



Williams Ohio Valley Midstream LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041
(304) 843-4559
(304) 843-3196 fax

December 22, 2015
(Via Federal Express)

Beverly McKeone
New Source Review Program Manager
Division of Air Quality
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304-2345

**Subject: Application for 45CSR13 NSR Construction Permit
Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
Moundsville, Marshall County, West Virginia**

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting one (1) original paper copy and two (2) CD-ROMs of an Application for 45CSR13 New Source Review (NSR) Construction Permit for the proposed Francis Compressor Station, to be located at the OVM Oak Grove Gas Plant; ~0.4 miles north of 5258 Fork Ridge Rd, ~3.7 miles southeast of Moundsville, in Marshall County, West Virginia.

This application for 45CSR13 NSR Construction Permit has been prepared and submitted to provide for the installation and operation of the following equipment and operations at the subject facility:

- ONE (1) 1,380 BHP CAT G3516B COMPRESSOR ENGINE W/ OXCAT CE-01/22E
- COMPRESSOR ROD PACKING AND ENGINE CRANKCASE LEAKS RPC-3/23E
- START/STOP/MAINTENANCE (INCLUDING BLOWDOWN) SSM-2/24E
- PIPING AND EQUIPMENT FUGITIVE EMISSIONS FUG-3/25E

With construction and operation of the Francis Compressor Station, the Oak Grove Gas Plant will continue to qualify as a Minor Source under the Prevention of Significant Deterioration (PSD) regulations and an Area Source for Hazardous Air Pollutants (HAP) under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations. Furthermore, the Oak Grove Gas Plant will remain subject to Title V Operating Permit regulations and the Francis Compressor Station will be incorporated into the Oak Grove Gas Plant Title V Operating Permit as requisite.

The Facility-Wide Emissions Summary (including the Oak Grove Gas Plant, Francis Compressor Station, and Independence Compressor Station) is shown below:

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)
 Application for 45CSR13 NSR Construction Permit

Facility-Wide Emissions Summary [Tons per Year]

Criteria Pollutants	Potential Emissions				Permit Thresholds		
	Francis	Oak Grove	Independence	TOTAL	WW-NSR	TVOP	PSD
Nitrogen Oxides (NOX)	6.66	121.26	---	127.93	10	100	250
Carbon Monoxide (CO)	3.89	192.57	---	196.47	10	100	250
Volatile Organic Compounds (VOC) - Point	26.71	69.94	1.00	97.64	na	na	250
Volatile Organic Compounds (VOC) - Fugitive	2.77	42.50	0.06	45.34	na	na	na
Volatile Organic Compounds (VOC) - TOTAL	29.48	112.44	1.06	142.98	10	100	na
Sulfur Dioxide (SO2)	0.03	0.76	---	0.79	10	100	250
Particulate Matter (PM10/2.5)	0.49	10.68	---	11.18	10	100	250
Hazardous Air Pollutants (HAP)	Potential Emissions (Including Fugitives)				Permit Thresholds		
	Francis	Oak Grove	Independence	TOTAL	WW-NSR	TVOP	PSD
Acetaldehyde	0.12	---	---	0.12	5.0	10	na
Acrolein	0.08	---	---	0.08	5.0	10	na
Benzene	0.05	1.86	0.06	1.97	0.5	10	na
Ethylbenzene	0.04	2.04	0.06	2.14	5.0	10	na
Formaldehyde	1.65	0.12	---	1.77	0.5	10	na
n-Hexane	0.35	3.70	0.06	4.11	5.0	10	na
Methanol	0.04	---	---	0.04	5.0	10	na
Toluene	0.05	1.96	0.06	2.06	5.0	10	na
2,2,4-TMP	0.04	2.10	0.06	2.20	5.0	10	na
Xylenes	0.04	2.05	0.06	2.15	5.0	10	na
Other HAP	0.01	0.01	---	0.02	5.0	10	na
Total HAP	2.47	13.84	0.35	16.66	5.0	25	na
Other Regulated Pollutants (Other than Criteria and HAP)	Potential Emissions (Including Fugitives)				Permit Thresholds		
	Francis	Oak Grove	Independence	TOTAL	WW-NSR	TVOP	PSD
Carbon Dioxide (CO ₂)	6,761	218,331	16	225,108	na	na	na
Methane (CH ₄)	79	416	292	787	na	na	na
Nitrous Oxide (N ₂ O)	0.01	69	---	69	na	na	na
CO ₂ equivalent (CO ₂ e)	8,744	249,163	7,327	265,234	na	100,000	na

If you have any questions concerning this submittal or need additional information, please contact me by telephone at (304) 843-4559 or by e-mail at Erika.Baldauff@Williams.com.

Sincerely,

Erika Baldauff
 Environmental Specialist

Enclosures:

- Application for NSR Construction Permit
- Attachments A through S
- Check for Application Fee

**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

For the:

Williams Ohio Valley Midstream LLC

FRANCIS COMPRESSOR STATION

(Located at the Existing OVM Oak Grove Gas Plant)

Marshall County, West Virginia

Submitted to:



WEST VIRGINIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

Submitted by:



Williams Ohio Valley Midstream LLC

100 Teletech Drive, Suite 2

Moundsville, WV 26041

Prepared by:



EcoLogic Environmental Consultants, LLC

864 Windsor Court

Santa Barbara, CA 93111

December 2015

**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
(Located at the Existing OVM Oak Grove Gas Plant)
Marshall County, West Virginia

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**APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
CONSTRUCTION PERMIT**

- **SECTION I. General**
 - **SECTION II. Additional Attachments and Supporting Documents**
 - **SECTION III. Certification of Information**
-

 <p>WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57th Street, SE Charleston, WV 25304 (304) 926-0475 www.dep.wv.gov/daq</p>	<p>APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)</p>
<p>PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):</p> <p><input checked="" type="checkbox"/> CONSTRUCTION <input type="checkbox"/> MODIFICATION <input type="checkbox"/> RELOCATION <input type="checkbox"/> CLASS I ADMINISTRATIVE UPDATE <input type="checkbox"/> TEMPORARY <input type="checkbox"/> CLASS II ADMINISTRATIVE UPDATE <input type="checkbox"/> AFTER-THE-FACT</p>	<p>PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):</p> <p><input type="checkbox"/> ADMINISTRATIVE AMENDMENT <input checked="" type="checkbox"/> MINOR MODIFICATION <input type="checkbox"/> SIGNIFICANT MODIFICATION</p> <p>IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION</p>
<p>FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.</p>	

Section I. General

<p>1. Name of applicant (as registered with the WV Secretary of State's Office): WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM)</p>	<p>2. Federal Employer ID No. (FEIN): 27-0856707</p>
<p>3. Name of facility (if different from above): FRANCIS COMPRESSOR STATION (FCS) (AT THE OAK GROVE GAS PLANT (OGGP))</p>	<p>4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH</p>
<p>5A. Applicant's mailing address: WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM) 100 TELETECH DR, STE 2 MOUNDSVILLE, WV 26041</p>	<p>5B. Facility's present physical address: ~0.4 MILES NORTH OF 5258 FORK RIDGE ROAD ~3.7 MILES SE OF MOUNDSVILLE MOUNDSVILLE, MARSHALL COUNTY, WV 26041</p>
<p>6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" 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 L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A.</p>	
<p>7. If applicant is a subsidiary corporation, please provide the name of parent corporation: THE WILLIAMS COMPANIES, INC.</p>	
<p>8. Does the applicant own, lease, have an option to buy, or otherwise have control of the <i>proposed site</i>? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, please explain: APPLICANT OWNS THE PROPERTY – If NO, you are not eligible for a permit for this source.</p>	
<p>9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): SIC CODE 1389 - OIL AND GAS FIELD SERVICES, N.E.C.</p>	<p>10. North American Industry Classification System (NAICS) code for the facility: 213112 - SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS</p>
<p>11A. DAQ Plant ID No. (existing facilities): FRANCIS COMPRESSOR STATION (FCS): TBD OAK GROVE GAS PLANT (OGGP): 0 5 1 - 0 0 1 5 7</p>	<p>11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities): OGGP: R13-3070 - ISSUED 07/12/13 OGGP: R13-3070A IS PENDING OGGP: TITLE V OPERATING PERMIT IS PENDING</p>

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

12A. Directions to the facility: – For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; – For Construction or Relocation permits , please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B . FROM LAFAYETTE AVE IN MOUNDSVILLE: A. HEAD EAST ONTO 12TH ST ~1.1 MI; B. CONTINUE ONTO FORK RIDGE RD ~5.4 MI; C. ENTRANCE TO SITE IS ON THE LEFT		
12.B. New site address (if applicable): NA	12C. Nearest city or town: MOUNDSVILLE	12D. County: MARSHALL
12.E. UTM Northing (KM): 4,413.806 KM NORTHING	12F. UTM Easting (KM): 526.243 KM EASTING	12G. UTM Zone: 17S
13. Briefly describe the proposed change(s) at the facility: THIS APPLICATION IS PREPARED AND SUBMITTED TO PROVIDE FOR THE INSTALLATION AND OPERATION OF THE FOLLOWING EQUIPMENT AND OPERATIONS AT THE PROPOSED FRANCIS COMPRESSOR STATION: <ul style="list-style-type: none"> • ONE (1) 1,380 BHP CAT G3516B COMPRESSOR ENGINE W/ OXCAT CE-01/22E • COMPRESSOR ROD PACKING AND ENGINE CRANKCASE LEAKS RPC-3/23E • START/STOP/MAINTENANCE (INCLUDING BLOWDOWN) SSM-2/24E • PIPING AND EQUIPMENT FUGITIVE EMISSIONS FUG-3/25E 		
14A. Provide the date of anticipated installation or change: APPROXIMATELY APRIL 1, 2016, OR AS SOON AS PERMIT IS ISSUED – If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: NA		14B. Date of anticipated Start-Up if a permit is granted: APPROXIMATELY APRIL 1, 2016, OR AS SOON AS PERMIT IS ISSUED
14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).		
15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day: 24 Days Per Week: 7 Weeks Per Year: 52		
16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
17. Risk Management Plans. If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your Risk Management Plan (RMP) to U.S. EPA Region III.		
18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D .		

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).
20. Include a Table of Contents as the first page of your application package.
21. Provide a Plot Plan , e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance). – Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).
22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F .
23. Provide a Process Description as Attachment G . – Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.
 – For chemical processes, provide a MSDS for each compound emitted to the air.

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

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

<input type="checkbox"/> Bulk Liquid Transfer	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger	

General Emission Unit, specify:

- **COMPRESSOR ENGINE EMISSIONS – 1,380 BHP CAT G3516B (CE-01/22E)**
- **PIPING AND EQUIPMENT FUGITIVES (FUG-3/25E)**

Fill out and provide the Emissions Unit Data Sheet(s) as **Attachment L**.

29. **Check all applicable Air Pollution Control Device Sheets** listed below:

<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System

Other Collectors, specify:

- **OXIDATION CATALYST (1-OXCAT) (FOR COMPRESSOR ENGINE (CE-01/22E))**

Fill out and provide the Air Pollution Control Device Sheet(s) as **Attachment M**.

30. **Provide all Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.

➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a Class I Legal Advertisement in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and *Example Legal Advertisement* for details). Please submit the Affidavit of Publication as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

YES NO

➤ **If YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "Precautionary Notice – Claims of Confidentiality" guidance found in the *General Instructions* as **Attachment Q**.

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable Authority Form below: **NA**

<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership

Submit completed and signed Authority Form as Attachment R.

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE: Paul Hunter (Please use blue ink) DATE: 12-17-15 (Please use blue ink)

35B. Printed name of signee: PAUL V. HUNTER	35C. Title: GENERAL MANAGER OHIO RIVER SUPPLY HUB	
35D. E-mail: PAULV.HUNTER@WILLIAMS.COM	36E. Phone: (412) 787-5561	36F. FAX: (412) 787-6002
36A. Printed name of contact person: ERIKA BALDAUFF	36B. Title: ENVIRONMENTAL SPECIALIST	
36C. E-mail: ERIKA.BALDAUFF@WILLIAMS.COM	36D. Phone: (304) 843-4559	36E. FAX: (304) 843-3196

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

ATTACHMENT A

Business Certificate

“6. **West Virginia Business Registration.** Provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A.”

- **Certificate of Amendment to the Certificate of Authority**
 - From: CAIMAN EASTERN MIDSTREAM, LLC
 - To: WILLIAMS OHIO VALLEY MIDSTREAM LLC
 - Date: May 15, 2012

 - **Certificate of Authority of a Foreign Limited Liability Company**
 - To: CAIMAN EASTERN MIDSTREAM, LLC
 - Date: September 11, 2009
-

State of West Virginia



Certificate

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

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

CAIMAN EASTERN MIDSTREAM, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

WILLIAMS OHIO VALLEY MIDSTREAM LLC

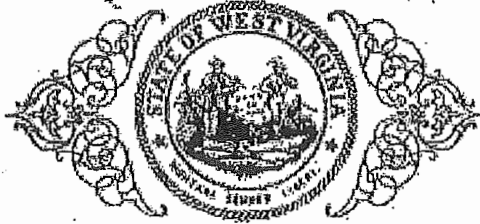


*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
May 15, 2012*

Natalie E. Tennant

Secretary of State

State of West Virginia



Certificate

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

CAIMAN EASTERN MIDSTREAM, LLC

Control Number: 99GIS

a limited liability company, organized under the laws of the State of Texas has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of September 11, 2009, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

to the limited liability company authorizing it to transact business in West Virginia

*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
September 11, 2009*



Natalie E. Tennant

Secretary of State

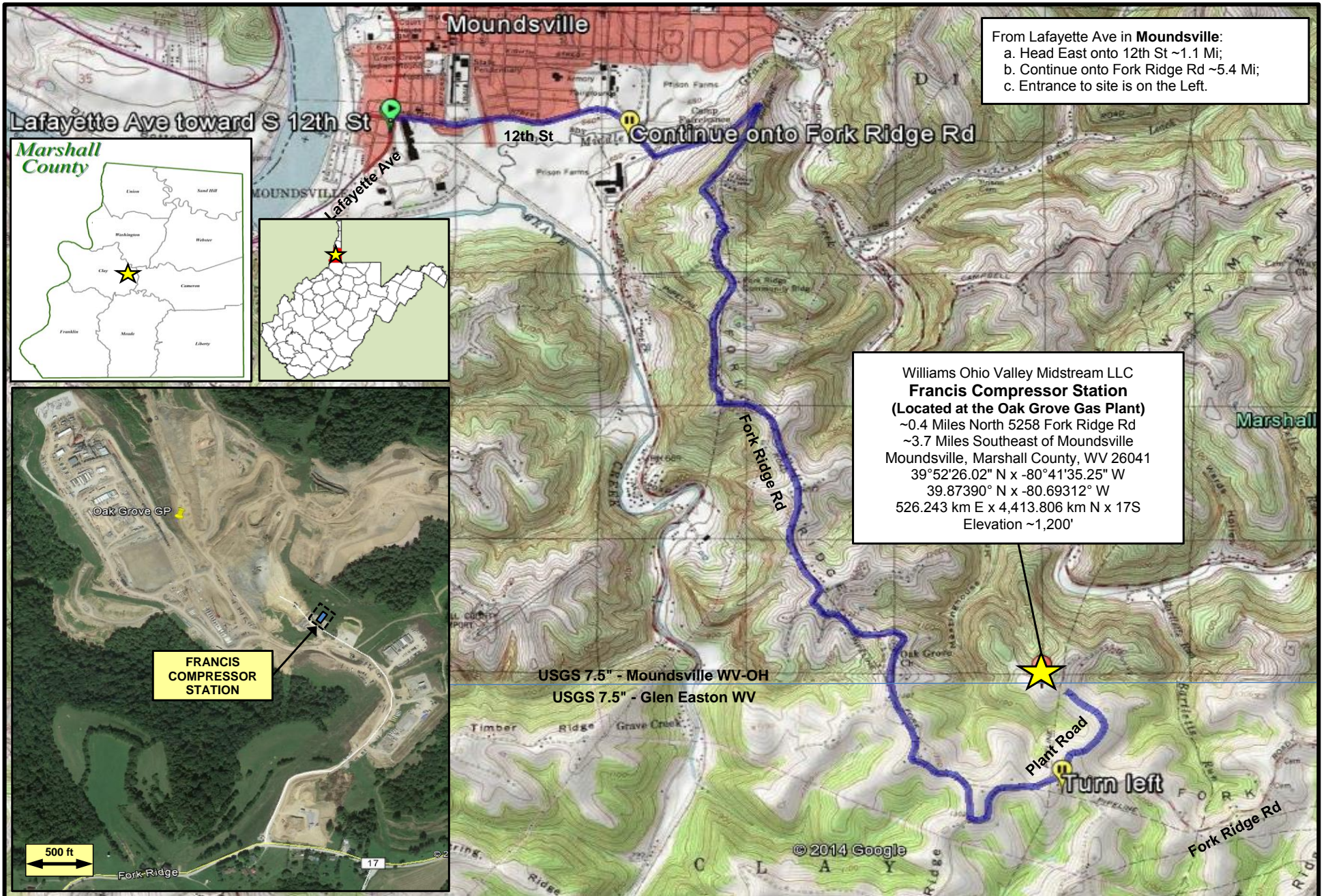
ATTACHMENT B

Map(s)

“12A. For **Modifications, Administrative Updates** or **Temporary** permits at an existing facility, please provide directions to the present location of the facility from the nearest state road. Include a MAP as Attachment B.”

- **Location:**
Oak Grove Gas Plant
~0.4 Miles North of 5258 Fork Ridge Rd
~3.7 Miles Southeast of Moundsville
Moundsville, Marshall County, WV 26041
 - **Latitude and Longitude:**
39°52'26.03" North x -80°41'35.24" West
39.8738° North x -80.6931° West
 - **UTM:**
526.243 km East x 4,413.806 km North x 17S
 - **Elevation:**
~1,200'
 - **Directions:**
From Lafayette Ave in Moundsville:
 - a. Head East onto 12th St ~1.1 Mi;
 - b. Continue onto Fork Ridge Rd ~5.4 Mi;
 - c. Entrance to site is on the left.
 - **USGS:**
7.5" Topographic – Moundsville WV-OH – 1997
7.5" Topographic – Glen Easton WV – 1960
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 (Located at the Oak Grove Gas Plant)
 Application for 45CSR13 NSR Construction Permit
Attachment B - Maps
LOCATION (TOPO) MAP



ATTACHMENT C
Installation and Start-Up Schedule

“14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as Attachment C.”

The OVM Francis Compressor Station is a new facility to be constructed and operated at the existing OVM Oak Grove Gas Plant. Startup of the facility is anticipated to occur on April 1, 2016, or as soon as the permit is issued.

ATTACHMENT D

Regulatory Discussion

“18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (if known). Discuss applicability and proposed demonstration(s) of compliance (if known). Provide this information as Attachment D.”

- **Regulatory Discussion**
 - A. Applicability of New Source Review (NSR) Regulations
 - B. Applicability of Federal Regulations
 - C. Applicability of Source Aggregation
 - D. Applicability of State Regulations
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
Application for 45CSR13 NSR Construction Permit

Attachment D
REGULATORY DISCUSSION

A. Applicability of New Source Review (NSR) Regulations

The following New Source Review (NSR) regulations are potentially applicable to natural gas compressor stations. Applicability to the Francis Compressor Station (FCS), located at the Oak Grove Gas Plant (OGGP), has been determined as follows:

1. Prevention of Significant Deterioration (PSD) [Not Applicable]

This rule does not apply to the FCS or to the OGGP because the total PTE for the entire facility qualifies as a “PSD Minor Source” for each regulated pollutant; as follows:

- NO_x: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- VOC: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- SO₂: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- PM_{10/2.5}: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy

2. Non-Attainment New Source Review (NNSR) [Not Applicable]

This rule does not apply to the FCS or to the OGGP. The operations are in Marshall County which is designated as Non-Attainment for Sulfur Dioxide (SO₂) and as Attainment/Unclassified/Maintenance for all other criteria pollutants. (As of 10/01/15, see - <http://www3.epa.gov/airquality/greenbook/ancl.html>.) The entire facility qualifies as an “NNSR Minor Source” as follows:

- SO₂: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy

3. Major Source of Hazardous Air Pollutants (HAPs) [Not Applicable]

This rule does not apply to the FCS or to the OGGP because the entire facility qualifies as a “HAP Area Source” as follows:

- Each HAP: HAP Area Source with Controlled Individual HAP PTE < 10 tpy
- Total HAPs: HAP Area Source with Controlled Total of All HAPs PTE < 25 tpy

4. Title V Operating Permit (TVOP) [Applicable]

This rule does apply. The application for the FCS operations is both an application for NSR permit and Title V Operating Permit revision to OGGP.

B. Applicability of Federal Regulations

The following federal regulations are potentially applicable to natural gas compressor stations. Applicability to the Francis Compressor Station (FCS), located at the Oak Grove Gas Plant (OGGP), has been determined as follows:

1. **NSPS A, General Provisions**

40CFR§60.1-§60.19

[Applicable]

This rule does apply to all sources subject to an NSPS (unless a specific provision is excluded within the source NSPS). Requirements include notification (§60.7); monitoring (§60.7); recordkeeping (§60.11); and reporting (§60.18).

2. **NSPS A, Control Devices - Flares**

40CFR§60.18(b)

[Not Applicable]

This rule does not apply because there is no flare at the FCS.

3. **NSPS D (also Da, Db, and Dc), Steam Generating Units**

40CFR§60.40-§60.48

[Not Applicable]

These rules do not apply because there is no boiler (or heater) at the FCS.

4. **NSPS K (also Ka and Kb), Volatile Organic Liquid Storage Vessels**

40CFR§60.40-§60.48

[Not Applicable]

This rule does not apply because there is no tank with capacity ≥ 75 m³ (471.7 bbl or 19,813 gal) that is used to store volatile organic liquids (VOL) at the FCS (§60.110(a)).

5. **NSPS GG, Stationary Gas Turbines**

40CFR§60.330-§60.335

[Not Applicable]

This rule does not apply because there is no stationary gas turbine at the FCS (§60.330).

6. **NSPS KKK, Leaks from Natural Gas Processing Plants**

40CFR§60.630-§60.636

[Not Applicable]

This rule does not apply because the FCS, while located at the Oak Grove Gas Plant, commenced construction after 08/23/11 (§60.630(b)). (See NSPS OOOO.)

7. **NSPS LLL, Onshore Natural Gas Processing: SO₂ Emissions**

40CFR§60.640-§60.648

[Not Applicable]

This rule does not apply because there is no gas sweetening operation at the FCS (§60.640(a)).

8. **NSPS IIII, Compression Ignition Reciprocating Internal Combustion Engines**

40CFR§60.4200-§60.4219

[Not Applicable]

This rule does not apply because there is no stationary compression ignition engine at the FCS (§60.4200(a)).

9. NSPS JJJJ, Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)

40CFR§60.4230-§60.4248

[Applicable]

This rule does apply to the 1,380 bhp Caterpillar G3516B compressor engine (CE-01/22E) because the maximum engine power is greater than 500 HP and the engine was manufactured on or after 07/01/07 (§60.4230(a)(4)(i)).

Requirements include NO_x, CO and VOC emission limits (§60.4233(e-f)); operating limits (§60.4243); performance testing (§60.4244); and notification and recordkeeping (§60.4245).

10. NSPS KKKK, Stationary Combustion Turbines

40CFR§60.4300-§60.4420

[Not Applicable]

This rule does not apply because there is no stationary combustion turbine at the FCS (§60.4300).

11. NSPS OOOO, Crude Oil and Natural Gas Production

40CFR§60.5360-§60.5430

[Applicable]

This rule does apply to the reciprocating compressor driven by the CAT G3516B engine (CE-01/22E) because the FCS is located within the natural gas production segment and the compressor commenced construction after 08/23/11 (§60.5360 and §60.5365(c)).

Requirements include replacing rod packing systems on a specified schedule (§60.5385(a)) and notification, monitoring, recordkeeping and reporting (§60.5410(c), §60.5415(c), §60.5420(b)(1) and §60.5420(b)(4)).

This rule does apply to continuous bleed natural gas-driven pneumatic controllers because the FCS is aggregated with the OGGP.

Requirements include utilizing compressed air or having a natural gas bleed rate of zero (§60.5390).

This rule does apply to sources of fugitive emissions because the FCS is aggregated with the OGGP.

Requirements include monitoring and repair of valves, flanges, connectors, pumps, pressure relief devices and open-ended valves or lines. The equipment leak standards are specified in §60.5400. Also subject to the notification, recordkeeping, and reporting as specified in §60.5420.

12. NESHAP Part 61 - Designated Source Standards

40CFR§61.01-§61.359

[Not Applicable]

This rule does not apply because the FCS is not a NESHAP Designated Facility (or Source).

13. NESHAP A (Part 63 (aka, MACT)) - General Provisions

40CFR§63.1§63.16

[Not Applicable]

This rule does not apply because the FCS is not subject to any requirements of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) or associated Maximum Achievable Control Technology (MACT) requirements (§63.1(a)).

(Note: The Compressor Engine (CE-01/22E) complies with NESHAP ZZZZ by compliance with NSPS JJJJ (§63.6590(a)(2)(iii)), no other requirements apply.)

14. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779

[Not Applicable]

This rule does not apply because there is no triethylene glycol dehydrator at the FCS (§63.760(b)(2)).

This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the FCS and the OGGP are an area source of HAP emissions (§63.760(b)(2)). In no case does this rule apply to engines or turbines.

15. NESHAP HHH, Natural Gas Transmission and Storage Facilities

40CFR§63.1270-§63.1289

[Not Applicable]

This rule does not apply because the FCS and the OGGP are not a natural gas transmission or storage facility transporting or storing natural gas prior to local distribution (§63.1270(a)).

16. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175

[Not Applicable]

This rule does not apply because there is no stationary gas turbine at the FCS (§63.6080).

17. NESHAP ZZZZ, Stationary Reciprocating Internal Combustion Engines (RICE)

40CFR§63.6580-§63.6675

[Applicable]

This rule does apply to the 1,380 bhp CAT G3516B Compressor Engine (CE-01/22E). It is "new"; i.e., commenced construction or reconstruction on or after 06/12/06 (§63.6590(a)(2)(iii)) so the only requirement is compliance with §60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines.

18. NESHAP DDDDD, Industrial, Commercial, and Institutional Boilers and Process Heaters – Major Sources

40CFR§63.7480 – §63.7575

[Not Applicable]

This rule does not apply because there is no boiler or heater at the FCS (§63.7485).

19. NESHAP JJJJJJ, Industrial, Commercial, and Institutional Boilers and Process Heaters – Area Sources

40CFR§63.11193 – §63.11237

[Not Applicable]

This rule does not apply because there is no boiler or heater at the FCS (§63.11193).

20. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220

[Not Applicable]

This rule does not apply because the FCS does not store more than a threshold quantity of a regulated substance in a process (§68.115).

21. Compliance Assurance Monitoring (CAM)

40CFR§64.1-§64.10

[Not Applicable]

This rule does not apply because there are no pollutant-specific emission units subject to an emissions limitation or standard (e.g., NSPS, NESHAP, HAP, NSR, PSD, SIP) with pre-controlled emissions greater than Title V major source thresholds, that requires an add-on control device to achieve compliance (§64.2(a)(2)).

22. Mandatory Greenhouse Gases (GHG) Reporting

40CFR§98.1-§98.9

[Potentially Applicable]

This rule does apply because the FCS has been aggregated with the OGGP and the combined operations is a listed source category and the combined heat input capacity of the stationary fuel combustion units is ≥ 30 MMBtu/hr (§98.2(a)).

C. Applicability of Source Aggregation

For New Source Review (NSR) and Title V permitting, the three-part regulatory criteria to determine whether emissions from two or more facilities should be aggregated and treated as a single source is whether the activities:

- i) Belong to the same industrial grouping; and
- ii) Are located on one or more contiguous or adjacent properties; and
- iii) Are under control of the same person (or persons under common control).

i) Same Industrial Grouping

The subject facility shares the same two-digit major SIC code of 13 as the upstream gas production wells and other Williams' facilities.

ii) Contiguous or Adjacent

The determination of whether two or more facilities are "contiguous" or "adjacent" is made on a case-by-case basis. This determination is proximity based, and it is important to focus on this criterion and whether two contiguous or adjacent facilities, considered as a single source, meet the common sense notion of a plant. The functional interrelationship of the two or more facilities is not a relevant inquiry in determining whether the facilities are "contiguous" or "adjacent."

Neither West Virginia nor federal regulations define the terms “contiguous” or “adjacent.” It is clear, however, that the determination of whether two or more facilities are “contiguous” or “adjacent” is based on the plain meaning of the terms “adjacent” and “contiguous”, which consider the physical distance between the facilities. The term contiguous is defined in the dictionary as being in actual contact; touching along a boundary or at a point. The term adjacent” is defined in the dictionary as not distant, nearby, having a common endpoint or border.

The closest Williams-owned facility to the subject facility is the Oak Grove Gas Plant (OGGP) located next to Francis Compressor Station. The Oak Grove Gas Plant meets the common sense definition of being “contiguous” with or “adjacent” to the subject facility. There are no other Williams owned facilities (other than OGGP) located within ½ mile of Francis Compressor Station.

The subject facility compresses gas produced from upstream production wells located in northern West Virginia. The subject facility is located at the Oak Grove Gas Plant owned and operated by Williams Ohio Valley Midstream LLC.

The location of the subject facility was chosen because of suitable characteristics for construction and operation, such as the availability of a reasonably flat grade and accessibility for large trucks and equipment. Williams’ business model is to construct scalable capacity that contemplates additional production from multiple operators and the initial configuration is merely a foundation for additional opportunities in the area. The subject facility does not need to be located in the immediate vicinity of the upstream wells in order to operate properly. Had suitable land been available elsewhere, the subject facility could have been located farther from the upstream wells and could theoretically be moved farther from the wells without affecting operations. Therefore, despite the fact that the subject facility is located in close proximity to one or many upstream production sources, aggregation of the subject facility with upstream wells does not meet the common sense notion of a plant.

iii) Common Control

Williams OVM operates under its parent company The Williams Companies, Inc. (Williams) and is the sole operator of the subject facility. The closest Williams-operated facility to the subject facility is the Oak Grove Gas Plant, located next to Francis Compressor Station. The OGGP is “contiguous” with or “adjacent” to the subject facility.

The production wells that send natural gas to the subject facility are owned and operated by other companies, which are unaffiliated with Williams. Williams has no ownership stake in any production well or company in West Virginia that may send natural gas to the subject facility.

Furthermore, neither Williams OVM, nor Williams, exercise operational control over any equipment owned or operated by any natural gas producer upstream of the subject facility. All employees at the subject facility are under the exclusive direction of Williams and are not under the control of any other entity. Similarly, Williams has no authority over employees of the production wells. These companies operate wholly independent of one another. No

employees are expected to shuttle back and forth between the subject facility and any production well.

At this time, contracts are in place for the subject facility to compress natural gas produced from multiple upstream production wells located throughout the region. As future commercial opportunities are identified, the subject facility will potentially receive gas from other producers. Williams will not have ownership or control of any future wellhead facilities. The producers are, and will be responsible for, any decisions to produce or shut-in wellhead facilities and have no control over the equipment installed, owned, and operated by Williams. Similarly, Williams cannot control the installation or operation of any equipment located at a well site that may be considered an air contamination source.

For the reason above, it is clear that Williams does not have common control of any upstream production wells.

Summary

The subject facility and the upstream production wells should not be aggregated and treated as a single source of emissions because the subject facility is not under common control with any of the upstream wells. Additionally, the subject facility and the upstream production wells, considered together, do not meet the common sense notion of a plant because the subject facility is expected to service multiple production wells and because the location of the facility was selected for reasons unrelated to the location of the production wells. Accordingly, the subject facility should not be aggregated with the upstream wells in determining major source or PSD status

However, as the Francis Compressor Station is considered “contiguous” or “adjacent” to the Oak Grove Gas Plant, and both facilities are owned and operated by Williams, these two facilities should be aggregated together for determining major source status.

D. Applicability of State Regulations

The following state regulations are potentially applicable to natural gas compressor stations. Applicability to the Francis Compressor Station (FCS), located at the Oak Grove Gas Plant (OGGP), has been determined as follows:

1. Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45CSR2

[Not Applicable]

This rule does not apply because there is no indirect heat exchanger at the FCS.

2. Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors

45CSR4

[Applicable]

This rule does apply and states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

- 3. Control of Air Pollution from Combustion of Refuse**
45CSR6 [Not Applicable]
This rule does not apply because there is no refuse combustion performed at the FCS.
- 4. Prevent and Control Air Pollution from the Emission of Sulfur Oxides**
45CSR10 [Not Applicable]
This rule does not apply because there is no “fuel burning unit” at the FCS.
- 5. 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**
45CSR13 [Applicable]
This rule does apply. Williams OVM is applying for a 45CSR13 New Source Review Construction Permit and has published the required Class I legal advertisement notifying the public of this application and paid the appropriate application fee.
- 6. Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants for Prevention of Significant Deterioration**
45CSR14 [Not Applicable]
The rule does not apply because the FCS is neither a new PSD major source of pollutants nor is the proposed facility a modification to an existing PSD major source.
- 7. Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**
45CSR16 [Applicable]
The rule does apply to this source by reference to §40CFR60 Subparts JJJJ and OOOO. The FCS is subject to the notification, testing, monitoring, recordkeeping and reporting requirements of these Subparts.
- 8. Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment**
45CSR19 [Not Applicable]
This rule does not apply. The FCS location is designated as either “Maintenance” or “Attainment/Unclassified” for all criteria pollutants, except for sulfur dioxide. The plant-wide potential-to-emit (PTE) sulfur dioxide is less than applicable thresholds.
- 9. Regulation of Volatile Organic Compounds (VOC)**
45CSR21 [Not Applicable]
This rule does not apply because the FCS is not located in Putnam County, Kanawha County, Cabell County, Wayne County, or Wood County
- 10. Air Quality Management Fees Program**
45CSR22 [Applicable]
This rule does apply. It establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution.

11. Prevent and Control Emissions of Toxic Air Pollutants

45CSR27

[Not Applicable]

This rule does not apply because equipment used in the production and distribution of petroleum products is exempt, provided that the product contains no more than 5% benzene by weight (§45-22-2.4).

12. Air Pollution Emissions Banking and Trading

45CSR28

[Not Applicable]

This rule does not apply. Williams Ohio Valley Midstream LLC does not choose to participate in the voluntarily statewide air pollutant emissions trading program.

13. Emission Statements for VOC and NOX

45CSR29

[Not Applicable]

This rule does not apply because FCS is not located in Putnam, Kanawha, Cabell, Wayne, Wood, or Greenbrier Counties (§45-29-1).

14. Requirements for Operating Permits

45CSR30

[Applicable]

This rule does apply. The application for the FCS operations is both an application for NSR permit and Title V Operating Permit revision to OGGP (§45-30-4.1.a.2).

15. Emission Standards for Hazardous Air Pollutants (HAP)

45CSR34

[Not Applicable]

This rule does not apply because the FCS is not subject to any requirements of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) or associated Maximum Achievable Control Technology (MACT) requirements (§63.1(a)).

ATTACHMENT E

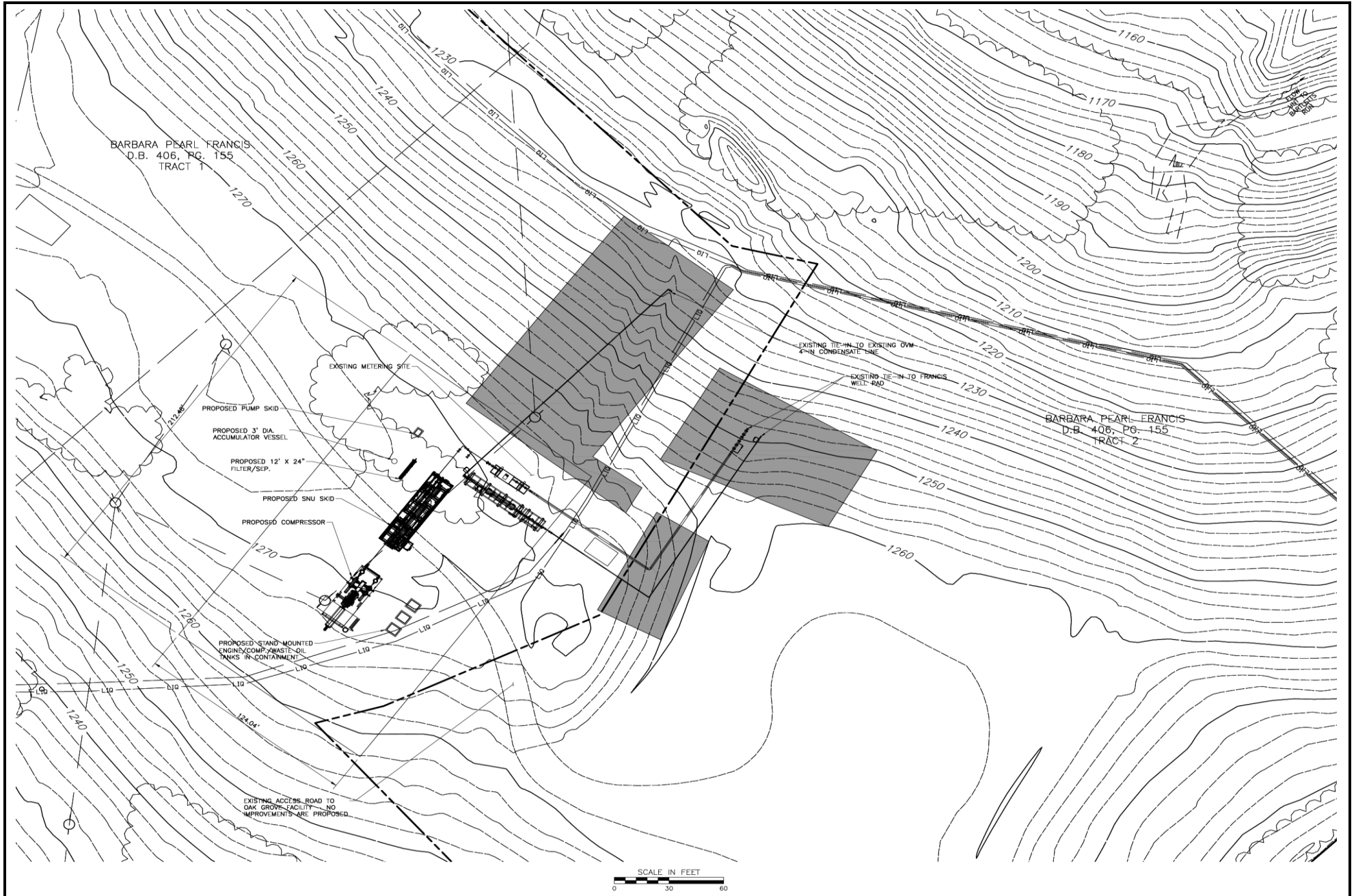
Plot Plan

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

- Plot Plan – Francis Compressor Station
 - Plot Plan – Oak Grove Gas Plant
-

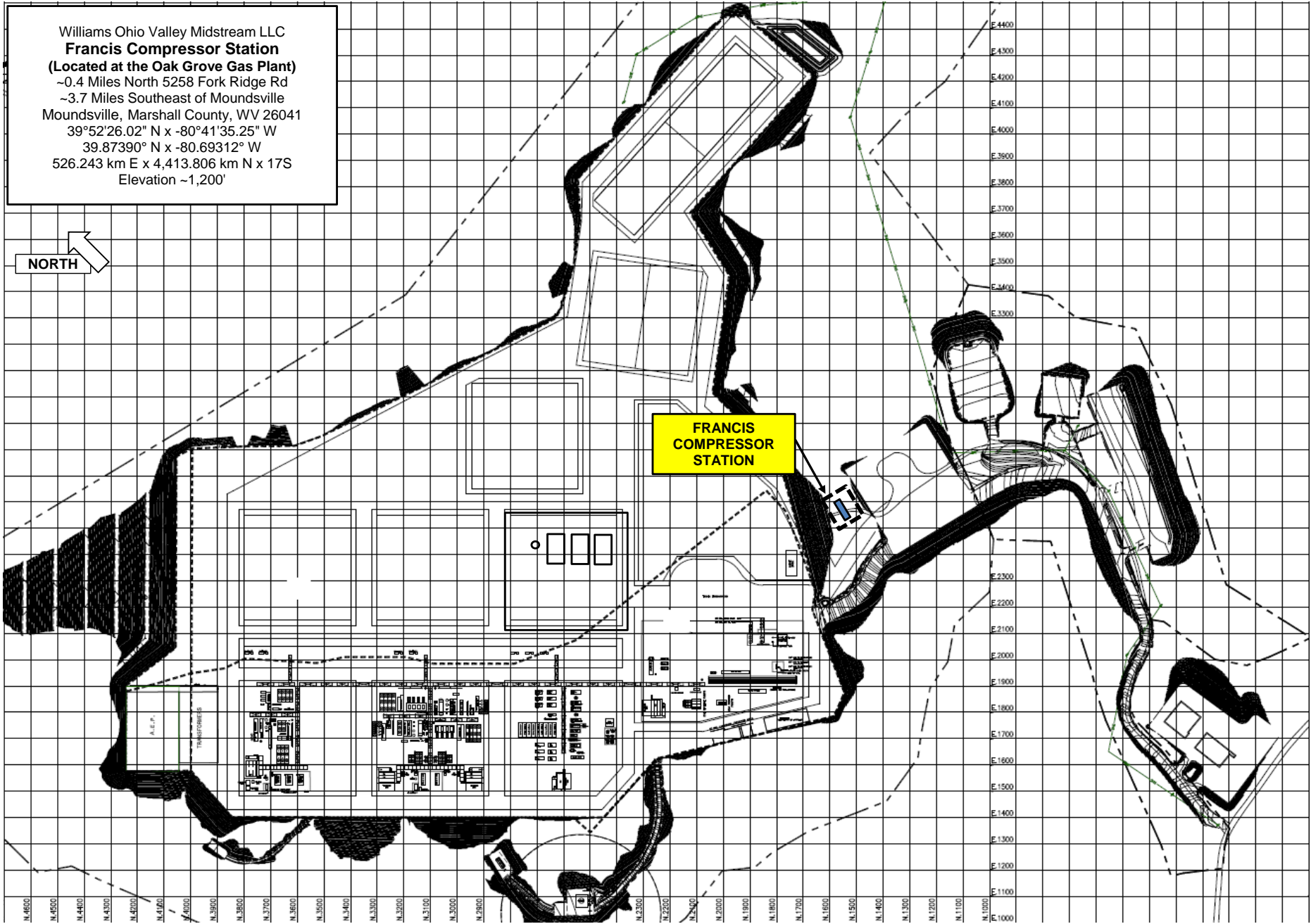
Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
(Located at the Oak Grove Gas Plant)
Application for 45CSR13 NSR Construction Permit
Attachment E - Plot Plan

FRANCIS COMPRESSOR STATION - PLOT PLAN



Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
(Located at the Oak Grove Gas Plant)
Application for 45CSR13 NSR Construction Permit
Attachment E - Plot Plan

OAK GROVE GAS PLANT - PLOT PLAN



Williams Ohio Valley Midstream LLC
Francis Compressor Station
(Located at the Oak Grove Gas Plant)
~0.4 Miles North 5258 Fork Ridge Rd
~3.7 Miles Southeast of Moundsville
Moundsville, Marshall County, WV 26041
39°52'26.02" N x -80°41'35.25" W
39.87390° N x -80.69312° W
526.243 km E x 4,413.806 km N x 17S
Elevation ~1,200'

NORTH

ATTACHMENT F
Detailed Process Flow Diagram(s) (PFD)

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

- Process Flow Diagram (PFD) – Francis Compressor Station
-

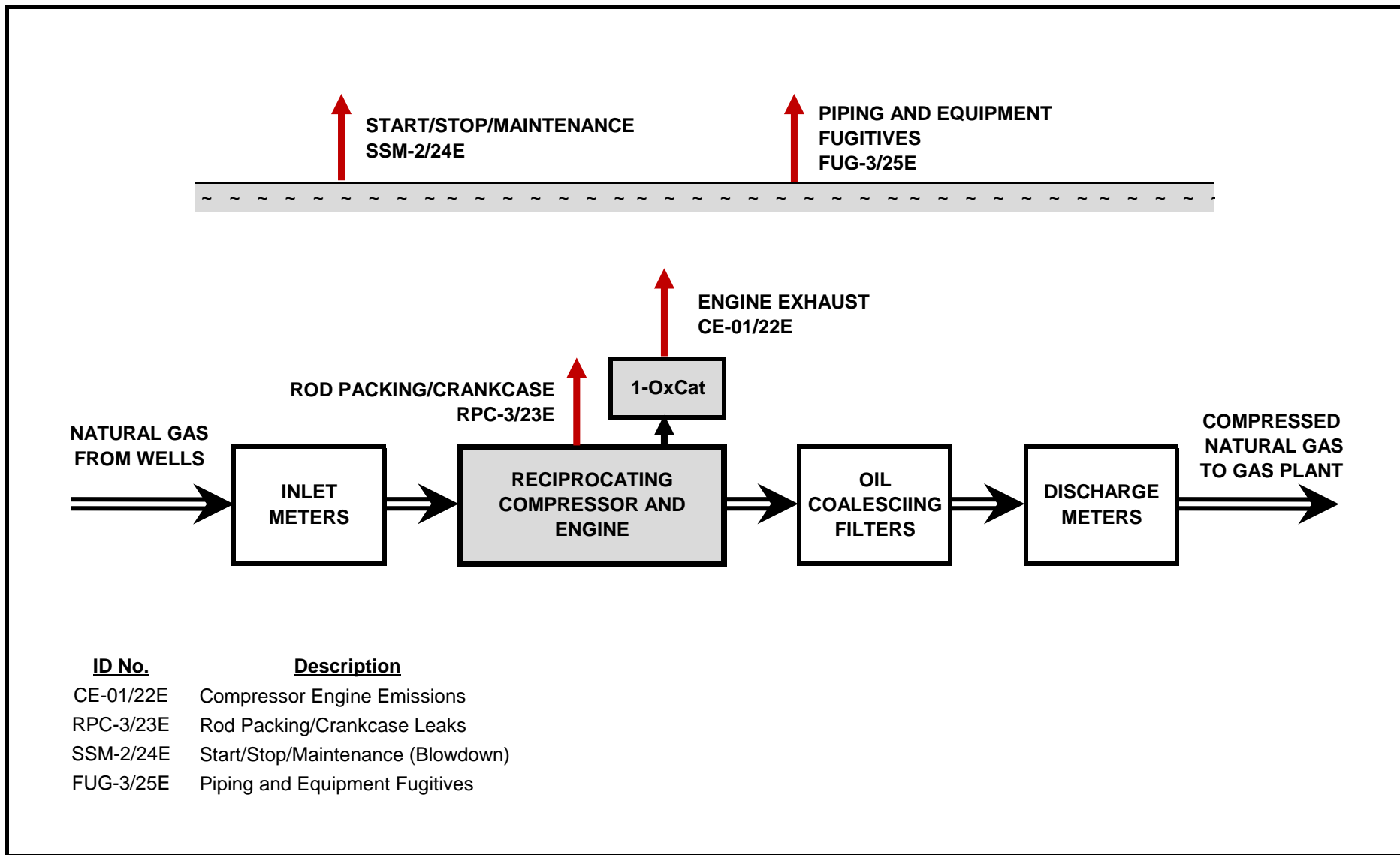
Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION

(Located at the Oak Grove Gas Plant)

Application for 45CSR13 NSR Construction Permit

Attachment F - Process Flow Diagram

PROCESS FLOW DIAGRAM (PFD)



ATTACHMENT G

Process Description

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

- **Process Description**
 - A. Project Overview
 - B. Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)
 - C. Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)
 - D. Start/Stop/Maintenance (Including Blowdown) (SSM-2/24E)
 - E. Piping and Equipment Fugitives (FUG-3/25E)
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
Application for 45CSR13 Construction Permit

Attachment G
PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC proposes to construct and operate the Francis Compressor Station at the inlet of the existing Oak Grove Gas Plant, 5258 Fork Ridge Rd, in Moundsville, Marshall County, WV (See Appendix B – Site Location Map).

B. Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)

One (1) natural gas-fueled CAT G3516B compressor engine is proposed at the facility. This will be a new, four stroke, lean burn (4SLB) engine w/ an oxidation catalyst (OxCat).

C. Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)

The compressor and engine operations result in emissions from the wear of mechanical joints, seals, and rotating surfaces over time.

D. Start/Stop/Maintenance (Including Blowdown) (SSM-2/24E)

During routine operation the compressor engine will undergo periods of startup and shutdown. Often when the engine is shutdown, the natural gas contained within the compressor and associated piping is vented to the atmosphere. Additionally, there will be other infrequent and (often) de-minimis emissions from various maintenance activities at the facility that are not necessarily associated with compressor blowdowns.

E. Piping and Equipment Fugitives (FUG-3/25E)

Piping and process equipment generate leaks from different component types (connectors, valves, pumps, etc.)

ATTACHMENT H
Material Safety Data Sheets (MSDS)
(And Representative Gas Analysis)

“24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as Attachment H. For chemical processes, provide a MSDS for each compound emitted to the air.”

- **NATURAL GAS**
 - Representative Inlet Gas Analysis – Design Basis
 - Gas Analysis Summary – Design Basis

 - **MATERIAL SAFETY DATA SHEETS (MSDS):**
 - Wellhead Natural Gas
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment H - MSDS (etc.)

Representative Inlet Gas Analysis - Design Basis

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C₁₁₊

AB Resources, LLC
 Cavenney No. 1-H

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

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

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment H - MSDS (etc.)

Gas Analysis Summary - Design Basis

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	0.452	0.00452	0.145	0.654	381.14
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.160	0.00160	0.070	0.318	185.56
Methane*	75-82-8	CH4	16.04	71.877	0.71877	11.531	52.109	30,385.73
Ethane*	74-84-0	C2H6	30.07	17.518	0.17518	5.267	23.804	13,880.75
Propane**	74-98-6	C3H8	44.10	6.744	0.06744	2.974	13.439	7,836.49
i-Butane**	75-28-5	C4H10	58.12	0.688	0.00688	0.400	1.807	1,053.75
n-Butane**	106-97-8	C4H10	58.12	1.674	0.01674	0.973	4.398	2,564.54
Cyclopentane**	287-92-3	C5H10	70.13	0.002	0.00002	0.001	0.006	3.70
i-Pentane**	78-78-4	C5H12	72.15	0.263	0.00263	0.190	0.857	500.03
n-Pentane**	109-66-0	C5H12	72.15	0.323	0.00323	0.233	1.053	614.10
Cyclohexane**	110-82-7	C6H12	84.16	0.007	0.00007	0.006	0.027	15.52
Other Hexanes**	varies	C6H14	86.18	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.19	0.009	0.00009	0.009	0.040	23.29
Heptanes**	varies	C7H16	100.20	0.025	0.00025	0.025	0.113	66.01
C8+ Heavies**	varies	C8H18+	130.3 est	0.184	0.00184	0.239	1.081	630.27
Benzene***	71-43-2	C6H6	78.11	0.001	0.00001	0.001	0.004	2.06
Ethylbenzene***	100-41-4	C8H10	106.17	0.001	0.00001	0.001	0.005	2.80
n-Hexane***	110-54-3	C6H14	86.18	0.065	0.00065	0.056	0.253	147.61
Toluene***	108-88-3	C7H8	92.14	0.002	0.00002	0.002	0.008	4.86
2,2,4-TMP (i-Octane)***	540-84-1	C8H18	114.23	0.001	0.00001	0.001	0.005	3.01
Xylenes***	1330-20-7	C8H10	106.17	0.004	0.00004	0.004	0.019	11.19

Totals:	100.00	1.00	22.13	100.00	58,312
Total THC:	99.39	0.99	21.91	99.03	57,746
Total VOC:	9.99	0.10	5.12	23.12	13,479
Total HAP:	0.07	0.001	0.07	0.29	172

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (VOC) *** = also Hazardous Air Pollutant (HAP)

#UGC (Universal Gas Constant) = 379.482 scf/lb-mol @ 60 °F and 14.696 psia. Pound "X"/scf = M% of "X" * MW of "X" / UGC

To be conservative, and to account for potential future changes in the gas quality, the following "worst-case" values were assumed:

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120% Min)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.160	0.318	186	0.259	0.514	300
Methane	75-82-8	CH4	71.877	52.109	30,386	86.340	62.594	36,500
Ethane	74-84-0	C2H6	17.518	23.804	13,881	1.169	8.596	4,446
VOC	Various	C3+	9.993	23.116	13,479	12.232	28.296	16,500
Benzene	71-43-2	C6H6	0.001	0.004	2	0.010	0.034	20
Ethylbenzene	110-54-3	C8H10	0.001	0.005	3	0.007	0.034	20
n-Hexane	100-41-4	C6H14	0.065	0.253	148	0.088	0.343	200
Toluene	108-88-3	C7H8	0.002	0.008	5	0.008	0.034	20
2,2,4-TMP (i-Octane)	540-84-1	C8H18	0.001	0.005	3	0.007	0.034	20
Xylenes	1330-20-7	C8H10	0.004	0.019	11	0.007	0.034	20
Total HAP	Various	C6+	0.074	0.294	172	0.129	0.514	300



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Version: 1.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

Synonyms: Wellhead Gas, Raw Gas, Methane, Residue Gas, Natural Gas Sweet, Marsh Gas, Fuel Gas, Petroleum Gas.

Intended Use of the Product

Use of the Substance/Mixture: Fuel.

Name, Address, and Telephone of the Responsible Party

Company

Williams, Inc.

One Williams Center

Tulsa, OK 74172, US

T 800-688-7507

enterprise@williams.com

Emergency Telephone Number

Emergency number : 800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

Classification (GHS-US)

Simple Asphy

Flam. Gas 1 H220

Compressed gas H280

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US)



Signal Word (GHS-US)

: Danger

Hazard Statements (GHS-US)

: H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation

Precautionary Statements (GHS-US)

: P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P403 - Store in a well-ventilated place.
P410+P403 - Protect from sunlight. Store in a well-ventilated place.

Other Hazards

Other Hazards Not Contributing to the Classification: Contains hydrogen sulfide. Hydrogen sulfide is a highly flammable, explosive gas under certain conditions, is a toxic gas, and may be fatal. Gas can accumulate in the headspace of closed containers, use caution when opening sealed containers. Heating the product or containers can cause thermal decomposition of the product and release hydrogen sulfide. Exposure may aggravate those with pre existing eye, skin, or respiratory conditions.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product identifier	% (w/w)	Classification (GHS-US)
Methane	(CAS No) 74-82-8	> 75	Simple Asphy

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			Flam. Gas 1, H220 Liquefied gas, H280
Ethane	(CAS No) 74-84-0	< 20	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Propane	(CAS No) 74-98-6	< 10	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Carbon dioxide	(CAS No) 124-38-9	< 10	Simple Asphy Compressed gas, H280
Butane	(CAS No) 106-97-8	< 5	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Nitrogen	(CAS No) 7727-37-9	< 5	Simple Asphy Compressed gas, H280
Hydrogen sulfide	(CAS No) 7783-06-4	<= 0.0004	Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 2 (Inhalation:gas), H330 Aquatic Acute 1, H400

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.

Inhalation: When symptoms occur: go into open air and ventilate suspected area. Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER/doctor/physician if you feel unwell

Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation persists. Thaw frosted parts with lukewarm water. Do not rub affected area.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists

Ingestion: Rinse mouth. Do NOT induce vomiting. Get immediate medical attention.

Most Important Symptoms and Effects Both Acute and Delayed

General: May cause frostbite on contact with the liquid. Butane is an asphyxiant. Lack of oxygen can be fatal

Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness

Skin Contact: Contact with the liquid may cause cold burns/frostbite

Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns

Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Chronic Symptoms: Contains a small amount of Hydrogen Sulfide, symptoms of overexposure are headaches, dizziness, nausea, coughing, respiratory irritation, eye irritation, skin irritation, pain in the nose, and loss of consciousness. Heating of the product may release higher amounts of Hydrogen Sulfide (H₂S).

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Foam, dry chemical, carbon dioxide, water spray, fog

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire

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Special Hazards Arising From the Substance or Mixture

Fire Hazard: Extremely flammable gas

Explosion Hazard: May form flammable/explosive vapor-air mixture. Heating may cause an explosion. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity: Hazardous reactions will not occur under normal conditions.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire

Firefighting Instructions: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leaking gas fire, eliminate all ignition sources if safe to do so. Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Carbon oxides (CO, CO₂). Hydrocarbon, sulfur dioxide (SO₂), and Hydrogen sulfide (H₂S) fatal and irritating gases

Other information: Do not allow run-off from fire fighting to enter drains or water courses

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Use special care to avoid static electric charges. Eliminate every possible source of ignition. Keep away from heat/sparks/open flames/hot surfaces - No smoking. Avoid breathing (dust, vapor, mist, gas). Use only outdoors or in a well-ventilated area. Ruptured cylinders may rocket. Do not allow product to spread into the environment

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment

Methods and Material for Containment and Cleaning Up

For Containment: Notify authorities if liquid enters sewers or public waters. Use only non-sparking tools

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. Isolate area until gas has dispersed. Use water spray to disperse vapors. For water based spills contact appropriate authorities and abide by local regulations for hydrocarbon spills into waterways. Contact competent authorities after a spill

Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Additional Hazards When Processed: Handle empty containers with care because residual vapors are flammable. Extremely flammable gas. Do not pressurize, cut, or weld containers. Do not puncture or incinerate container. Liquid gas can cause frost-type burns. If stored under heat for extended periods or significantly agitated, this material might evolve or release hydrogen sulfide, a toxic, flammable gas, which can raise and widen this material's actual flammability limits and significantly lower its auto-ignition temperature. Hydrogen sulfide can be fatal.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product

Technical Measures: Proper grounding procedures to avoid static electricity should be followed. Comply with applicable regulations.

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Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep in fireproof place. Store in a well-ventilated place. Keep container tightly closed. Keep/Store away from extremely high or low temperatures, ignition sources, direct sunlight, incompatible materials. Store in original container.

Incompatible Materials: strong acids, Strong bases, Strong oxidizers, chlorine, Halogenated compounds

Conditions for Safe Storage, Including Any Incompatibilities Not available

Specific End Use(s)

Fuel.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Hydrogen sulfide (7783-06-4)		
USA ACGIH	ACGIH TWA (ppm)	1 ppm
USA ACGIH	ACGIH STEL (ppm)	5 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	20 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m ³)	15 mg/m ³
USA NIOSH	NIOSH REL (ceiling) (ppm)	10 ppm
USA IDLH	US IDLH (ppm)	100 ppm
Alberta	OEL Ceiling (mg/m ³)	21 mg/m ³
Alberta	OEL Ceiling (ppm)	15 ppm
Alberta	OEL TWA (mg/m ³)	14 mg/m ³
Alberta	OEL TWA (ppm)	10 ppm
British Columbia	OEL Ceiling (ppm)	10 ppm
Manitoba	OEL STEL (ppm)	5 ppm
Manitoba	OEL TWA (ppm)	1 ppm
New Brunswick	OEL STEL (mg/m ³)	21 mg/m ³
New Brunswick	OEL STEL (ppm)	15 ppm
New Brunswick	OEL TWA (mg/m ³)	14 mg/m ³
New Brunswick	OEL TWA (ppm)	10 ppm
Newfoundland & Labrador	OEL STEL (ppm)	5 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1 ppm
Nova Scotia	OEL STEL (ppm)	5 ppm
Nova Scotia	OEL TWA (ppm)	1 ppm
Nunavut	OEL Ceiling (mg/m ³)	28 mg/m ³
Nunavut	OEL Ceiling (ppm)	20 ppm
Nunavut	OEL STEL (mg/m ³)	21 mg/m ³
Nunavut	OEL STEL (ppm)	15 ppm
Nunavut	OEL TWA (mg/m ³)	14 mg/m ³
Nunavut	OEL TWA (ppm)	10 ppm
Northwest Territories	OEL Ceiling (mg/m ³)	28 mg/m ³
Northwest Territories	OEL Ceiling (ppm)	20 ppm
Northwest Territories	OEL STEL (mg/m ³)	21 mg/m ³
Northwest Territories	OEL STEL (ppm)	15 ppm
Northwest Territories	OEL TWA (mg/m ³)	14 mg/m ³
Northwest Territories	OEL TWA (ppm)	10 ppm
Ontario	OEL STEL (ppm)	15 ppm
Ontario	OEL TWA (ppm)	10 ppm
Prince Edward Island	OEL STEL (ppm)	5 ppm
Prince Edward Island	OEL TWA (ppm)	1 ppm
Québec	VECD (mg/m ³)	21 mg/m ³
Québec	VECD (ppm)	15 ppm

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Québec	VEMP (mg/m ³)	14 mg/m ³
Québec	VEMP (ppm)	10 ppm
Saskatchewan	OEL STEL (ppm)	15 ppm
Saskatchewan	OEL TWA (ppm)	10 ppm
Yukon	OEL STEL (mg/m ³)	27 mg/m ³
Yukon	OEL STEL (ppm)	15 ppm
Yukon	OEL TWA (mg/m ³)	15 mg/m ³
Yukon	OEL TWA (ppm)	10 ppm

Propane (74-98-6)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	1800 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1800 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	1000 ppm
USA IDLH	US IDLH (ppm)	2100 ppm (10% LEL)
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1800 mg/m ³
Québec	VEMP (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Butane (106-97-8)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1900 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	800 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL STEL (ppm)	750 ppm
British Columbia	OEL TWA (ppm)	600 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
New Brunswick	OEL TWA (mg/m ³)	1900 mg/m ³
New Brunswick	OEL TWA (ppm)	800 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Nunavut	OEL STEL (mg/m ³)	2576 mg/m ³
Nunavut	OEL STEL (ppm)	1000 ppm
Nunavut	OEL TWA (mg/m ³)	1901 mg/m ³
Nunavut	OEL TWA (ppm)	800 ppm
Northwest Territories	OEL STEL (mg/m ³)	2576 mg/m ³
Northwest Territories	OEL STEL (ppm)	1000 ppm
Northwest Territories	OEL TWA (mg/m ³)	1901 mg/m ³
Northwest Territories	OEL TWA (ppm)	800 ppm
Ontario	OEL TWA (ppm)	800 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1900 mg/m ³

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Québec	VEMP (ppm)	800 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Yukon	OEL STEL (mg/m ³)	1600 mg/m ³
Yukon	OEL STEL (ppm)	750 ppm
Yukon	OEL TWA (mg/m ³)	1400 mg/m ³
Yukon	OEL TWA (ppm)	600 ppm
Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	9000 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	9000 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m ³)	54000 mg/m ³
USA NIOSH	NIOSH REL (STEL) (ppm)	30000 ppm
USA IDLH	US IDLH (ppm)	40000 ppm
Alberta	OEL STEL (mg/m ³)	54000 mg/m ³
Alberta	OEL STEL (ppm)	30000 ppm
Alberta	OEL TWA (mg/m ³)	9000 mg/m ³
Alberta	OEL TWA (ppm)	5000 ppm
British Columbia	OEL STEL (ppm)	15000 ppm
British Columbia	OEL TWA (ppm)	5000 ppm
Manitoba	OEL STEL (ppm)	30000 ppm
Manitoba	OEL TWA (ppm)	5000 ppm
New Brunswick	OEL STEL (mg/m ³)	54000 mg/m ³
New Brunswick	OEL STEL (ppm)	30000 ppm
New Brunswick	OEL TWA (mg/m ³)	9000 mg/m ³
New Brunswick	OEL TWA (ppm)	5000 ppm
Newfoundland & Labrador	OEL STEL (ppm)	30000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	5000 ppm
Nova Scotia	OEL STEL (ppm)	30000 ppm
Nova Scotia	OEL TWA (ppm)	5000 ppm
Nunavut	OEL STEL (mg/m ³)	27000 mg/m ³
Nunavut	OEL STEL (ppm)	15000 ppm
Nunavut	OEL TWA (mg/m ³)	9000 mg/m ³
Nunavut	OEL TWA (ppm)	5000 ppm
Northwest Territories	OEL STEL (mg/m ³)	27000 mg/m ³
Northwest Territories	OEL STEL (ppm)	15000 ppm
Northwest Territories	OEL TWA (mg/m ³)	9000 mg/m ³
Northwest Territories	OEL TWA (ppm)	5000 ppm
Ontario	OEL STEL (ppm)	30000 ppm
Ontario	OEL TWA (ppm)	5000 ppm
Prince Edward Island	OEL STEL (ppm)	30000 ppm
Prince Edward Island	OEL TWA (ppm)	5000 ppm
Québec	VECD (mg/m ³)	54000 mg/m ³
Québec	VECD (ppm)	30000 ppm
Québec	VEMP (mg/m ³)	9000 mg/m ³
Québec	VEMP (ppm)	5000 ppm
Saskatchewan	OEL STEL (ppm)	30000 ppm

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Saskatchewan	OEL TWA (ppm)	5000 ppm
Yukon	OEL STEL (mg/m ³)	27000 mg/m ³
Yukon	OEL STEL (ppm)	15000 ppm
Yukon	OEL TWA (mg/m ³)	9000 mg/m ³
Yukon	OEL TWA (ppm)	5000 ppm
Nitrogen (7727-37-9)		
Methane (74-82-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Ethane (74-84-0)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Exposure Controls

Appropriate Engineering Controls: Gas detectors should be used when flammable gases/vapours may be released. Ensure adequate ventilation, especially in confined areas. Proper grounding procedures to avoid static electricity should be followed. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment

Personal Protective Equipment: Protective goggles. Protective clothing. Respiratory protection of the dependent type. Insulated gloves



Materials for Protective Clothing: Chemically resistant materials and fabrics. Wear fire/flammable resistant/retardant clothing

Hand Protection: Wear chemically resistant protective gloves. Insulated gloves

Eye Protection: Chemical goggles or face shield.

Skin and Body Protection: Not available

Respiratory Protection: Use a NIOSH-approved self-contained breathing apparatus whenever exposure may exceed established Occupational Exposure Limits.

Thermal Hazard Protection: Wear suitable protective clothing.

Other Information: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State : Gas

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Appearance	: Clear, Colorless gas
Odor	: Contains Ethyl Mercaptan for leak detection, which has a skunk-like odor, odorless.
Odor Threshold	: Not available
pH	: Not available
Relative Evaporation Rate (butylacetate=1)	: Not available
Melting Point	: Not available
Freezing Point	: Not available
Boiling Point	: -157 °C (-250.6°F)
Flash Point	: -187 °C (-304.6°F)
Auto-ignition Temperature	: > 288 °C (>550.4°F)
Decomposition Temperature	: Not available
Flammability (solid, gas)	: Extremely flammable gas
Lower Flammable Limit	: 3 %
Upper Flammable Limit	: 17 %
Vapor Pressure	: 40 mm Hg @25°C (77°F)
Relative Vapor Density at 20 °C	: 0.6
Relative Density	: Not available
Specific Gravity	: Not available
Solubility	: Not available
Log Pow	: Not available
Log Kow	: Not available
Viscosity, Kinematic	: Not available
Viscosity, Dynamic	: Not available
Explosion Data – Sensitivity to Mechanical Impact	: Not available
Explosion Data – Sensitivity to Static Discharge	: Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

Chemical Stability: Extremely flammable gas. Stable at standard temperature and pressure.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Direct sunlight. Extremely high or low temperatures. Open flame. Overheating. Heat. Sparks. Incompatible materials. Avoid ignition sources

Incompatible Materials: Strong acids. Strong bases. Strong oxidizers. Halogenated compounds. Chlorine

Hazardous Decomposition Products: Carbon oxides (CO, CO₂). hydrocarbons. Sulfur dioxide and hydrogen sulfide are fatal and irritating gases.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity : Not classified

LD50 and LC50 Data Not available

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

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Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness.

Symptoms/Injuries After Skin Contact: Contact with the liquid may cause cold burns/frostbite.

Symptoms/Injuries After Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns.

Symptoms/Injuries After Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data

Hydrogen sulfide (7783-06-4)	
LC50 Inhalation Rat (mg/l)	0.99 mg/l (Exposure time: 1 h)
ATE (gases)	100.000 ppmV/4h
Propane (74-98-6)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Butane (106-97-8)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Ethane (74-84-0)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Wellhead Natural Gas (CAS Mixture)	
LC50 Fish 1	0.002 mg/l (Exposure time: 96 h - Species: Coregonus clupeaformis)
Hydrogen sulfide (7783-06-4)	
LC50 Fish 1	0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 Daphnia 1	0.022 mg/l (Exposure time: 96 h - Species: Gammarus pseudolimnaeus)
LC 50 Fish 2	0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not established.
Hydrogen sulfide (7783-06-4)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	0.45 (at 25 °C)
Propane (74-98-6)	
Log Pow	2.3
Butane (106-97-8)	
Log Pow	2.89
Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83
Ethane (74-84-0)	
Log Pow	<= 2.8

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Mobility in Soil Not available

Other Adverse Effects

Other adverse effects: Can cause frost damage to vegetation. Has photochemical ozone creation potential.

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

Additional Information: Handle empty containers with care because residual vapors are flammable. Empty gas cylinders should be returned to the vendor for recycling or refilling.

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

DOT Proper Shipping Name : Natural gas, compressed
(with high methane content)

Hazard Labels (DOT) : 2.1 - Flammable gases



DOT Packaging Exceptions (49 CFR 173.xxx) : 306

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302

DOT Packaging Bulk (49 CFR 173.xxx) : 302

Additional Information

Emergency Response Guide (ERG) Number : 115

Transport by sea

DOT Vessel Stowage Location : E - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length, but is prohibited from carriage on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

Air transport

DOT Quantity Limitations Passenger Aircraft/Rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo Aircraft Only (49 CFR 175.75) : 150 kg

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard
Hydrogen sulfide (7783-06-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 302 (Specific toxic chemical listings) Listed on SARA Section 313 (Specific toxic chemical listings)	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 313 - Emission Reporting	1.0 %

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Propane (74-98-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Butane (106-97-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Methane (74-82-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Ethane (74-84-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
US State Regulations
Hydrogen sulfide (7783-06-4)
<p>U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Acute U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Chronic U.S. - California - Toxic Air Contaminant List (AB 1807, AB 2728) U.S. - Colorado - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min) U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr) U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities U.S. - Delaware - Accidental Release Prevention Regulations - Toxic Endpoints U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities U.S. - Hawaii - Occupational Exposure Limits - STELs U.S. - Hawaii - Occupational Exposure Limits - TWAs U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs) U.S. - Idaho - Occupational Exposure Limits - Acceptable Maximum Peak Above the Ceiling Concentration for an 8-Hour Shift U.S. - Idaho - Occupational Exposure Limits - Ceilings U.S. - Idaho - Occupational Exposure Limits - TWAs U.S. - Louisiana - Reportable Quantity List for Pollutants U.S. - Maine - Air Pollutants - Hazardous Air Pollutants U.S. - Massachusetts - Allowable Ambient Limits (AALs) U.S. - Massachusetts - Allowable Threshold Concentrations (ATCs) U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2 U.S. - Massachusetts - Right To Know List U.S. - Massachusetts - Threshold Effects Exposure Limits (TEELs) U.S. - Michigan - Occupational Exposure Limits - STELs U.S. - Michigan - Occupational Exposure Limits - TWAs U.S. - Michigan - Polluting Materials List U.S. - Michigan - Process Safety Management Highly Hazardous Chemicals U.S. - Minnesota - Chemicals of High Concern U.S. - Minnesota - Hazardous Substance List U.S. - Minnesota - Permissible Exposure Limits - STELs U.S. - Minnesota - Permissible Exposure Limits - TWAs</p>

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U.S. - Montana - Ambient Air Quality Standards
 U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
 U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCEA - Extraordinarily Hazardous Substances (EHS)
 U.S. - New Mexico - Air Quality - Ambient Air Quality Standards
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances
 U.S. - North Carolina - Control of Toxic Air Pollutants
 U.S. - North Dakota - Ambient Air Quality Standards - Maximum Permissible Concentrations
 U.S. - North Dakota - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Ohio - Extremely Hazardous Substances - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - Ceilings
 U.S. - Oregon - Permissible Exposure Limits - STELs
 U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 1-Hour
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 24-Hour
 U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - Annual
 U.S. - South Carolina - Toxic Air Pollutants - Maximum Allowable Concentrations
 U.S. - South Carolina - Toxic Air Pollutants - Pollutant Categories
 U.S. - Tennessee - Occupational Exposure Limits - STELs
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Drinking Water Standards - Secondary Constituent Levels (SCLs)
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Hazardous Waste - Hazardous Constituents
 U.S. - Vermont - Permissible Exposure Limits - STELs
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Virginia - Water Quality Standards - Chronic Freshwater Aquatic Life
 U.S. - Virginia - Water Quality Standards - Chronic Saltwater Aquatic Life
 U.S. - Washington - Dangerous Waste - Dangerous Waste Constituents List
 U.S. - Washington - Dangerous Waste - Discarded Chemical Products List
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 25 Feet to Less Than 40 Feet
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 40 Feet to Less Than 75 Feet
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 75 Feet or Greater
 U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights Less Than 25 Feet
 U.S. - Wyoming - Process Safety Management - Highly Hazardous Chemicals
 U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Fresh Water
 U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Marine Water

Propane (74-98-6)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities

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U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Idaho - Occupational Exposure Limits - TWAs
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELs
 U.S. - Washington - Permissible Exposure Limits - TWAs

Butane (106-97-8)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Maine - Chemicals of High Concern
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Chemicals of High Concern
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List

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U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELS
 U.S. - Washington - Permissible Exposure Limits - TWAs

Carbon dioxide (124-38-9)

U.S. - Hawaii - Occupational Exposure Limits - STELS
 U.S. - Hawaii - Occupational Exposure Limits - TWAs
 U.S. - Idaho - Occupational Exposure Limits - TWAs
 U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
 U.S. - Michigan - Occupational Exposure Limits - STELS
 U.S. - Michigan - Occupational Exposure Limits - TWAs
 U.S. - Minnesota - Hazardous Substance List
 U.S. - Minnesota - Permissible Exposure Limits - STELS
 U.S. - Minnesota - Permissible Exposure Limits - TWAs
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New York - Occupational Exposure Limits - TWAs
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Tennessee - Occupational Exposure Limits - STELS
 U.S. - Tennessee - Occupational Exposure Limits - TWAs
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Vermont - Permissible Exposure Limits - STELS
 U.S. - Vermont - Permissible Exposure Limits - TWAs
 U.S. - Washington - Permissible Exposure Limits - STELS
 U.S. - Washington - Permissible Exposure Limits - TWAs

Nitrogen (7727-37-9)

U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Right To Know List
 U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Methane (74-82-8)

U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
 U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements

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U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Excluded Volatile Organic Compounds
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

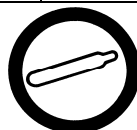
Ethane (74-84-0)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
 U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
 U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
 U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
 U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
 U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
 U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
 U.S. - Massachusetts - Right To Know List
 U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
 U.S. - Minnesota - Hazardous Substance List
 U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
 U.S. - New Jersey - Environmental Hazardous Substances List
 U.S. - New Jersey - Excluded Volatile Organic Compounds
 U.S. - New Jersey - Right to Know Hazardous Substance List
 U.S. - New Jersey - Special Health Hazards Substances List
 U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
 U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
 U.S. - Oregon - Permissible Exposure Limits - TWAs
 U.S. - Pennsylvania - RTK (Right to Know) List
 U.S. - Texas - Effects Screening Levels - Long Term
 U.S. - Texas - Effects Screening Levels - Short Term
 U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Canadian Regulations

Wellhead Natural Gas

WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas
----------------------	--



Hydrogen sulfide (7783-06-4)

Listed on the Canadian DSL (Domestic Substances List) inventory.
 Listed on the Canadian Ingredient Disclosure List

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WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects
----------------------	---

Propane (74-98-6)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Butane (106-97-8)

Listed on the Canadian DSL (Domestic Substances List) inventory.

Listed on the Canadian Ingredient Disclosure List

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Carbon dioxide (124-38-9)

Listed on the Canadian DSL (Domestic Substances List) inventory.

Listed on the Canadian Ingredient Disclosure List

WHMIS Classification	Class A - Compressed Gas
----------------------	--------------------------

Nitrogen (7727-37-9)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas
----------------------	--------------------------

Methane (74-82-8)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

Ethane (74-84-0)

Listed on the Canadian DSL (Domestic Substances List) inventory.

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
----------------------	--

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION

Revision date : 10/02/2013

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200

GHS Full Text Phrases:

Acute Tox. 2 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 2
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Compressed gas	Gases under pressure Compressed gas
Flam. Gas 1	Flammable gases Category 1
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H330	Fatal if inhaled
H400	Very toxic to aquatic life

Party Responsible for the Preparation of This Document

Wellhead Natural Gas

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Williams, Inc.
One Williams Center
Tulsa, OK 74172, US
800-688-7507

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

North America GHS US 2012 & WHMIS

ATTACHMENT I
Emission Units Table

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

- **Emissions Unit Table**
-

ATTACHMENT J

Emission Points Data Summary Sheet

“26. Fill out the **Emission Points Data Summary Sheet** (Table 1 and Table 2) and provide it as Attachment J.”

- **Table 1 – Emissions Data**

- Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)
- Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)
- Startup/Shutdown/Maintenance (Including Blowdown) (SSM-2/24E)
- Piping and Equipment Fugitives (FUG-3/25E)
- FRANCIS COMPRESSOR STATION (FCS) – FACILITY-WIDE SUMMARY
- OAK GROVE GAS PLANT (OGGP) – FACILITY-WIDE SUMMARY

- **Table 2 – Release Parameter Data**

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet

Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)

Table 1: Emissions Data																							
Emission Point ID No. <i>(Must match Emission Units Table & Plot Plan)</i>	Emission Point Type ¹	Emission Unit Vented Through This Point <i>(Must match Emission Units Table & Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table & Plot Plan)</i>		Vent Time for Emission Unit <i>(Chemical processes only)</i>		All Regulated Pollutants - Chemical Name/CAS ³ <i>(Speciate VOCs & HAPS)</i>	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used ⁶	Emission Concentration ⁷ <i>(ppmv or mg/m³)</i>								
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr											
CE-01/22E	Upward Vertical	CE-01/22E	CE-01/22E	01-OxCat	OxCat	C	8,760	NOx	1.52	6.66	1.52	6.66	Gas	Vendor									
								1,380 bhp CAT G3516B (4SLB@1,400 rpm) Compressor Engine 01/22E								CO	8.88	38.91	0.89	3.89	Gas	Vendor	
								VOC	4.29	18.79	1.29	5.64	Gas	Vendor									
								SO2	0.01	0.03	0.01	0.03	Gas	AP-42									
								PM10/2.5	0.11	0.49	0.11	0.49	Liq/Solid	AP-42									
								Acetaldehyde	0.09	0.41	0.03	0.12	Gas	AP-42									
								Acrolein	0.06	0.25	0.02	0.08	Gas	AP-42									
								Benzene	0.01	0.02	1.5E-03	0.01	Gas	AP-42									
								Ethylbenzene	4.5E-04	2.0E-03	1.3E-04	5.9E-04	Gas	AP-42									
								Formaldehyde	1.22	5.33	0.37	1.60	Gas	Vendor									
								n-Hexane	0.01	0.05	0.00	0.02	Gas	AP-42									
								Methanol	0.03	0.12	0.01	0.04	Gas	AP-42									
								Toluene	4.6E-03	0.02	1.4E-03	0.01	Gas	AP-42									
								2,2,4-TMP	2.8E-03	0.01	8.5E-04	3.7E-03	Gas	AP-42									
								Xylenes	2.1E-03	0.01	6.2E-04	2.7E-03	Gas	AP-42									
								Other HAP	0.01	0.05	3.2E-03	0.01	Gas	AP-42									
								Total HAP	1.44	6.29	0.43	1.89	Gas	Sum									
								CO2	1,530	6,703	1,530	6,703	Gas	Vendor									
								CH4	7	32	7	32	Gas	Vendor									
								N2O	2.5E-03	0.01	2.5E-03	0.01	Gas	AP-42									
CO2e	1,713	7,502	1,713	7,502	Gas	Wgt Sum																	

Continued ...

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet

Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)

Table 1: Emissions Data															
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RPC/23E	Varies	Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)				C	8,760	NOx	---	---	---	---	Gas	Vendor	
								CO	---	---	---	---	Gas	Vendor	
		VOC	1.18	5.15	1.18			5.15	Gas	Vendor					
		SO2	---	---	---			---	Gas	AP-42					
		PM10/2.5	---	---	---			---	Liq/Solid	AP-42					
		Acetaldehyde	---	---	---			---	Gas	AP-42					
		Acrolein	---	---	---			---	Gas	AP-42					
		Benzene	1.7E-03	0.01	1.7E-03			0.01	Gas	AP-42					
		Ethylbenzene	1.7E-03	0.01	1.7E-03			0.01	Gas	AP-42					
		Formaldehyde	0.01	0.05	0.01			0.05	Gas	Vendor					
		n-Hexane	0.01	0.06	0.01			0.06	Gas	AP-42					
		Methanol	---	---	---			---	Gas	AP-42					
		Toluene	1.7E-03	0.01	1.7E-03			0.01	Gas	AP-42					
		2,2,4-TMP	1.7E-03	0.01	1.7E-03			0.01	Gas	AP-42					
		Xylenes	1.7E-03	0.01	1.7E-03			0.01	Gas	AP-42					
		Other HAP	---	---	---			---	Gas	AP-42					
		Total HAP	0.03	0.15	0.03			0.15	Gas	Sum					
		CO2	13	58	13			58	Gas	Vendor					
		CH4	3	11	3			11	Gas	Vendor					
		N2O	---	---	---			---	Gas	AP-42					
CO2e	78	341	78	341	Gas	Wgt Sum									

Continued ...

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet

Start/Stop/Maintenance (Including Blowdown) (SSM-2/24E)

Table 1: Emissions Data																							
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)								
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr											
SSM-2/24E	Varies	SSM-2/24E	SSM-2/24E	---	---	Varies	na	NOx	---	---	---	---	Gas	Vendor									
								Startup/Shutdown/Maintenance (Including Blowdown) (SSM-2/24E)								CO	---	---	---	---	Gas	Vendor	
								VOC	---	15.92	---	15.92	---	---	Gas	Vendor							
								SO2	---	---	---	---	---	---	Gas	AP-42							
								PM10/2.5	---	---	---	---	---	---	Liq/Solid	AP-42							
								Acetaldehyde	---	---	---	---	---	---	Gas	AP-42							
								Acrolein	---	---	---	---	---	---	Gas	AP-42							
								Benzene	---	0.02	---	0.02	---	---	Gas	AP-42							
								Ethylbenzene	---	0.02	---	0.02	---	---	Gas	AP-42							
								Formaldehyde	---	---	---	---	---	---	Gas	Vendor							
								n-Hexane	---	0.19	---	0.19	---	---	Gas	AP-42							
								Methanol	---	---	---	---	---	---	Gas	AP-42							
								Toluene	---	0.02	---	0.02	---	---	Gas	AP-42							
								2,2,4-TMP	---	0.02	---	0.02	---	---	Gas	AP-42							
								Xylenes	---	0.02	---	0.02	---	---	Gas	AP-42							
								Other HAP	---	---	---	---	---	---	Gas	AP-42							
								Total HAP	---	0.29	---	0.29	---	---	Gas	Sum							
								CO2	---	---	---	---	---	---	Gas	Vendor							
								CH4	---	35	---	35	---	---	Gas	Vendor							
								N2O	---	---	---	---	---	---	Gas	AP-42							
CO2e	---	880	---	880	---	---	Gas	Wgt Sum															

Continued ...

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet

Piping and Equipment Fugitives (FUG-3/25E)

Table 1: Emissions Data																							
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)								
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr											
FUG-3/25E	Fugitive	FUG-3/25E		LDAR	LDAR	C	8,760	NOx	---	---	---	---	Gas	Vendor									
								CO	---	---	---	---	Gas	Vendor									
								Piping and Equipment Fugitives (FUG-3/25E)								VOC	1.32	5.77	0.63	2.77	Gas	Vendor	
								SO2	---	---	---	---	Gas	AP-42									
								PM10/2.5	---	---	---	---	Liq/Solid	AP-42									
								Acetaldehyde	---	---	---	---	Gas	AP-42									
								Acrolein	---	---	---	---	Gas	AP-42									
								Benzene	4.2E-03	0.02	3.1E-03	0.01	Gas	AP-42									
								Ethylbenzene	4.2E-03	0.02	3.1E-03	0.01	Gas	AP-42									
								Formaldehyde	---	---	---	---	Gas	Vendor									
								n-Hexane	0.03	0.12	1.8E-02	0.08	Gas	AP-42									
								Methanol	---	---	---	---	Gas	AP-42									
								Toluene	4.2E-03	0.02	3.1E-03	0.01	Gas	AP-42									
								2,2,4-TMP	4.2E-03	0.02	3.1E-03	0.01	Gas	AP-42									
								Xylenes	4.2E-03	0.02	3.1E-03	0.01	Gas	AP-42									
								Other HAP	---	---	---	---	Gas	AP-42									
								Total HAP	0.05	0.21	0.03	0.15	Gas	Sum									
								CO2	0.02	0.08	0.01	0.03	Gas	Vendor									
								CH4	1	2	0.2	1	Gas	Vendor									
								N2O	---	---	---	---	Gas	AP-42									
CO2e	13	57	6	21	Gas	Wgt Sum																	

Continued ...

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment J - Emission Points Data Summary Sheet
FACILITY-WIDE SUMMARY

Table 1: Emissions Data																						
Emission Point ID No. <i>(Must match Emission Units Table & Plot Plan)</i>	Emission Point Type ¹	Emission Unit Vented Through This Point <i>(Must match Emission Units Table & Plot Plan)</i>		Air Pollution Control Device <i>(Must match Emission Units Table & Plot Plan)</i>		Vent Time for Emission Unit <i>(Chemical processes only)</i>		All Regulated Pollutants - Chemical Name/CAS ³ <i>(Speciate VOCs & HAPS)</i>	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase <i>(At exit conditions, Solid, Liquid or Gas/Vapor)</i>	Est. Method Used ⁶	Emission Concentration ⁷ <i>(ppmv or mg/m³)</i>							
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr										
na	na	na	na	na	na	na	na	NOx	1.52	6.66	1.52	6.66	Gas	Sum								
								CO	8.88	38.91	0.89	3.89	Gas	Sum								
								FRANCIS COMPRESSOR STATION (FCS) FACILITY-WIDE SUMMARY (Including Fugitives (FUG-3/25E))							VOC - Point	5.47	39.86	2.46	26.71	Gas	Sum	
								VOC - Fug	1.32	5.77	0.63	2.77	Gas	Sum								
								VOC - Total	6.78	45.63	3.10	29.48	Gas	Sum								
								SO2	0.01	0.03	0.01	0.03	Gas	Sum								
								PM10/2.5	0.11	0.49	0.11	0.49	Solid/Gas	Sum								
								Acetaldehyde	0.09	0.41	0.03	0.12	Gas	Sum								
								Acrolein	0.06	0.25	0.02	0.08	Gas	Sum								
								Benzene	0.01	0.07	6.3E-03	0.05	Gas	Sum								
								Ethylbenzene	6.4E-03	0.05	5.0E-03	0.04	Gas	Sum								
								Formaldehyde	1.23	5.38	0.38	1.65	Gas	Sum								
								n-Hexane	0.05	0.43	0.04	0.35	Gas	Sum								
								Methanol	0.03	0.12	0.01	0.04	Gas	---								
								Toluene	0.01	0.07	6.2E-03	0.05	Gas	Sum								
								2,2,4-TMP	0.01	0.06	5.7E-03	0.04	Gas	Sum								
								Xylenes	0.01	0.05	5.5E-03	0.04	Gas	Sum								
								Other HAP	0.01	0.05	3.2E-03	0.01	Gas	Sum								
								Total HAP	1.52	6.93	0.50	2.47	Gas	Sum								
								CO2	1,544	6,761	1,544	6,761	Gas	Sum								
CH4	10	81	10	79	Gas	Sum																
N2O	2.5E-03	0.01	2.5E-03	0.01	Gas	Sum																
CO2e	1,804	8,781	1,796	8,744	Gas	Wgt Sum																

FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment J - Emission Points Data Summary Sheet

OAK GROVE GAS PLANT - FACILITY-WIDE SUMMARY

Table 1: Emissions Data																
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)	
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr				
na	na	na	na	na	na	na	na	NOx	651.48	132.01	651.48	127.93	Gas	Sum		
		OAK GROVE GAS PLANT (OGGP) FACILITY-WIDE SUMMARY (Including Francis CS and Independence CS) (Including Fugitives)														
								CO	1,295	235.64	1,287	196.47	Gas	Sum		
								VOC - Point	17,769	2,128	214.91	97.64	Gas	Sum		
								VOC - Fug	29.91	131.00	14.07	45.34	Gas	Sum		
								VOC - Total	17,799	2,259	228.98	142.98	Gas	Sum		
								SO2	1.68	0.80	1.68	0.79	Gas	Sum		
								PM10/2.5	21.55	11.35	21.55	11.18	Solid/Gas	Sum		
								Acetaldehyde	0.03	0.12	0.03	0.12	Gas	Sum		
								Acrolein	0.02	0.08	0.02	0.08	Gas	Sum		
								Benzene	449.99	53.02	5.59	1.97	Gas	Sum		
								Ethylbenzene	610.24	71.40	7.19	2.14	Gas	Sum		
								Formaldehyde	0.44	1.91	0.79	1.77	Gas	Sum		
								n-Hexane	549.76	66.47	7.00	4.11	Gas	Sum		
								Methanol	0.01	0.04	0.01	0.04	Gas	---		
								Toluene	531.15	62.33	6.40	2.06	Gas	Sum		
								2,2,4-TMP	656.51	76.71	7.65	2.20	Gas	Sum		
								Xylenes	612.23	71.63	7.21	2.15	Gas	Sum		
								Other HAP	0.01	0.02	0.03	0.02	Gas	Sum		
								Total HAP	3,410.41	403.82	41.90	16.66	Gas	Sum		
								CO2	32,714	143,286	51,395	225,108	Gas	Sum		
								CH4	812	3,555	180	787	Gas	Sum		
								N2O	0.05	0.23	15.66	68.60	Gas	Sum		
								CO2e	53,018	232,217	60,556	265,234	Gas	Wgt Sum		

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment J - Emission Points Data Summary Sheet

Notes

Criteria Pollutants	
Pollutant	CAS
NO2	10024-97-2
CO	630-08-0
VOC	varies
Propane	74-98-6
i-Butane	75-28-5
n-Butane	106-97-8
SO2	7446-09-5
PM10/2.5	varies

Hazardous Air Pollutants (HAPs)	
Pollutant	CAS
Acetaldehyde	75-07-0
Acrolein	107-02-8
Benzene	71-43-2
Ethylbenzene	100-41-4
Formaldehyde	50-00-0
n-Hexane	110-54-3
Methanol	67-56-1
Toluene	108-88-3
2,2,4-TMP	540-84-1
Xylenes	1330-20-7

Greenhouse Gas (GHG) Pollutants	
Pollutant	CAS
CO2	124-38-9
CH4	74-82-8
N2O	10024-97-2
CO2e	na

Table 1: Notes

The EMISSION POINTS DATA 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 EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

- 1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
- 2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
- 3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, 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.
- 4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
- 6 Indicate method used to determine emission rate as follows:
 MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
- 7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

ATTACHMENT K
Fugitive Emissions Data Summary Sheet

“27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as Attachment K.”

- **Application Forms Checklist**
 - **Fugitive Emissions Summary**
 - **Leak Source Data Sheet**
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment K - Fugitive Emissions

Fugitive Emissions Data Summary Sheet

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

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS

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

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment K - Fugitive Emissions

Fugitive Emissions Data Summary Sheet - Continued

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

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions.

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS ¹	Maximum Potential Pre-Controlled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	---	---	---	---	---
Unpaved Haul Roads	na	---	---	---	---	---
Storage Pile Emissions	na	---	---	---	---	---
Loading/Unloading Operations	na	---	---	---	---	---
Wastewater Treatment	na	---	---	---	---	---
Equipment Leaks (FUG-3/25E)	VOC	1.32	5.77	0.63	2.77	AP-42
	Acetaldehyde	---	---	---	---	AP-42/MB
	Acrolein	---	---	---	---	AP-42/MB
	Benzene	4.2E-03	0.02	3.1E-03	0.01	AP-42/MB
	Ethylbenzene	4.2E-03	0.02	3.1E-03	0.01	AP-42/MB
	Formaldehyde	---	---	---	---	AP-42/MB
	n-Hexane	0.03	0.12	0.02	0.08	AP-42/MB
	Methanol	---	---	---	---	AP-42/MB
	Toluene	4.2E-03	0.02	3.1E-03	0.01	AP-42/MB
	2,2,4-TMP	4.2E-03	0.02	3.1E-03	0.01	AP-42/MB
	Xylenes	4.2E-03	0.02	3.1E-03	0.01	AP-42/MB
	Other HAP	---	---	---	---	AP-42/MB
	Total HAP	0.05	0.21	0.03	0.15	SUM
	CO2	0.02	0.1	0.01	0.03	AP-42
	CH4	2.3	9.9	0.8	3.6	AP-42
N2O	---	---	---	---	---	
CO2e	57	248	21	90	Wgt Sum	
General Clean-up - VOC Emissions	na	---	---	---	---	---
Other	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, 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 min (e.g. 5 lb VOC/20 min batch).

³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in min (e.g. 5 lb VOC/20 min batch).

⁴ Indicate method used to determine emission rate as follows:

MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment K - Fugitive Emissions

Fugitive Emissions Data Summary Sheet - Continued

LEAK SOURCE DATA SHEET

Soure 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
Pumps⁵	Light Liquid VOC ^{6,7}	6	6/0/0/0/0/0 na	≤ 5	1
	Heavy Liquid VOC ⁸	---	---	---	---
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Valves¹⁰	Gas VOC	257	257/0/0/0/0/0 na	≤ 5	822
	Light Liquid VOC	64	64/0/0/0/0/0 na	≤ 5	19
	Heavy Liquid VOC	---	---	---	---
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Safety Relief Valves¹¹	Gas VOC	See "Other"	---	---	---
	Light Liquid VOC	---	---	---	---
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Open Ended Lines¹²	Gas VOC	14	0	---	153
	Light Liquid VOC	4	0	---	17
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Sampling Connections¹³	Gas VOC	See "Open Ended Lines"	---	---	---
	Light Liquid VOC	---	---	---	---
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Compressors	Gas VOC	See "Other"	---	---	---
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Flanges	Gas VOC	120	120/0/0/0/0/0 na	≤ 5	256
	Light Liquid VOC	30	30/0/0/0/0/0 na	≤ 5	2
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
Other (Connectors)	Gas VOC	767	0/0/0/0/767/0 na	≤ 5	1,982
	Light Liquid VOC	192	0/0/0/0/192/0 na	≤ 5	2,290
	Non-VOC ⁹ (Water/Oil)	---	---	---	---
TOTAL (lb/yr)					5,542
TOTAL (tpy)					2.77

Attachment K
FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in visual or soap-bubble leak detection ppm. Do not include monitoring by methods. "M/Q(M)/Q/SA/A/0" means the time period between inspections as follows:
Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category valves, gas service: 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); 0 - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count seal-less pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR. 51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C. then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₂, etc. DO NOT LIST CO, H, H₂O, N, O, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

ATTACHMENT L
Emissions Unit Data Sheet(s)

“28. Fill out the **Emissions Unit Data Sheet(s)** as Attachment L.”

- **NATURAL GAS COMPRESSOR/GENERATOR ENGINE (CE-01/22E)**
 - 1,380 BHP CAT G3516B ENGINE - VENDOR DATA
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
 Application for 45CSR13 NSR Construction Permit
Attachment L - Emission Unit Data Sheet

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Facility		Francis					
Source Identification Number ¹		CE-01/22E					
Engine Manufacturer and Model		CAT G3516B					
Manufacturer's Rated bhp/rpm		1,380 / 1,400					
Source Status ²		NS					
Date Installed/Modified/Removed ³		TBD					
Manufactured/Reconstruction Date ⁴		After 06/12/06					
Certified Engine (40CFR60 NSPS JJJJ) ⁵		No					
Engine, Fuel and Combustion Data	Engine Type ⁶	LB4S					
	APCD Type ⁷	OXCAT					
	Fuel Type ⁸	RG					
	H ₂ S (gr/100 scf)	0.2					
	Operating bhp/rpm	1,380 / 1,400					
	BSFC (Btu/bhp-hr)	8,182					
	Fuel (ft ³ /hr)	11,070					
	Fuel (MMft ³ /yr)	96.97					
	Operation (hrs/yr)	8,760					
Reference ⁹	PTE ¹⁰	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NOx	1.52	6.66				
MD	CO	0.89	3.89				
MD	VOC	1.29	5.64				
AP	SO ₂	0.01	0.03				
AP	PM _{10/2.5}	0.11	0.49				
MD	HCHO	0.37	1.60				
MD/AP	Total HAP	0.43	1.89				
MD/40CFR98	CO _{2e}	1,713	7,502				

ENGINE SPEED (rpm):	1400
COMPRESSION RATIO:	8
AFTERCOOLER TYPE:	SCAC
AFTERCOOLER - STAGE 2 INLET (°F):	130
AFTERCOOLER - STAGE 1 INLET (°F):	201
JACKET WATER OUTLET (°F):	210
ASPIRATION:	TA
COOLING SYSTEM:	JW+OC+1AC, 2AC
CONTROL SYSTEM:	ADEM3
EXHAUST MANIFOLD:	DRY
COMBUSTION:	LOW EMISSION
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5
SET POINT TIMING:	28

RATING STRATEGY:	STANDARD
RATING LEVEL:	CONTINUOUS
FUEL SYSTEM:	CAT WIDE RANGE
	WITH AIR FUEL RATIO CONTROL
SITE CONDITIONS:	
FUEL:	Gas Analysis
FUEL PRESSURE RANGE(psig):	7.0-40.0
FUEL METHANE NUMBER:	57.3
FUEL LHV (Btu/scf):	1181
ALTITUDE(ft):	1500
MAXIMUM INLET AIR TEMPERATURE(°F):	100
STANDARD RATED POWER:	1380 bhp@1400rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE			
			100%	100%	75%	50%	
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	1380	1380	1035	690
INLET AIR TEMPERATURE			°F	100	100	100	100

ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	7425	7425	7953	8542
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8182	8182	8763	9412
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft ³ /min	3284	3284	2576	1801
AIR FLOW	(WET)	(3)(4)	lb/hr	13962	13962	10953	7657
FUEL FLOW (60°F, 14.7 psia)			scfm	145	145	116	83
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	93.3	93.3	75.7	53.2
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	1007	1007	1000	1020
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft³/min	9216	9216	7207	5113
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	14454	14454	11348	7940

EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(8)(9)	g/bhp-hr	2.92	2.92	3.13	3.08
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	4.53	4.53	4.86	4.93
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	2.14	2.14	2.29	2.32
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	1.01	1.01	1.08	1.10
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.40	0.40	0.39	0.39
CO2		(8)(9)	g/bhp-hr	503	503	537	584
EXHAUST OXYGEN		(8)(11)	% DRY	9.1	9.1	8.8	8.4

HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	22309	22309	20744	19351
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	6110	6110	5092	4074
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	4475	4475	3978	3363
HEAT REJ. TO A/C - STAGE 1 (1AC)		(12)(13)	Btu/min	12348	12348	10260	3630
HEAT REJ. TO A/C - STAGE 2 (2AC)		(12)(13)	Btu/min	5637	5637	5297	3438

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(13)(14)	Btu/min	42875
TOTAL AFTERCOOLER CIRCUIT (2AC)	(13)(14)	Btu/min	5919
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

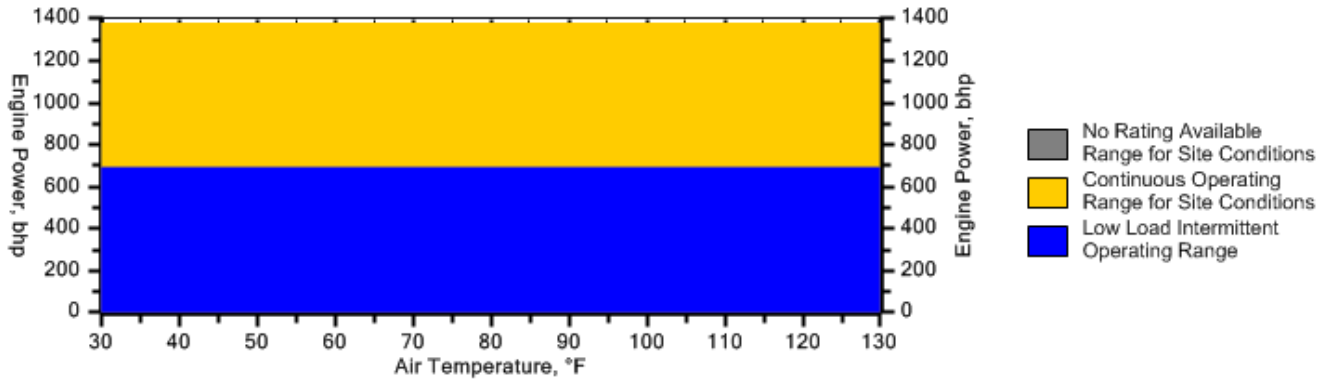
CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

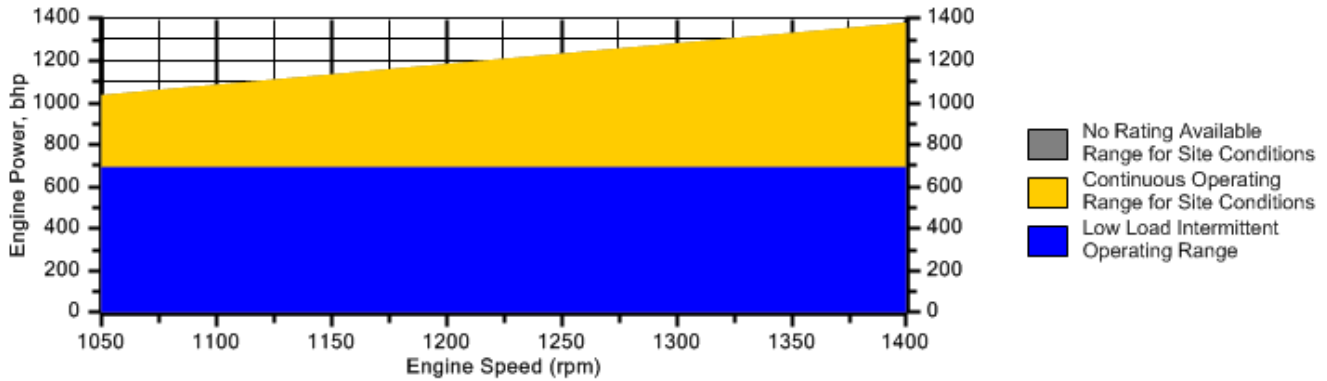
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1500 ft and 1400 rpm



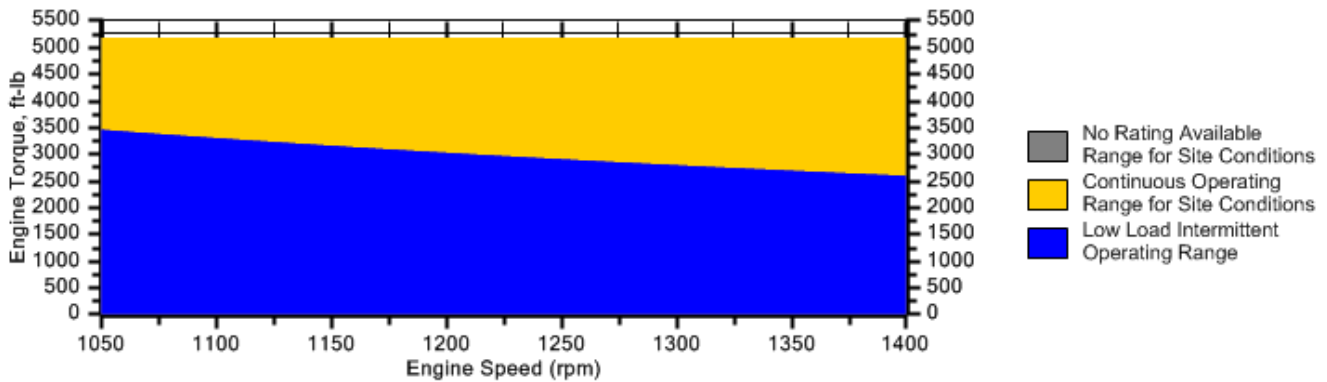
Engine Power vs. Engine Speed

Data represents speed sweep at 1500 ft and 100 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 1500 ft and 100 °F



Note: At site conditions of 1500 ft and 100°F inlet air temp., constant torque can be maintained down to 1050 rpm. The minimum speed for loading at these conditions is 1050 rpm.

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is $\pm 3\%$ of full load.
2. Fuel consumption tolerance is $\pm 3.0\%$ of full load data.
3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of $\pm 5\%$.
4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
5. Inlet manifold pressure is a nominal value with a tolerance of $\pm 5\%$.
6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
7. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of $\pm 6\%$.
8. Emissions data is at engine exhaust flange prior to any after treatment.
9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3 . Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.
10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5 .
12. Heat rejection values are nominal. Tolerances, based on treated water, are $\pm 10\%$ for jacket water circuit, $\pm 50\%$ for radiation, $\pm 20\%$ for lube oil circuit, and $\pm 5\%$ for aftercooler circuit.
13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.
14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.1010	0.1011
Methane	CH4	72.9370	73.0283
Ethane	C2H6	17.1740	17.1955
Propane	C3H8	6.2900	6.2979
Isobutane	iso-C4H10	0.6170	0.6178
Norbutane	nor-C4H10	1.4920	1.4939
Isopentane	iso-C5H12	0.2500	0.2503
Norpentane	nor-C5H12	0.3110	0.3114
Hexane	C6H14	0.0610	0.0611
Heptane	C7H16	0.0170	0.0170
Nitrogen	N2	0.4630	0.4636
Carbon Dioxide	CO2	0.1570	0.1572
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0040	0.0040
Nonane	C9H20	0.0010	0.0010
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.8750	100.0000

Fuel Makeup: Gas Analysis
Unit of Measure: English

Calculated Fuel Properties

Caterpillar Methane Number:	57.3
Lower Heating Value (Btu/scf):	1181
Higher Heating Value (Btu/scf):	1301
WOBBE Index (Btu/scf):	1367
THC: Free Inert Ratio:	159.92
Total % Inerts (% N2, CO2, He):	0.62%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.996
Stoich A/F Ratio (Vol/Vol):	12.23
Stoich A/F Ratio (Mass/Mass):	16.41
Specific Gravity (Relative to Air):	0.745
Specific Heat Constant (K):	1.275

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

ATTACHMENT M
Air Pollution Control Device Sheet(s)

“29. Fill out the **Air Pollution Control Device Sheet(s)** as Attachment M.”

- **OXIDATION CATALYST (1-OXCAT) FOR COMPRESSOR ENGINE CE-01/22E**
 - OXIDATION CATALYST - VENDOR DATA
-

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment M - Air Pollution Control Device Sheet

Control Device ID No. (must match Emission Units Table):

1-OXCAT

Equipment Information

1. Manufacturer: Catalytic Combustion Corporation	2. Control Device Name: OXIDATION CATALYST (1-OXCAT)
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: <div style="display: flex; justify-content: space-around; text-align: center;"> CO 90% NMNEHC 70% HCHO 70% </div>	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 9,216 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse or disposal. NA	

Gas Stream Characteristics

14. Are halogenated organics present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are particulates present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
15. Inlet emission stream parameters:	Maximum	Typical	
Pressure (mmHg):	NA	NA	
Heat Content (BTU/scf):	NA	NA	
Oxygen Content (%):	NA	NA	
Moisture Content (%):	NA	NA	
Relative Humidity (%):	NA	NA	

FRANCIS COMPRESSOR STATION

Application for 45CSR13 NSR Construction Permit

Attachment M - Air Pollution Control Device Sheet - Continued

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

NA

28. Describe the collection material disposal system:

NA

29. Describe the collection material disposal system:

NA

30. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

RECORDKEEPING:

REPORTING:

TESTING:

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 or air control device.

RECORDKEEPING

Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING

Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING

Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Collection Efficiency for each air pollutant.

CO ~100% NMNEHC ~100% HCHO ~100%

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

CO ≥90% NMNEHC ≥70% HCHO ≥70%

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

To Williams
 Attn
 Via E-mail

Our Ref. QT-115-2264-1
 Date : 12/7/2015
 Page: 1 of 1

PERFORMANCE EXPECTATION

For: Location: Francis 1,2,3

Engine Operating Parameters and Catalyst Description

Engine Manufacturer	Caterpillar	Substrate Type	Folded Metal Foil
Engine Model	G3516B	Cell Pattern	320 cpsi Herringbone
Horsepower	1380 bhp	Banding	CCC C-Channel Design
Speed	1400 rpm	Catalyst Dimensions	23.875 x 14.875 x 3.50"
Exhaust Flowrate	9,216 acfm	Quantity Required	3 per Unit
Exhaust Temperature	1007 °F	Formulation	HFX4
Fuel	Field Gas		

Engine Output, Fresh Catalyst Performance Expectation and Warranted Emissions

	Raw Exhaust	Performance	Performance
NOx	0.5 g/bhp-hr		
CO	2.92 g/bhp-hr	90 % Conversion	0.29 g/bhp-hr
THC	4.53 g/bhp-hr		
NMNEHC	1.01 g/bhp-hr	70 % Conversion	0.30 g/bhp-hr
HCHO	0.4 g/bhp-hr	70 % Conversion	0.12 g/bhp-hr
Oxygen	9.1 %		

* Per user supplied information

Notes and Cautions

Note: Catalyst performance is dependent upon the engine being run in accordance with the manufacturer's specifications for new engines.

Issued by

Name : Brian Weninger

Date : 12/7/15

ATTACHMENT N

Supporting Emissions Calculations

“30. Provide all **Supporting Emissions Calculations** as Attachment N.”

- **Emission Summary Spreadsheets**
 - Potential to Emit (PTE) – CRITERIA – CONTROLLED
 - Potential to Emit (PTE) – CRITERIA – PRE-CONTROLLED
 - Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS (HAP) – CONTROLLED
 - Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS (HAP) – PRE-CONTROLLED
 - Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED
 - Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – PRE-CONTROLLED
 - **Unit-Specific Emission Spreadsheets**
 - Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)
 - Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)
 - Start/Stop/Maintenance (Including Blowdown) (SSM-2/24E)
 - **Fugitive Emissions**
 - Piping and Equipment Fugitives (FUG-3/25E)
 - **AP-42 and GHG Emission Factors**
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – CRITERIA – CONTROLLED

Unit ID	Point ID	Description	Site Rating	NOX		CO		VOC		SO2		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	22E	CAT G3516B Compressor Engine (OxCat)	1,380 bhp	1.52	6.66	0.89	3.89	1.29	5.64	0.01	0.03	0.11	0.49
RPC-3	23E	Rod Packing/Crankcase Leaks	1 Recip	---	---	---	---	1.18	5.15	---	---	---	---
SSM-2	24E	Start/Stop/Maintenance (i.e., Blowdown)	1 Recip	---	---	---	---	---	15.92	---	---	---	---
POINT SOURCE SUBTOTAL - FRANCIS CS:				1.52	6.66	0.89	3.89	2.46	26.71	0.01	0.03	0.11	0.49

POINT SOURCE SUBTOTAL - OAK GROVE GP:	649.96	121.26	1,285.92	192.57	212.22	69.94	1.67	0.76	21.43	10.68
POINT SOURCE SUBTOTAL - INDEPENDENCE CS:	---	---	---	---	0.23	1.00	---	---	---	---
TOTAL - POINT SOURCE EMISSIONS:	651.48	127.93	1,286.81	196.47	214.91	97.64	1.68	0.79	21.55	11.18
PSD THRESHOLD:		250 tpy		250 tpy		250 tpy		250 tpy		250 tpy

FUG-3	25E	Piping and Equipment Fugitives - Gas	---	---	---	---	0.63	2.77	---	---	---	---
FUGITIVE SOURCE SUBTOTAL - FRANCIS CS:				---	---	---	0.63	2.77	---	---	---	---

FUGITIVE SOURCE SUBTOTAL - OAK GROVE GP:	---	---	---	---	13.43	42.50	---	---	---	---
FUGITIVE SOURCE SUBTOTAL - INDEPENDENCE CS:	---	---	---	---	0.01	0.06	---	---	---	---
TOTAL - FUGITIVE EMISSIONS:	---	---	---	---	14.07	45.34	---	---	---	---

GRAND TOTAL - FRANCIS CS:	1.52	6.66	0.89	3.89	3.10	29.48	0.01	0.03	0.11	0.49
GRAND TOTAL - OAK GROVE GP:	649.96	121.26	1285.92	192.57	225.64	112.44	1.67	0.76	21.43	10.68
GRAND TOTAL - INDEPENDENCE CS:	---	---	---	---	0.24	1.06	---	---	---	---
GRAND TOTAL - PLANT-WIDE EMISSIONS:	651.48	127.93	1,286.81	196.47	228.98	142.98	1.68	0.79	21.55	11.18
WV NSR THRESHOLD:	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy
TVOP THRESHOLD:		100 tpy		100 tpy		100 tpy		100 tpy		100 tpy

- Notes:
- 1 - Emissions are based on operation at 100% of rated load for 8,760 hr/yr; except.
 - a - Start/Stop/Maintenance (SSM-2/24E) is intermittent and infrequent.
 - 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
 - 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 - 4 - Intermittent Flare Operations distorts the lb/hr emission calculations from the OGGP.

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – CRITERIA – PRE-CONTROLLED

Unit ID	Point ID	Description	Site Rating	NOX		CO		VOC		SO2		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	22E	CAT G3516B Compressor Engine (OxCat)	1,380 bhp	1.52	6.66	8.88	38.91	4.29	18.79	0.01	0.03	0.11	0.49
RPC-3	23E	Rod Packing/Crankcase Leaks	1 Recip	---	---	---	---	1.18	5.15	---	---	---	---
SSM-2	24E	Start/Stop/Maintenance (i.e., Blowdown)	1 Recip	---	---	---	---	---	15.92	---	---	---	---
POINT SOURCE SUBTOTAL - FRANCIS CS:				1.52	6.66	8.88	38.91	5.47	39.86	0.01	0.03	0.11	0.49

POINT SOURCE SUBTOTAL - OAK GROVE GP:	649.96	125.34	1,285.92	196.73	17,763.49	2,087.61	1.67	0.77	21.43	10.86
POINT SOURCE SUBTOTAL - INDEPENDENCE CS:	---	---	---	---	0.06	0.06	---	---	---	---
TOTAL - POINT SOURCE EMISSIONS:	651.48	132.01	1,294.81	235.64	17,769.01	2,127.52	1.68	0.80	21.55	11.35
PSD THRESHOLD:		250 tpy		250 tpy		250 tpy		250 tpy		250 tpy

FUG-3	25E	Piping and Equipment Fugitives - Gas	---	---	---	---	---	1.32	5.77	---	---	---	---
FUGITIVE SOURCE SUBTOTAL - FRANCIS CS:				---	---	---	---	1.32	5.77	---	---	---	---

FUGITIVE SUBTOTAL - OAK GROVE GP:	---	---	---	---	28.58	125.17	---	---	---	---
FUGITIVE SOURCE SUBTOTAL - INDEPENDENCE CS:	---	---	---	---	0.01	0.06	---	---	---	---
TOTAL - FUGITIVE EMISSIONS:	---	---	---	---	29.91	131.00	---	---	---	---

GRAND TOTAL - FRANCIS CS:	1.52	6.66	8.88	38.91	6.78	45.63	0.01	0.03	0.11	0.49
GRAND TOTAL - OAK GROVE GP:	649.96	125.34	1,285.92	196.73	17,792.07	2,212.78	1.67	0.77	21.43	10.86
GRAND TOTAL - INDEPENDENCE CS:	---	---	---	---	0.07	0.12	---	---	---	---
GRAND TOTAL - PLANT-WIDE EMISSIONS:	651.48	132.01	1,294.81	235.64	17,798.92	2,258.52	1.68	0.80	21.55	11.35
WV NSR THRESHOLD:	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy	6 lb/hr AND 10 tpy
TVOP THRESHOLD:		100 tpy		100 tpy		100 tpy		100 tpy		100 tpy

- Notes:
- 1 - Emissions are based on operation at 100% of rated load for 8,760 hr/yr; except.
 - a - Start/Stop/Maintenance (SSM-2/24E) is intermittent and infrequent.
 - 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
 - 3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
 - 4 - Intermittent Flare Operations distorts the lb/hr emission calculations from the OGGP.

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS (HAP) – CONTROLLED

Unit ID	Acetaldehyde		Acrolein		Benzene		Ethylbenzene		Formaldehyde		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	0.03	0.12	0.02	0.08	1.5E-03	0.01	1.3E-04	5.9E-04	0.37	1.60	3.8E-03	0.02	0.01	0.04	1.4E-03	0.01	8.5E-04	3.7E-03	6.2E-04	2.7E-03	3.2E-03	0.01	0.43	1.89
RPC-3	---	---	---	---	1.7E-03	0.01	1.7E-03	0.01	0.01	0.05	0.01	0.06	---	---	1.7E-03	0.01	1.7E-03	0.01	1.7E-03	0.01	---	---	0.03	0.15
SSM-2	---	---	---	---	---	0.02	---	0.02	---	---	---	0.19	---	---	---	0.02	---	0.02	---	0.02	---	---	---	0.29
FCS:	0.03	0.12	0.02	0.08	3.2E-03	0.03	1.9E-03	0.03	0.38	1.65	0.02	0.27	0.01	0.04	3.1E-03	0.03	2.6E-03	0.03	2.4E-03	0.03	3.2E-03	0.01	0.46	2.32
OGGP:	---	---	---	---	5.55	1.76	7.14	1.94	0.41	0.12	6.93	3.60	---	---	6.36	1.86	7.60	2.00	7.16	1.95	0.03	0.01	41.18	13.24
ICS:	---	---	---	---	0.01	0.06	0.01	0.06	---	---	0.01	0.06	---	---	0.01	0.06	0.01	0.06	0.01	0.06	---	---	0.08	0.33
PS-TOT:	0.03	0.12	0.02	0.08	5.56	1.85	7.16	2.03	0.79	1.77	6.96	3.93	0.01	0.04	6.37	1.94	7.62	2.08	7.18	2.03	0.03	0.02	41.72	15.89
PSD:	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
FUG-3	---	---	---	---	3.1E-03	0.01	3.1E-03	0.01	---	---	1.8E-02	0.08	---	---	3.1E-03	0.01	3.1E-03	0.01	3.1E-03	0.01	---	---	0.03	0.15
FCS:	---	---	---	---	3.1E-03	0.01	3.1E-03	0.01	---	---	1.8E-02	0.08	---	---	3.1E-03	0.01	3.1E-03	0.01	3.1E-03	1.4E-02	---	---	0.03	0.15
OGGP:	---	---	---	---	0.02	0.10	0.02	0.10	---	---	0.02	0.10	---	---	0.02	0.10	0.02	0.10	0.02	0.10	---	---	0.14	0.60
ICS:	---	---	---	---	8.1E-04	3.5E-03	8.1E-04	3.5E-03	---	---	8.1E-04	3.5E-03	---	---	8.1E-04	3.5E-03	8.1E-04	3.5E-03	8.1E-04	3.5E-03	---	---	4.9E-03	0.02
FUG-TOT:	---	---	---	---	0.03	0.12	0.03	0.12	---	---	0.04	0.18	---	---	0.03	0.12	0.03	0.12	0.03	0.12	---	---	0.18	0.77
FCS:	0.03	0.12	0.02	0.08	6.3E-03	0.05	5.0E-03	0.04	0.38	1.65	0.04	0.35	0.01	0.04	6.2E-03	0.05	5.7E-03	0.04	5.5E-03	0.04	3.2E-03	0.01	0.50	2.47
OGGP:	---	---	---	---	5.57	1.86	7.17	2.04	0.41	0.12	6.95	3.70	---	---	6.38	1.96	7.63	2.10	7.19	2.05	0.03	0.01	41.32	13.84
ICS:	---	---	---	---	0.01	0.06	0.01	0.06	---	---	0.01	0.06	---	---	0.01	0.06	0.01	0.06	0.01	0.06	---	---	0.08	0.35
TOTAL:	0.03	0.12	0.02	0.08	5.59	1.97	7.19	2.14	0.79	1.77	7.00	4.11	0.01	0.04	6.40	2.06	7.65	2.20	7.21	2.15	0.03	0.02	41.90	16.66
NSR:	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	
TVOP:	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	25

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS (HAP) – PRE-CONTROLLED

Unit ID	Acetaldehyde		Acrolein		Benzene		Ethylbenzene		Formaldehyde		n-Hexane		Methanol		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	0.03	0.12	0.02	0.08	1.5E-03	0.01	1.3E-04	5.9E-04	0.37	1.60	3.8E-03	0.02	0.01	0.04	1.4E-03	0.01	8.5E-04	3.7E-03	6.2E-04	2.7E-03	3.2E-03	0.01	0.43	1.89
RPC-3	---	---	---	---	1.7E-03	0.01	1.7E-03	0.01	0.01	0.05	0.01	0.06	---	---	1.7E-03	0.01	1.7E-03	0.01	1.7E-03	0.01	---	---	0.03	0.15
SSM-2	---	---	---	---	---	0.02	---	0.02	---	---	---	0.19	---	---	---	0.02	---	0.02	---	0.02	---	---	---	0.29
FCS:	0.03	0.12	0.02	0.08	3.2E-03	0.03	1.9E-03	0.03	0.38	1.65	0.02	0.27	0.01	0.04	3.1E-03	0.03	2.6E-03	0.03	2.4E-03	0.03	3.2E-03	0.01	0.46	2.32
OGGP:	---	---	---	---	449.95	52.81	610.20	71.19	0.06	0.27	549.68	65.92	---	---	531.11	62.12	656.47	76.51	612.19	71.42	0.01	0.00	3409.68	400.33
ICS:	---	---	---	---	0.01	0.06	0.01	0.06	---	---	0.01	0.06	---	---	0.01	0.06	0.01	0.06	0.01	0.06	---	---	0.08	0.33
PS-TOT:	0.03	0.12	0.02	0.08	449.96	52.90	610.22	71.28	0.44	1.91	549.71	66.25	0.01	0.04	531.13	62.21	656.48	76.59	612.20	71.51	0.01	0.02	3410.22	402.99
PSD:	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
FUG-3	---	---	---	---	4.2E-03	0.02	4.2E-03	0.02	---	---	0.03	0.12	---	---	4.2E-03	0.02	4.2E-03	0.02	4.2E-03	0.02	---	---	0.05	0.21
FCS:	---	---	---	---	4.2E-03	0.02	4.2E-03	0.02	---	---	0.03	0.12	---	---	4.2E-03	0.02	4.2E-03	0.02	4.2E-03	0.02	---	---	0.05	0.21
OGGP:	---	---	---	---	0.02	0.10	0.02	0.10	---	---	0.02	0.10	---	---	0.02	0.10	0.02	0.10	0.02	0.10	---	---	0.14	0.60
ICS:	---	---	---	---	8.1E-04	3.5E-03	8.1E-04	3.5E-03	---	---	8.1E-04	3.5E-03	---	---	8.1E-04	3.5E-03	8.1E-04	3.5E-03	8.1E-04	3.5E-03	---	---	4.9E-03	0.02
FUG-TOT:	---	---	---	---	0.03	0.12	0.03	0.12	---	---	0.05	0.22	---	---	0.03	0.12	0.03	0.12	0.03	0.12	---	---	0.19	0.83
FCS:	0.03	0.12	0.02	0.08	7.4E-03	0.05	6.0E-03	0.05	0.38	1.65	0.04	0.39	0.01	0.04	7.3E-03	0.05	6.8E-03	0.05	6.5E-03	0.05	3.2E-03	0.01	0.51	2.53
OGGP:	---	---	---	---	449.97	52.91	610.22	71.29	0.06	0.27	549.70	66.02	---	---	531.13	62.22	656.49	76.61	612.21	71.52	0.01	0.00	3409.82	400.94
ICS:	---	---	---	---	0.01	0.06	0.01	0.06	---	---	0.01	0.06	---	---	0.01	0.06	0.01	0.06	0.01	0.06	---	---	0.08	0.35
TOTAL:	0.03	0.12	0.02	0.08	449.99	53.02	610.24	71.40	0.44	1.91	549.76	66.47	0.01	0.04	531.15	62.33	656.51	76.71	612.23	71.63	0.01	0.02	3410.41	403.82
NSR:	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 0.5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy	2 lb/hr <u>OR</u> 5 tpy
TVOP:	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED

Unit ID	Point ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	kg/MMBtu: 53.06		kg/MMBtu: 1.00E-03		kg/MMBtu: 1.00E-04		TOTAL CO2e tpy
					GWP: CO2 tpy	GWP: CO2e tpy	GWP: CH4 tpy	GWP: CO2e tpy	GWP: N2O tpy	GWP: CO2e tpy	
CE-01	22E	CAT G3516B Compressor Engine (OxCat)	11.29	8,760	6,703	6,703	32	796	0.01	3	7,502
RPC-3	23E	Rod Packing/Crankcase Leaks	---	8,760	58	58	11	283	---	---	341
SSM-2	24E	Start/Stop/Maintenance (i.e., Blowdown)	---	---	---	---	35.2	880	---	---	880
POINT SOURCE SUBTOTAL - FRANCIS CS:					6,761	6,761	78	1,959	0.01	3	8,723
POINT SOURCE SUBTOTAL - OAK GROVE GP:					218,331	218,331	371	9,273	69	20,441	248,045
POINT SOURCE SUBTOTAL - INDEPENDENCE CS:					16	16	262	6,561	---	---	6,577
TOTAL - POINT SOURCE EMISSIONS:					225,108	225,108	712	17,794	69	20,444	263,345
FUG-3	25E	Piping and Equipment Fugitives - Gas	---	8,760	0.03	0.03	1	21	---	---	21
FUGITIVE SOURCE SUBTOTAL - FRANCIS CS:					0.03	0.03	1	21	---	---	21
FUGITIVE SOURCE SUBTOTAL - OAK GROVE GP:					0.4	0.4	45	1,118	---	---	1,118
FUGITIVE SOURCE SUBTOTAL - INDEPENDENCE CS:					0.2	0.2	30	750	---	---	750
TOTAL - FUGITIVE EMISSIONS:					0.6	0.6	76	1,888	---	---	1,889
GRAND TOTAL - FRANCIS CS:					6,761	6,761	79	1,980	0.01	3	8,744
GRAND TOTAL - OAK GROVE GP:					218,331	218,331	416	10,391	69	20,441	249,163
GRAND TOTAL - INDEPENDENCE CS:					16	16	292	7,311	---	---	7,327
GRAND TOTAL - PLANT-WIDE EMISSIONS:					225,108	225,108	787	19,682	69	20,444	265,234
TVOP THRESHOLD:					na		na		na		100,000
PSD THRESHOLD:					na	OR	na	OR	na	AND	na

Notes: 1 - PSD Thresholds and Title V Major Source Thresholds are only applicable if other regulated air pollutants exceed the corresponding Thresholds.

FRANCIS COMPRESSOR STATION (and OAK GROVE GP and INDEPENDENCE CS)

Application for 45CSR13 NSR Construction Permit

Attachment N - Supporting Emissions Calculations

Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – PRE-CONTROLLED

Unit ID	Point ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	kg/MMBtu: 53.06		kg/MMBtu: 1.00E-03		kg/MMBtu: 1.00E-04		TOTAL CO2e tpy
					GWP: CO2 tpy	GWP: CO2e tpy	GWP: CH4 tpy	GWP: CO2e tpy	GWP: N2O tpy	GWP: CO2e tpy	
CE-01	22E	CAT G3516B Compressor Engine (OxCat)	11.29	8,760	6,703	6,703	32	796	0.01	3	7,502
RPC-3	23E	Rod Packing/Crankcase Leaks	---	8,760	58	58	11	283	---	---	341
SSM-2	24E	Start/Stop/Maintenance (i.e., Blowdown)	---	---	---	---	35.2	880	---	---	880
POINT SOURCE SUBTOTAL - FRANCIS CS:					6,761	6,761	78	1,959	0.01	3	8,723
POINT SOURCE SUBTOTAL - OAK GROVE GP:					136,520	136,520	2,841	70,962	0	64	207,600
POINT SOURCE SUBTOTAL - INDEPENDENCE CS:					3	3	468	11,704	0.0	0	11,707
TOTAL - POINT SOURCE EMISSIONS:					143,285	143,285	3,387	84,625	0	68	228,030
FUG-3	25E	Piping and Equipment Fugitives - Gas	---	8,760	0.08	0.08	2	57	---	---	57
FUGITIVE SOURCE SUBTOTAL - FRANCIS CS:					0.08	0.08	2	57	0	0	57
FUGITIVE SOURCE SUBTOTAL - OAK GROVE GP:					1.1	0.4	135	1,118	---	---	3,380
FUGITIVE SOURCE SUBTOTAL - INDEPENDENCE CS:					0.2	0.2	30	750	---	---	750
TOTAL - FUGITIVE EMISSIONS:					1.4	0.7	167	1,925	---	---	4,187
GRAND TOTAL - FRANCIS CS:					6,761	6,761	81	2,016	0.01	3	8,781
GRAND TOTAL - OAK GROVE GP:					136,521	136,521	2,976	72,080	0	64	210,979
GRAND TOTAL - INDEPENDENCE CS:					4	4	498	12,454	---	---	12,457
GRAND TOTAL - PLANT-WIDE EMISSIONS:					143,286	143,285	3,555	86,550	0	68	232,217
TVOP THRESHOLD:					na		na		na		100,000
PSD THRESHOLD:					na	OR	na	OR	na) AND	na

Notes: 1 - PSD Thresholds and Title V Major Source Thresholds are only applicable if other regulated air pollutants exceed the corresponding Thresholds.

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Attachment N - Supporting Emissions Calculations

Compressor Engine Emissions – 1,380 bhp CAT G3516B (CE-01/22E)

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions			
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/MMBtu	lb/hr	tpy
CE-01/22E	Engine 01 Caterpillar (CAT) G3516B 1,380 bhp 1,400 rpm 4SLB / AFRC Oxidation Catalyst Manufactured/Modified After July 1, 2010 NSPS JJJJ Affected 8,760 hr/yr 1,020 Btu/scf (HHV) 8,182 Btu/bhp-hr 11.29 MMBtu/hr (HHV) 98,911 MMBtu/yr (HHV) 11,070 scf/hr 0.27 MMscfd 1.86 MMscf/wk 96.97 MMscf/yr	Vendor Data	NOx	0.50	0.13	1.52	6.66	0.0%	0.50	0.13	1.52	6.66
		Vendor Data	CO	2.92	0.79	8.88	38.91	90.0%	0.29	0.08	0.89	3.89
		Vendor Data	THC	4.53	1.22	13.78	60.37	15.6%	3.82	1.03	11.63	50.94
		Vendor Data	NMHC	2.14	0.58	6.51	28.52	33.0%	1.43	0.39	4.36	19.10
		Vendor Data	NMNEHC	1.01	0.27	3.07	13.46	70.0%	0.30	0.08	0.92	4.04
		NMNEHC+HCHO	VOC	1.41	0.38	4.29	18.79	70.0%	0.42	0.11	1.29	5.64
		AP-42 Table 3.2-2	SO2	2.2E-03	5.88E-04	0.01	0.03	---	2.2E-03	5.88E-04	0.01	0.03
		AP-42 Table 3.2-2	PM10/2.5	0.04	9.99E-03	0.11	0.49	---	0.04	9.99E-03	0.11	0.49
		AP-42 Table 3.2-2	Acetaldehyde	0.03	8.36E-03	0.09	0.41	70.0%	0.01	2.51E-03	0.03	0.12
		AP-42 Table 3.2-2	Acrolein	0.02	5.14E-03	0.06	0.25	70.0%	0.01	1.54E-03	0.02	0.08
		AP-42 Table 3.2-2	Benzene	1.6E-03	4.40E-04	5.0E-03	0.02	70.0%	4.9E-04	1.32E-04	1.5E-03	0.01
		AP-42 Table 3.2-2	Ethylbenzene	1.5E-04	3.97E-05	4.5E-04	2.0E-03	70.0%	4.4E-05	1.19E-05	1.3E-04	5.9E-04
		Vendor Data	Formaldehyde	0.40	0.05	1.22	5.33	70.0%	0.12	0.02	0.37	1.60
		AP-42 Table 3.2-2	n-Hexane	4.1E-03	1.11E-03	0.01	0.05	70.0%	1.2E-03	3.33E-04	3.8E-03	0.02
		AP-42 Table 3.2-2	Methanol	0.01	2.50E-03	0.03	0.12	70.0%	2.8E-03	7.50E-04	0.01	0.04
		AP-42 Table 3.2-2	Toluene	1.5E-03	4.08E-04	4.6E-03	0.02	70.0%	4.5E-04	1.22E-04	1.4E-03	0.01
		AP-42 Table 3.2-2	2,2,4-TMP	9.3E-04	2.50E-04	2.8E-03	0.01	70.0%	2.8E-04	7.50E-05	8.5E-04	3.7E-03
		AP-42 Table 3.2-2	Xylenes	6.8E-04	1.84E-04	2.1E-03	0.01	70.0%	2.0E-04	5.52E-05	6.2E-04	2.7E-03
		AP-42 Table 3.2-2	Other HAP	3.5E-03	9.34E-04	0.01	0.05	70.0%	1.0E-03	2.80E-04	3.2E-03	0.01
			Sum	Total HAP	0.47	0.07	1.44	6.29	70.0%	0.14	0.02	0.43
Vendor Data	CO2	503	116.89	1,530	6,703	---	503	116.89	1,530	6,703		
THC-NMHC	CH4	2.39	0.64	7.27	31.85	---	2.39	0.64	7.27	31.85		
40CFR98 - Table C-2	N2O	8.2E-04	2.20E-04	2.5E-03	0.01	---	8.2E-04	2.20E-04	2.5E-03	0.01		
40CFR98 - Table A-1	CO2e	563	133.05	1,713	7,502	---	563	133.05	1,713	7,502		

- Notes: 1) Fuel Heating Value may vary; 1,020 MMBtu/scf is at the low end of the range and results in a conservative fuel consumption estimate.
 2) VOC is the sum of NMNEHC (non-methane non-ethane hydrocarbons) and formaldehyde (HCHO).

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Attachment N - Supporting Emissions Calculations

Compressor Rod Packing and Engine Crankcase Leaks (RPC-3/23E)

Natural Gas

Unit ID	Unit Description	Number of Compressors	Cylinders per Compressor	scfh per Cylinder	Contingency	Total Rod Packing Leak Rate MMscf/yr	VOC		HCHO		n-Hexane		BTEX,TMP (Each)		Total HAP		CO2		CH4		CO2e	
							16,500 lb/MMscf	na lb/MMscf	200 lb/MMscf	20 lb/MMscf	300 lb/MMscf	300 lb/MMscf	36,500 lb/MMscf	912,800 lb/MMscf								
							lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy		
RPC-3/23E	Rod Packing	1	4	15	15%	0.60	1.14	4.99	na	na	0.01	0.06	1.4E-03	0.01	0.02	0.09	0.02	0.1	3	11	63	276

Combustion Gas

Unit ID	Unit Description	Total BHP	Crankcase Leak Rate 0.50 scf/bhp-hr MMscf/yr	Safety Factor	VOC		HCHO		n-Hexane		BTEX,TMP (Each)		Total HAP		CO2		CH4		CO2e	
					21.55 lb/MMscf	6.11 lb/MMscf	0.06 lb/MMscf	0.21 lb/MMscf	7.21 lb/MMscf	7,689 lb/MMscf	37 lb/MMscf	8,603 lb/MMscf								
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy		
RPC-3/23E	Crankcase	1,380	6.04	250%	0.04	0.16	0.01	0.05	1.1E-04	4.8E-04	3.6E-04	1.6E-03	0.01	0.05	13	58	0.1	0.3	15	65

VOC		HCHO		n-Hexane		BTEX,TMP (Each)		Total HAP		CO2		CH4		CO2e	
lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TOTAL RPC-3/23E:															
1.18	5.15	0.01	0.05	0.01	0.06	1.7E-03	0.01	0.03	0.15	13	58	3	11	78	341

Notes: 1 - RPC is a broad category covering leaks of natural gas from sealed surfaces, such as packing and gaskets, resulting from the wear of mechanical joints, seals, and rotating surfaces over time. It also includes the crankcase emissions from reciprocating engines.

2 - Emission are based upon 40CFR98, Subpart W and manufacturer's data.

3 - To be conservative, and to account for potential future changes, the following "worst-case" gas characteristics were assumed:

Pollutant	Representative Gas Analysis	Worst-Case Assumption
CO2	186 lb/MMscf	300 lb/MMscf
CH4	30,386 lb/MMscf	36,500 lb/MMscf
VOC	13,479 lb/MMscf	16,500 lb/MMscf
n-Hexane	148 lb/MMscf	200 lb/MMscf
BTEX, TMP (ea)	5 lb/MMscf	20 lb/MMscf
Total HAP	172 lb/MMscf	300 lb/MMscf

4 - Total Rod Packing Leak Rate (scf/yr) =
 No. of Compressors * Cylinders/Compressor *
 scfh/Cylinder * 8760 hr/yr * (1 + Contingency)

5 - Engine crankcase emissions are based on vendor data: "As a general rule, blow-by (i.e., crankcase emissions) on a new engine is approx 0.5 scf/bhp-hr." A "safety factor" is used to account for increasing blow-by as the engines "wear".

6 - Crankcase emissions are estimated as follows:

(Data from CAT G3516B Data Sheet and Emissions Calculation Spreadsheet.)

Total Engine Exhaust (TEEx) (Volume)	9,216 ft3/min (acf/min)	1,743 MMscf/yr TEEx*
Pollutant	G3516B PTE	Crankcase Emission Factor**
Crankcase THC emissions (Mass)	60.37 tpy THC	69.25 lb THC / MMscf TEEx
Crankcase VOC emissions (Mass)	18.79 tpy VOC	21.55 lb VOC / MMscf TEEx
Crankcase HCHO emissions (Mass)	5.33 tpy HCHO	6.11 lb HCHO / MMscf TEEx
Crankcase n-Hexane emissions (Mass)	0.05 tpy BTEX (ea)	0.06 lb BTEX (ea) / MMscf TEEx
Crankcase BTEX, TMP (ea) emissions (Mass)	0.18 tpy BTEX (ea)	0.21 lb BTEX (ea) / MMscf TEEx
Crankcase HAP emissions (Mass)	6.29 tpy HAP	7.21 lb HAP / MMscf TEEx
Crankcase CO2 emissions (Mass)	6,703 tpy CO2	7,689 lb CO2 / MMscf TEEx
Crankcase CH4 emissions (Mass)	32 tpy CH4	37 lb CH4 / MMscf TEEx
Crankcase CO2e emissions (Mass)	7,502 tpy CO2e	8,606 lb CO2e / MMscf TEEx

* Conversion from acf/min to scf/yr based on 8,760 hr/yr, 1,007 oF exhaust temp, and 68 oF std temp.

** Crankcase Emission Factor = PTE (tpy) from a G3516B Engine ÷ Total Engine Exhaust (TEEx) (MMsf/yr).

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Attachment N - Supporting Emissions Calculations

Start/Stop/Maintenance (Including Blowdown) (SSM-2/24E)

Unit		No of Compressor Units	Total bhp	a. Engine "Cold-Start" Gas Volume scf/Start	b. Blowdown Gas Volume scf/B-D	SSM and Blowdown Events/yr	Total Gas Vented MMscf/yr	VOC 16,500 lb/MMscf tpy	n-Hex 200 lb/MMscf tpy	BTEX,TMP 20 lb/MMscf tpy	Total HAP 300 lb/MMscf tpy	CH4 36,500 lb/MMscf tpy	CO2e GWP = 25 tpy
SSM-2/24E	a. Cold Start (Engine)	1	na	700	---	208	0.15	1.20	0.01	1.5E-03	0.02	2.66	66
	b. Blowdown (Recip Comp)	1	1,380	---	8,577	208	1.78	14.72	0.18	0.02	0.27	32.56	814

TOTAL SSM-2/24E:

15.92	0.19	0.02	0.29	35.22	880
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Notes: 1 - SSM Emissions are the sum of:

- a. Unburned fuel resulting from "cold-start" of idle gas-fired engines; and
- b. Natural gas that is purged (aka blowdown) from the compressors and associated piping and equipment.

2 - Starting Gas Quantity and Blowdown (B-D) Gas Quantity as per Engineering Department.

(e.g., 8,577 scf/B-D of a compressor with a 1,380 bhp engine equals 6.22 scf/bhp/B-D.)

Engines	a. Unburned "Cold-Start" Gas is Constant at:	700 scf/start
	b. Blowdown Gas is Related to bhp at:	6.22 scf/bhp/B-D

3 - To be conservative, the following gas characteristics were assumed:

Pollutant	Gas Analysis	Estimated
Carbon Dioxide	185.56 lb/MMscf	300.00 lb/MMscf
Methane	30,385.73 lb/MMscf	36,500.00 lb/MMscf
Ethane	13,880.75 lb/MMscf	4,445.72 lb/MMscf
VOC	13,479.23 lb/MMscf	16,500.00 lb/MMscf
Benzene	2.06 lb/MMscf	20.00 lb/MMscf
Ethylbenzene	2.80 lb/MMscf	20.00 lb/MMscf
n-Hexane	147.61 lb/MMscf	200.00 lb/MMscf
Toluene	4.86 lb/MMscf	20.00 lb/MMscf
2,2,4-TMP (i-Octane)	3.01 lb/MMscf	20.00 lb/MMscf
Xylenes	11.19 lb/MMscf	20.00 lb/MMscf
Total HAP	171.52 lb/MMscf	300.00 lb/MMscf

5 - Emission estimates are conservatively based on:

4.0	Starts per week
4.0	Blowdown(s) per week

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Attachment N - Supporting Emissions Calculations

Piping and Equipment Fugitives (FUG-3/25E)

Unit ID	Description	Component (Unit) Type (Gas)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Hydrocarbons (THC)		VOC		n-Hexane		BTEX, TMP-ea		Total HAP		CO2		CH4		CO2e		
						lb/hr	tpy	28.30 Wgt%	lb/hr	tpy	0.34 Wgt%	lb/hr	tpy	0.03 Wgt%	lb/hr	tpy	0.51 Wgt%	lb/hr	tpy	0.51 Wgt%	lb/hr	tpy
FUG-3 /25E	Process Piping Fugitives (Gas)	Valves	257	0.00992	87%	0.33	1.45	0.09	0.41	1.1E-03	5.0E-03	1.1E-04	5.0E-04	1.7E-03	0.01	1.7E-03	0.01	0.21	0.91	5	23	
		Pump Seals	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	30	0.01940	0%	0.58	2.55	0.16	0.72	2.0E-03	0.01	2.0E-04	8.7E-04	3.0E-03	0.01	3.0E-03	0.01	0.36	1.60	9	40	
		Connectors	737	0.00044	33%	0.22	0.95	0.06	0.27	7.5E-04	3.3E-03	7.5E-05	3.3E-04	1.1E-03	4.9E-03	1.1E-03	4.9E-03	0.14	0.60	3	15	
		Flanges	120	0.00086	0%	0.10	0.45	0.03	0.13	3.5E-04	1.5E-03	3.5E-05	1.5E-04	5.3E-04	2.3E-03	5.3E-04	2.3E-03	0.06	0.28	2	7	
		Open-ended	14	0.00441	0%	0.06	0.27	0.02	0.08	2.1E-04	9.3E-04	2.1E-05	9.3E-05	3.2E-04	1.4E-03	3.2E-04	1.4E-03	0.04	0.17	1	4	
			1,158	Controlled:		1.30	5.68	0.37	1.61	4.4E-03	0.02	4.4E-04	1.9E-03	0.01	0.03	0.01	0.03	0.81	3.55	20	89	
				Pre-Control:		3.62	15.86	1.02	4.49	0.01	0.05	1.2E-03	0.01	0.02	0.08	0.02	0.08	2.27	9.93	57	248	

Unit ID	Description	Component (Unit) Type (Water/Oil)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Hydrocarbons (THC)		VOC		n-Hexane		BTEX, TMP-ea		Total HAP		CO2		CH4		CO2e		
						lb/hr	tpy	100.00 Wgt%	lb/hr	tpy	5.00 Wgt%	lb/hr	tpy	1.00 Wgt%	lb/hr	tpy	10.00 Wgt%	lb/hr	tpy	0.10 Wgt%	lb/hr	tpy
FUG-3 /25E	Process Piping Fugitives (Water/Oil)	Valves	64	0.00022	84%	2.2E-03	0.01	2.2E-03	0.01	1.1E-04	4.9E-04	2.2E-05	9.7E-05	2.2E-04	9.7E-04	2.2E-06	9.7E-06	1.1E-04	4.9E-04	2.8E-03	0.01	
		Pump Seals	6	0.00005	69%	9.8E-05	4.3E-04	9.8E-05	4.3E-04	4.9E-06	2.2E-05	9.8E-07	4.3E-06	9.8E-06	4.3E-05	9.8E-08	4.3E-07	4.9E-06	2.2E-05	1.2E-04	5.4E-04	
		Other	8	0.03086	0%	0.23	1.01	0.23	1.01	1.2E-02	0.05	2.3E-03	1.0E-02	2.3E-02	0.10	2.3E-04	1.0E-03	0.01	0.05	0.29	1	
		Connectors	184	0.00024	33%	0.03	0.13	0.03	0.13	1.5E-03	6.6E-03	3.0E-04	1.3E-03	3.0E-03	1.3E-02	3.0E-05	1.3E-04	1.5E-03	0.01	0.04	0.16	
		Flanges	30	0.00001	0%	1.9E-04	8.4E-04	1.9E-04	8.4E-04	9.6E-06	4.2E-05	1.9E-06	8.4E-06	1.9E-05	8.4E-05	1.9E-07	8.4E-07	9.6E-06	4.2E-05	2.4E-04	1.1E-03	
		Open-ended	4	0.00055	0%	1.9E-03	0.01	1.9E-03	0.01	9.6E-05	4.2E-04	1.9E-05	8.4E-05	1.9E-04	8.4E-04	1.9E-06	8.4E-06	9.6E-05	4.2E-04	2.4E-03	0.01	
			296	Controlled:		0.27	1.16	0.27	1.16	1.3E-02	0.06	2.7E-03	1.2E-02	0.03	0.12	2.7E-04	1.2E-03	0.01	0.06	0.33	1	
				Pre-Control:		0.29	1.28	0.29	1.28	0.01	0.06	2.9E-03	0.01	0.03	0.13	2.9E-04	---	0.01	---	---	---	

TOTAL CONTROLLED FUGITIVE EMISSIONS:

TOTAL PRE-CONTROL FUGITIVE EMISSIONS:

1.56	6.84	0.63	2.77	0.02	0.08	3.1E-03	0.01	0.03	0.15	0.01	0.03	1	4	21	90
3.91	17.14	1.32	5.77	0.03	0.12	4.2E-03	0.02	0.05	0.21	0.02	0.08	2	10	57	248

Notes: 1 - Assumed 8,760 hours per year of fugitive emissions.

4 - Number of components in Gas Service are based on GRI-HAPCalc estimates, plus a **0%** margin.

5 - Number of components in Water/Oil Service are based on **25%** of components in Gas Service, except pump seals.

6 - "Other" components include compressor seals, relief valves, drains, meters, etc.

7 - The facility has implemented an LDAR Program. Control effectiveness is estimated as follows:

2 - Emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995.

TABLE 2.4 O&G PROD (AVG)	Gas		Water/Oil	
	kg/hr	lb/hr	kg/hr	lb/hr
Valves	4.5E-03	0.00992	9.8E-05	0.00022
Pump Seals	na	na	2.4E-05	0.00005
Others*	8.8E-03	0.01940	1.4E-02	0.03086
Connectors	2.0E-04	0.00044	1.1E-04	0.00024
Flanges	3.9E-04	0.00086	2.9E-06	0.00001
Open-Ended Lines	2.0E-03	0.00441	2.5E-04	0.00055

3 - To be conservative, the following gas characteristics were assumed:

Pollutant	Gas	Light Liquid
Carbon Dioxide	0.51 Wgt%	0.10 Wgt%
Methane	62.59 Wgt%	5.00 Wgt%
VOC	28.30 Wgt%	100.00 Wgt%
n-Hexane	0.34 Wgt%	5.00 Wgt%
BTEX, TMP-ea	0.03 Wgt%	1.00 Wgt%
Total HAP	0.51 Wgt%	10.00 Wgt%

CONTROL EFFECTIVENESS FOR AN LDAR PROGRAM AT A SOCMI PROCESS UNIT

Equipment Type and Service	Control Effectiveness (%)		
	Monthly Monitoring 10,000 ppmv Leak Definition	Quarterly Monitoring 10,000 ppmv Leak Definition	HON*
Valves - gas	87	67	92
Valves - light liquid	84	61	88
Pumps - light liquid	69	45	75
Compressors - gas	b	b	93
Connectors - gas and light liquid	b	33	b
Pressure relief devices - gas	b	44	b

* Control effectiveness attributed to the requirements of the HON equipment leak regulation is estimated based on equipment-specific leak definitions and performance levels.

b Data are not available to estimate control effectiveness.

AP-42 and GHG EMISSION FACTORS
(Preferentially use test data or vendor data where available)

Pollutant		GAS-FIRED ENGINE			GAS-FIRED TURBINE		
		AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00			AP-42 Table 3.1-1; 3.1-2a; 3.1-3 04/00		
		2SLB lb/MMBtu	4SLB lb/MMBtu	4SRB lb/MMBtu	Uncontrolled lb/MMBtu	Water Injection lb/MMBtu	Lean Pre-Mix# lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	3.17E+00	4.08E+00	2.21E+00	3.20E-01	1.30E-01	9.90E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC-CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC-C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	3.40E-03	3.40E-03	3.40E-03
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPS	Acetaldehyde	7.76E-03	8.36E-03	2.79E-03	4.00E-05	4.00E-05	4.00E-05
	Acrolein	7.78E-03	5.14E-03	2.63E-03	6.40E-06	6.40E-06	6.40E-06
	Benzene	1.94E-04	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	Methanol (MeOH)	2.48E-03	2.50E-03	3.06E-03	---	---	---
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	TMP, 2,2,4- (i-Octane)	8.46E-04	2.50E-04	---	---	---	---
	Xylenes	2.68E-04	1.84E-04	1.95E-04	6.40E-05	6.40E-05	6.40E-05
	Other HAPs	1.61E-03	9.34E-04	9.39E-04	5.97E-05	5.97E-05	5.97E-05
GHG	CO2**** (GWP=1)	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.60E-03	8.60E-03	8.60E-03
	N2O (GWP=298)	2.20E-04	2.20E-04	2.20E-04	3.00E-03	3.00E-03	3.00E-03
	CO2e	1.53E+02	1.48E+02	1.23E+02	1.18E+02	1.18E+02	1.18E+02

(#Lean Pre-Mix - aka: Dry Low Emissions (DLE or DLN) and SoLoNOx)

Pollutant		GAS-FIRED EXTERNAL COMBUSTION			FLARE	DIESEL ENGINE
		AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			13.5-1 04/15	3.3-1; 3.3-2 10/96
		Uncontrolled lb/MMBtu	LoNOx Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	Combustion lb/MMBtu	Uncontrolled lb/MMBtu
CRITERIA	NOX	9.80E-02	4.90E-02	3.14E-02	6.80E-02	4.41E+00
	CO	8.24E-02	8.24E-02	8.24E-02	3.10E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	≥98%	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	Destruction and Removal Efficiency	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03		3.50E-01
	VOC (NMNEHC+HCHO)	5.56E-03	5.56E-03	5.56E-03		3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.882E-04	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	7.451E-03	3.10E-01
HAPS	Acetaldehyde	---	---	---		7.67E-04
	Acrolein	---	---	---		9.25E-05
	Benzene	2.06E-06	2.06E-06	2.06E-06		9.33E-04
	Ethylbenzene	---	---	---		---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05	≥98% Destruction and Removal Efficiency	1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03		---
	Methanol (MeOH)	---	---	---		---
	Toluene	3.33E-06	3.33E-06	3.33E-06		4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---		---
	Xylenes	---	---	---		2.85E-04
Other HAPs	1.86E-06	1.86E-06	1.86E-06		1.05E-03	
GHG	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.64E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03	98% DRE	6.61E-03
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	2.16E-03	1.32E-03
	CO2e	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.65E+02

40 CFR 98 - DEFAULT EMISSION FACTORS

Fuel Type	Table C-1 to Subpart C of Part 98		Table C-2 to Subpart C of Part 98	
	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu
Fuel Oil No. 2 (Diesel)	0.138 MMBtu/gal	163.05	6.61E-03	1.32E-03
Propane	0.091 MMBtu/gal	138.60	6.61E-03	1.32E-03
Natural Gas	1,026 Btu/scf	116.98	2.20E-03	2.20E-04

Global Warming Potential (100 Yr) (GWP)		
Table A-1 to Subpart A of Part 98		
CO2	CH4	N2O
1.00	25.00	298.00

Conversion Factors

<http://www.onlineconversion.com/>

1.0 lb =	453.5924 g
1.0 kg =	2.2046 lb
1.0 hp =	2,544.433 Btu/hr
1.0 hp =	745.700 Watt
1.0 kW =	3,412.142 Btu/hr
1.0 kW-hr =	1,3400 hp-hr
1.0 cf =	7.4805 gal
1.0 gal H2O =	8.3378 lb
1.0 cf H2O =	62.3711 gal
1.0 m =	3.2808 ft
1.0 km =	0.6214 mi
1.0 acre =	43,560.174 ft2
1.0 °F =	(°C*9/5)+32
1.0 °R =	°F+459.67
1.0 % =	10,000 ppm
UGC (stp) =	379.48 scf/lb-mol

*Converted Ext Comb Emission Factors to lb/MMBtu by dividing lb/MMscf by AP-42 default HHV of 1,020 Btu/scf.

**Converted GHG Emission Factors to lb/MMBtu by multiplying kg/MMBtu by 2.2046 lb/kg.

***Assumes 100% conversion of fuel sulfur to SO2 (2,000 gr/MMscf).

****Assumes 99.5% conversion of fuel carbon to CO2 for natural gas.

ATTACHMENT O
Monitoring/Recordkeeping/Reporting/Testing Plans

“31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as Attachment O.”

- **Monitoring/Recordkeeping/Reporting/Testing Plans**
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
Application for 45CSR13 NSR Construction Permit

Attachment O
MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

Williams Ohio Valley Midstream LLC proposes the following monitoring, recordkeeping, testing and reporting requirements at the subject facility:

A. Monitoring

1. Monitor the quantity of natural gas consumed and hours of operation of the engine.

B. Recordkeeping

1. Maintain records of the amount of natural gas consumed and hours of operation of the engine.
2. Maintain records of testing conducted in accordance with the permit.
3. Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility.
4. The records shall be maintained on site or in a readily available off-site location for a period of five (5) years.

C. Reporting

1. Any deviations from the allowable emissions limitations, including visible emissions, shall be reported to the WVDEP-Division of Air Quality.
2. Any and all application forms, reports, or compliance certifications required by this Permit shall be certified by a responsible official.

D. Testing

1. The Compressor Engine (CE-01/22E) shall be tested in accordance w/ requirements of 40 CFR 60 (NSPS) Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

ATTACHMENT P

Public Notice

“32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and Example Legal Advertisement for details). Please submit the **Affidavit of Publication** as Attachment P immediately upon receipt.”

The applicant shall cause such legal advertisement to appear a minimum of one (1) day in the newspaper most commonly read in the area where the facility exists or will be constructed. The notice must be published no earlier than five (5) working days of receipt by this office of your application. The original affidavit of publication must be received by this office no later than the last day of the public comment period.

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

The location of the source should be as specific as possible starting with:

- 1) the street address of the source;
- 2) the nearest street or road;
- 3) the nearest town or unincorporated area;
- 4) the county; and
- 5) latitude and longitude coordinates.

Types and amounts of pollutants discharged must include all regulated pollutants (PM, PM10, VOC, SO₂, Xylene, etc.) and their potential to emit or the permit level being sought in units of tons per year (including fugitive emissions).

- Legal Advertisement (as shown) will be placed in a newspaper of general circulation in the area where the source is located (See 45CSR§13-8.3 thru 45CSR§13-8.5).
 - An Affidavit of Publication shall be submitted immediately upon receipt.
-

Williams Ohio Valley Midstream LLC
FRANCIS COMPRESSOR STATION
Application for 45CSR13 NSR Construction Permit
Attachment P - Public Notice

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Construction Permit for a natural gas compressor station located at the existing Oak Grove Gas Plant, 5258 Fork Ridge Rd, Moundsville, Marshall County, WV.

The latitude and longitude coordinates are 39.8739 degrees North and -80.6931 degrees West.

The applicant estimates the potential to discharge regulated air pollutants will be as follows:

6.66	tons of nitrogen oxides per year
3.89	tons of carbon monoxide per year
29.48	tons of volatile organic compounds per year
0.03	tons of sulfur dioxide per year
0.49	tons of particulate matter per year
0.05	tons of benzene per year
1.65	tons of formaldehyde per year
0.35	tons of n-hexane per year
2.47	tons of total hazardous air pollutants per year
8,744	tons of carbon dioxide equivalent per year

Startup of the facility is anticipated to occur during the 2nd quarter of 2016.

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

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the _____ day of _____ 20_____.

By: Williams Ohio Valley Midstream LLC
Mr. Paul V. Hunter
General Manager Ohio River Supply Hub
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

ATTACHMENT Q
Business Confidential Claims
(NOT APPLICABLE)

also

ATTACHMENT R
Authority Forms
(NOT APPLICABLE)

ATTACHMENT S
Title V Permit Revision Information

The OVM Francis Compressor Station will be located at the existing OVM Oak Grove Gas Plant. It is requested the Oak Grove Gas Plant Title V permit is updated to include the Francis Compressor Station 45CSR13 permit requirements.

Attachment S
Title V Permit Revision Information

1. New Applicable Requirements Summary	
Mark all applicable requirements associated with the changes involved with this permit revision:	
<input type="checkbox"/> SIP	<input type="checkbox"/> FIP
<input checked="" type="checkbox"/> Minor source NSR (45CSR13)	<input type="checkbox"/> PSD (45CSR14)
<input type="checkbox"/> NESHAP (45CSR15)	<input type="checkbox"/> Nonattainment NSR (45CSR19)
<input checked="" type="checkbox"/> Section 111 NSPS (Subpart(s) <u>JJJJ and OOOO</u>)	<input checked="" type="checkbox"/> Section 112(d) MACT standards (Subpart(s) <u>ZZZZ</u>)
<input type="checkbox"/> Section 112(g) Case-by-case MACT	<input type="checkbox"/> 112(r) RMP
<input type="checkbox"/> Section 112(i) Early reduction of HAP	<input type="checkbox"/> Consumer/commercial prod. reqts., section 183(e)
<input type="checkbox"/> Section 129 Standards/Reqs.	<input type="checkbox"/> Stratospheric ozone (Title VI)
<input type="checkbox"/> Tank vessel reqt., section 183(f)	<input type="checkbox"/> Emissions cap 45CSR§30-2.6.1
<input type="checkbox"/> NAAQS, increments or visibility (temp. sources)	<input type="checkbox"/> 45CSR27 State enforceable only rule
<input type="checkbox"/> 45CSR4 State enforceable only rule	<input type="checkbox"/> Acid Rain (Title IV, 45CSR33)
<input type="checkbox"/> Emissions Trading and Banking (45CSR28)	<input type="checkbox"/> Compliance Assurance Monitoring (40CFR64) ⁽¹⁾
<input type="checkbox"/> NO _x Budget Trading Program Non-EGUs (45CSR1)	<input type="checkbox"/> NO _x Budget Trading Program EGUs (45CSR26)
⁽¹⁾ If this box is checked, please include Compliance Assurance Monitoring (CAM) Form(s) for each Pollutants Specific Emission Unit (PSEU) (See Attachment H to Title V Application). If this box is not checked, please explain why Compliance Assurance Monitoring is not applicable:	

2. Non Applicability Determinations

List all requirements, which the source has determined not applicable to this permit revision and for which a permit shield is requested. The listing shall also include the rule citation and a rationale for the determination.

NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS D - No boiler greater than 250 MMBtu/hr (40CFR60.40(a)(1))
NSPS Da - No boiler greater than 250 MMBtu/hr (40CFR60.40a(a)(1))
NSPS Db - No boiler greater than 100 MMBtu/hr (40CFR60.40b(a))
NSPS K - No tank greater than 40,000 gallons (40CFR 60.110(a))
NSPS Ka - No tank greater than 151.416 m³ (40,000 gal) (40CFR60.110a(a))
NSPS Kb - No tank greater than 75 m³ (19,815 gal) (40CFR60.110b(a))
NSPS GG - No stationary gas turbine (40CFR60.330(a))
NSPS KKK - Plant construction commenced after 08/23/11 (40CFR60.630(b))
NSPS LLL - No sweetening units on site (40CFR60.640(a))
NSPS IIII - No stationary compression ignition engine (§60.4200(a))
NSPS KKKK - No stationary combustion turbine (§60.4300(a))

NATIONAL EMISSION STANDARDS FOR HAZAROUS AIR POLLUTANTS (NESHAP)

NESHAP HH - Not a major source of HAP and no TEG dehydration unit (§63.760(b)(2))
NESHAP HHH - No natural gas transmission or storage prior to local distribution (§63.1270(a))
NESHAP YYYY - No stationary gas turbine (§63.6080(a))
NESHAP DDDDD - Not a major source of HAP (§63.7485(a))
NESHAP JJJJJ - No boiler as defined (§63.11195(e))

COMPLIANCE ASSURANCE MONITORING (CAM)

CAM - This rule does not apply because there no pollutant specific emission units subject to an emissions limitation or standard that require a control device be used to achieve compliance. (§64.2a))

WEST VIRGINIA AIR QUALITY REGULATIONS

45CSR14 - Not a PSD major source or PSD major modification
45CSR19 - Not located in a non-attainment area for NO_x, CO, or VOC
45CSR21 - Control of VOCs - Not located in Putnam, Kanawha, Cabell, Wayne, or Wood County
45CSR27 - Exempt because equipment is used in the production and distribution of petroleum products
45CSR28 - Voluntary Emission Trading Program - Applicant chooses not to participate
45CSR29 - Not in Putnam, Kanawha, Cabell, Wayne, or Wood County
45CSR34 - Not a major source of HAP or otherwise subject to NESHAP requirements

Permit Shield Requested (*not applicable to Minor Modifications*)

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

3. Suggested Title V Draft Permit Language

Are there any changes involved with this Title V Permit revision outside of the scope of the NSR Permit revision? Yes No If Yes, describe the changes below.

Also, please provide **Suggested Title V Draft Permit language** for the proposed Title V Permit revision (including all applicable requirements associated with the permit revision and any associated monitoring /recordkeeping/ reporting requirements), OR attach a marked up pages of current Title V Permit. Please include appropriate citations (Permit or Consent Order number, condition number and/or rule citation (e.g. 45CSR§7-4.1)) for those requirements being added / revised.

4. Active NSR Permits/Permit Determinations/Consent Orders Associated With This Permit Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
R13-3070	07/12/2013	PD14-044
R13-3070A	Pending	
	/ /	

5. Inactive NSR Permits/Obsolete Permit or Consent Orders Conditions Associated With This Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
	/ /	
	/ /	
	/ /	

6. Change in Potential Emissions

Pollutant	Change in Potential Emissions (+ or -), TPY
Nitrogen Oxides (NOx)	+6.66
Carbon Monoxide (CO)	+3.89
Volatile Organic Compounds (VOC)	+29.48
Sulfur Dioxide (SO2)	+0.03
Particulate Matter (PM)	+0.49
Formaldehyde (HCHO)	+1.65
Total Hazardous Air Pollutants (HAPs)	+2.47

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

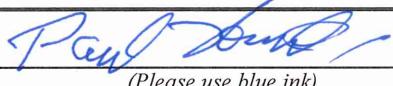
7. Certification For Use Of Minor Modification Procedures (Required Only for Minor Modification Requests)

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete. The criteria for allowing the use of Minor Modification Procedures are as follows:

- i. Proposed changes do not violate any applicable requirement;
- ii. Proposed changes do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;
- iii. Proposed changes do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient air quality impacts, or a visibility increment analysis;
- iv. Proposed changes do not seek to establish or change a permit term or condition for which there is no underlying applicable requirement and which permit or condition has been used to avoid an applicable requirement to which the source would otherwise be subject (synthetic minor). Such terms and conditions include, but are not limited to a federally enforceable emissions cap used to avoid classification as a modification under any provision of Title I or any alternative emissions limit approved pursuant to regulations promulgated under § 112(j)(5) of the Clean Air Act;
- v. Proposed changes do not involve preconstruction review under Title I of the Clean Air Act or 45CSR14 and 45CSR19;
- vi. Proposed changes are not required under any rule of the Director to be processed as a significant modification;

Notwithstanding subparagraph 45CSR§30-6.5.a.1.A. (items i through vi above), minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in rules of the Director which are approved by the U.S. EPA as a part of the State Implementation Plan under the Clean Air Act, or which may be otherwise provided for in the Title V operating permit issued under 45CSR30.

Pursuant to 45CSR§30-6.5.a.2.C., the proposed modification contained herein meets the criteria for use of Minor permit modification procedures as set forth in Section 45CSR§30-6.5.a.1.A. The use of Minor permit modification procedures are hereby requested for processing of this application.

(Signed):		Date:	12 / 17 / 15
	(Please use blue ink)		(Please use blue ink)
Named (typed):	Paul V. Hunter	Title:	General Manager Ohio River Supply Hub

Note: Please check if the following included (if applicable):

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Compliance Assurance Monitoring Form(s) |
| <input type="checkbox"/> | Suggested Title V Draft Permit Language |

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

APPLICATION FEE

Include a check payable to WVDEP – Division of Air Quality.

- As per WV Rule 22 (45CSR22) filed on May 6, 1991, a **minimum fee of \$1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
 - **Additional charges** may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:
 - **NSPS Requirements:** **\$1,000** **JJJJ-Compressor Engine (CE-01/22E) and OOOO-LDAR (FUG-3/25E)**
 - NESHAP Requirements: \$2,500 Not Applicable
 - New Major Source: \$10,000 Not Applicable
 - Major Modifications: \$5,000 Not Applicable
 - Total application fee is **\$2,000** [= \$1,000 minimum fee + \$1,000 additional charges]
-

****** End of Application for 45CSR13 NSR Construction Permit ******