for Gastar Yoho Well Pad was chosen because of suitable characteristics of construction. This includes relatively flat grade and accessibility for large trucks and equipment. There are no other Gastar facilities located within 0.5 miles of the Yoho Pad.

The Williams Compressor Station and Gastar wells share the same industrial grouping and are located on contiguous or adjacent properties. However, the two (2) facilities are not under common control.

Therefore, the emissions from these two (2) facilities should not be aggregated in determining major source or PSD status.

**40 CFR 60 Subpart Kb Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984**

Pursuant to §60.110d(4), 40 CFR 60, Subpart Kb does not apply to the following:

*(4) Vessels with a design capacity less than or equal to 1,589.874 m<sup>3</sup> used for petroleum or condensate stored, processed, or treated prior to custody transfer.*

The largest storage tanks located at the Yoho Pad are each 22,000 gallons, or 83.3 m<sup>3</sup>. Therefore, Subpart Kb does not apply to any of the storage tanks.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the Yoho natural gas production facility and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO<sub>x</sub>), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM<sub>10</sub>), Particulate Matter less than 2.5 microns (PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. Gastar included the following HAPs as emitted in substantive amounts in their emissions estimate: Benzene, n-Hexane, Toluene, and Trimethylpentane. The following table lists each HAP’s carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

## Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Xylene	VOC	No	Inadequate Data
Trimethylpentane	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at [www.epa.gov/iris](http://www.epa.gov/iris).

## AIR QUALITY IMPACT ANALYSIS

The estimated maximum emissions from the proposed Yoho natural gas production facility are less than applicability thresholds that would define the proposed facility as a “major stationary source” under 45CSR14 and, therefore, no air quality impacts modeling analysis was required. Additionally, based on the nature of the proposed construction, modeling was not required under 45CSR13, Section 7.

## MONITORING OF OPERATIONS

The following substantive monitoring, compliance demonstration, and record-keeping requirements (MRR) shall be required:

- For the purposes of demonstrating compliance with maximum limit for the aggregate production of condensate/liquids from the wells set forth in 4.1.3 of the draft permit, Gastar shall be required to monitor and record the monthly and

rolling twelve month total of condensate/liquids (in gallons) produced in the wells. Monitoring and recording the monthly and rolling twelve month total of condensate/liquids (in gallons) unloaded from the storage tanks can be used to show compliance with this requirement.

- For the purposes of demonstrating compliance with visible emissions limitations set forth in 4.1.2(d) of the draft permit, Gastar shall be required to:
  - (1) Conduct an initial Method 22 visual emission observation on the line heaters to determine the compliance with the visible emission provisions. Gastar shall be required to take a minimum of two (2) hours of visual emissions observations on the line heaters.
  - (2) Conduct monthly Method 22 visible emission observations of the line heater stack to ensure proper operation for a minimum of ten (10) minutes each month the line heaters are in operation.
  - (3) In the event visible emissions are observed in excess of the limitations given under 4.1.2(d) of the draft permit, Gastar shall be required to take immediate corrective action.
  
- Gastar shall be required to maintain records of all visual emission observations pursuant to the monitoring required under 4.2.2 of the draft permit including any corrective action taken.
  
- Gastar shall be required to report any deviation(s) from the allowable visible emission requirement for any emission source discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 to the Director of the Division of Air Quality as soon as practicable, but in any case within ten (10) calendar days of the occurrence and shall include at least the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

## PERFORMANCE TESTING OF OPERATIONS

The following substantive performance testing requirements shall be required:

- Within sixty (60) days of the issuance date of the draft permit, Gastar shall be required to perform, or have performed, an analysis to determine the constituent properties of the condensate (testing done previous to permit issuance deemed to be appropriate by the Director shall be accepted). The analysis shall, at a minimum, include the same components as the analysis used to calculate storage tank emissions in Permit Application R13-3132. Where applicable, if the analysis shows average constituent properties that, when used to calculate emissions in the same manner as submitted in Permit Application R13-3132, result in emissions that are greater than the levels that define a "modification" under 45CSR13, Gastar shall be required to, within thirty (30) days of receiving the results of the analysis, submit to the Director an appropriate permit application to increase emissions.

## RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-3132 for the construction of a natural gas production facility near New Martinsville, Wetzel County, be granted to Gastar Exploration USA, Inc.

---

Roy F. Kees, P.E.  
Engineer - NSR Permitting

---

Date

Fact Sheet R13-3132  
Gastar Exploration USA, Inc.  
Yoho Pad