I.D. No. 051-00157 Reg. PD15-057
Company OVM
Facility Oak Grove Region
Initials

Williams Ohio Valley Midstream LLC
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275
(412) 787-7300
(412) 787-6002 fax

July 21, 2015
(Via Federal Express)

Entire Document
NON-CONFIDENTIAL

RECEIVED
JUL 23 2015

Bev 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: **Request for Determination of Permit Exemption**
Williams Ohio Valley Midstream LLC
INDEPENDENCE COMPRESSOR STATION
(Co-Located w/ the Oak Grove Gas Plant)
Marshall County, West Virginia

ORIGINAL

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting a Request for Determination of Permit Exemption for the proposed Independence Compressor Station to be co-located with the Oak Grove Gas Plant at 5258 Fork Ridge Rd in Moundsville, Marshall County, West Virginia.

The following equipment and activities are proposed at the Independence Compressor Station:

- Three (3) Residue Gas Compressors, each driven by an electric motor
- Reciprocating Compressor Rod Packing Leaks
- Start/Stop/Maintenance (i.e., Blowdown)
- Piping and Equipment Fugitives

It is Williams OVM's conclusion that the proposed equipment and activities at the Independence Compressor Station are not subject to the requirements of 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation*; because the proposed equipment and activities do not meet the definition of "stationary source" as defined in §45-13-2, Section 2.24:

a) *The equipment is not subject to any substantive requirement of an emission control rule promulgated by the Secretary;*

Although the reciprocating compressors at the Independence Compressor Station are subject to NSPS Subpart OOOO - *Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution*, the emission control requirements of this rule are not substantive. In fact, the proposed equipment and activities at the Independence Compressor Station qualify as insignificant activities using very conservative emission estimating protocols.

b) *The equipment does not discharge or have the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or have the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant;*

c) *The equipment does not discharge or have the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis;*

As demonstrated by the table below and emission spreadsheets accompanying this document, the Independence Compressor Station emissions are well below the thresholds identified in b) and c) above.

d) *The equipment does not discharge or have the potential to discharge any air pollutant(s) in amounts at or above those listed in Table 45-13A;*

As demonstrated by the table below and emission spreadsheets accompanying this document, the Independence Compressor Station emissions are below the amounts listed in Table 45-13A.

e) The change does not result in an increase above any numerical limit in the current Oak Grove Gas Plant permit (R13-3070).

The equipment at Independence Compressor Station will not result in increased processed gas volumes at the Oak Grove Gas Plant or affect emissions from any of the existing plant equipment. Additionally, the combined emissions from Oak Grove Gas Plant and Independence Compressor Station will not exceed any new major source thresholds (e.g., PSD).

The potential-to-emit (PTE) regulated air pollutants are such that each proposed emission unit (and the entire Independence Compressor Station) qualifies as "Insignificant Activities" as follows:

Insignificant Activities

Emission units which do not have any applicable requirements and which emit criteria pollutants (CO, NOx, SO2, VOC, and PM) into the atmosphere at a rate of less than 1 pound per hour and less than 10,000 pounds per year aggregate total for each criteria pollutant from all emission units.

The Independence CS does NOT have any potential to emit CO, NOX, SO2, and PM.

The Independence CS has insignificant (0.24 lb/hr) potential emissions of VOC, as shown:

ID	Description	VOC		
		lb/hr (avg)	lb/yr	tpy
RPC	Rod Packing Leaks	0.03	245	0.12
SSM	Start/Stop/Maintenance (Blowdown)	0.20	1,748	0.87
FUG	Piping and Equipment Fugitives*	0.01	128	0.06
	TOTAL Potential to Emit (PTE):	**0.24**	**2,121**	**1.06**
	Insignificant Source Threshold:	1.00	10,000	5.00

Emission units which do not have any applicable requirements and which emit hazardous air pollutants into the atmosphere at a rate of less than 0.1 pounds per hour and less than 1,000 pounds per year aggregate total for all HAPs from all emission sources. This limitation cannot be used for any source which emits dioxin/furans nor for toxic air pollutants as per 45CSR27.

The Independence CS has insignificant (0.08 lb/hr) potential emissions of HAP, as shown:

ID	Description	HAP		
		lb/hr (avg)	lb/yr	tpy
RPC	Rod Packing Leaks	0.01	82	0.04
SSM	Start/Stop/Maintenance (Blowdown)	0.07	583	0.29
FUG	Piping and Equipment Fugitives*	0.00	43	0.02
	TOTAL Potential to Emit (PTE):	**0.08**	**707**	**0.35**
	Insignificant Source Threshold:	0.10	1,000	0.50

IMPORTANT: The potential to emit (PTE) criteria and hazardous air pollutants at the Independence Compressor Station are very low (i.e., de minimis or insignificant) because:

1) The compressors are driven by electric motors, which generate no emissions; and
2) The residue gas emissions (RPC-2/19E, SSM-1/20E, and FUG-2/21E) are primarily methane with some ethane -- Nearly all of the VOC (and HAP) content has been removed from the residue gas at the upstream Oak Grove Gas Plant.

Williams OVM seeks concurrence from the WVDEP that the equipment and operations proposed at the Independence Compressor Station, co-located at the Oak Grove Gas Plant, are insignificant activities and are exempt from 45CSR13 Construction Permit requirements.

If you have any questions concerning this submittal or need additional information, please contact me at (412) 787-4259 or Danell.Zawaski@Williams.com.

Sincerely,

R. Danell Zawaski, P.E.
Environmental Specialist

Enclosures:
Permit Determination Form
Attachments A through E

REQUEST FOR DETERMINATION OF PERMIT EXEMPTION

For the:

Williams Ohio Valley Midstream LLC

INDEPENDENCE COMPRESSOR STATION (Co-Located with the 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
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

Prepared by:

EcoLogic Environmental Consultants, LLC
864 Windsor Court
Santa Barbara, CA 93111

July 2015

REQUEST FOR DETERMINATION OF PERMIT EXEMPTION

Williams Ohio Valley Midstream LLC

INDEPENDENCE COMPRESSOR STATION

(Co-Located with the Oak Grove Gas Plant)

TABLE OF CONTENTS

COVER LETTER

PERMIT DETERMINATION FORM

ATTACHMENTS

- ATTACHMENT A — Location Map (and Aerial View and Plot Plan)
- ATTACHMENT B — Detailed Process Flow Diagram (PFD)
- ATTACHMENT C — Detailed Process Description
- ATTACHMENT D — Material Safety Data Sheets (MSDS) (And Representative Extended Gas Analysis)
- ATTACHMENT E — Supporting Calculations

PERMIT DETERMINATION FORM

Williams Ohio Valley Midstream LLC
INDEPENDENCE COMPRESSOR STATION
(Co-Located with the Oak Grove Gas Plant)
Request for Determination of Permit Exemption

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

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I D # _____

PDF # _____ PERMIT WRITER _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
Williams Ohio Valley Midstream LLC

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
INDEPENDENCE COMPRESSOR STATION (Co-Located at the Oak Grove Gas Plant)

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
213112 – Support for Oil and Gas Operations

4A. MAILING ADDRESS:
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

4B. PHYSICAL ADDRESS:
5258 Fork Ridge Rd
Moundsville, WV 26041

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):
From Moundsville:
a. Head East on 12th St ~1.1 mi; b. Continue onto Fork Ridge Rd ~5.4 mi; c. Entrance is on the Left.

5B. NEAREST ROAD:	5C. NEAREST CITY OR TOWN:	5D. COUNTY:
Fork Ridge Rd	**Moundsville**	**Marshall**
5E. UTM NORTHING (KM):	5F. UTM EASTING (KM):	5G. UTM ZONE:
4,414.1 km	**525.9 km**	**17S**

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
R. Danell Zawaski, P.E.

6B. TITLE:
Environmental Specialist

6C. TELEPHONE:	6D. FAX:	6E. E-MAIL:
(412) 787-4259	**(412) 787-6002**	**Danell.Zawaski@Williams.com**

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
0 5 1 – 0 0 1 5 7

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):
R13-3070

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:
No - This PDF is not being submitted as the result of an enforcement action.

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☒ **NEW SOURCE** ☐ **ADMINISTRATIVE UPDATE**
☐ **MODIFICATION** ☐ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ **YES** ☐ **NO** ☒ **NA**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☐ **YES** ☒ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
Approx. 2 Months following Exemption

10B. DATE OF ANTICIPATED START-UP:
Approx. 2 Months following Exemption

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B.**

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C.**

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D.** FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	NA	NA
PM_{10}	NA	NA
VOCs	0.24	1.06
CO	NA	NA
NO_x	NA	NA
SO_2	NA	NA
Pb	NA	NA
HAPs (AGGREGATE AMOUNT)	0.08	0.35
TAPs (INDIVIDUALLY)*	0.01	0.06
OTHER (INDIVIDUALLY)*	NA	NA

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E.**

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, **DON WICBURG** (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____

TITLE: **VICE PRESIDENT AND GENERAL MANAGER** DATE:: **07/02/2015**

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS

☒ **ATTACHMENT A** ☒ **ATTACHMENT B** ☒ **ATTACHMENT C** ☒ **ATTACHMENT D** ☒ **ATTACHMENT E**

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE

www.dep.wv.gov/daq

ATTACHMENT A

Location/Topographic Map

- **Address:**
  5258 Fork Ridge Rd
  ~3.7 Miles Southeast of Moundsville
  North side of Fork Ridge Rd
  Moundsville, Marshall County, WV 26041

- **Latitude and Longitude:**
  39°52'37.0" North x -80°41'56.5" West
  (39.8769° North x -80.6990° West)

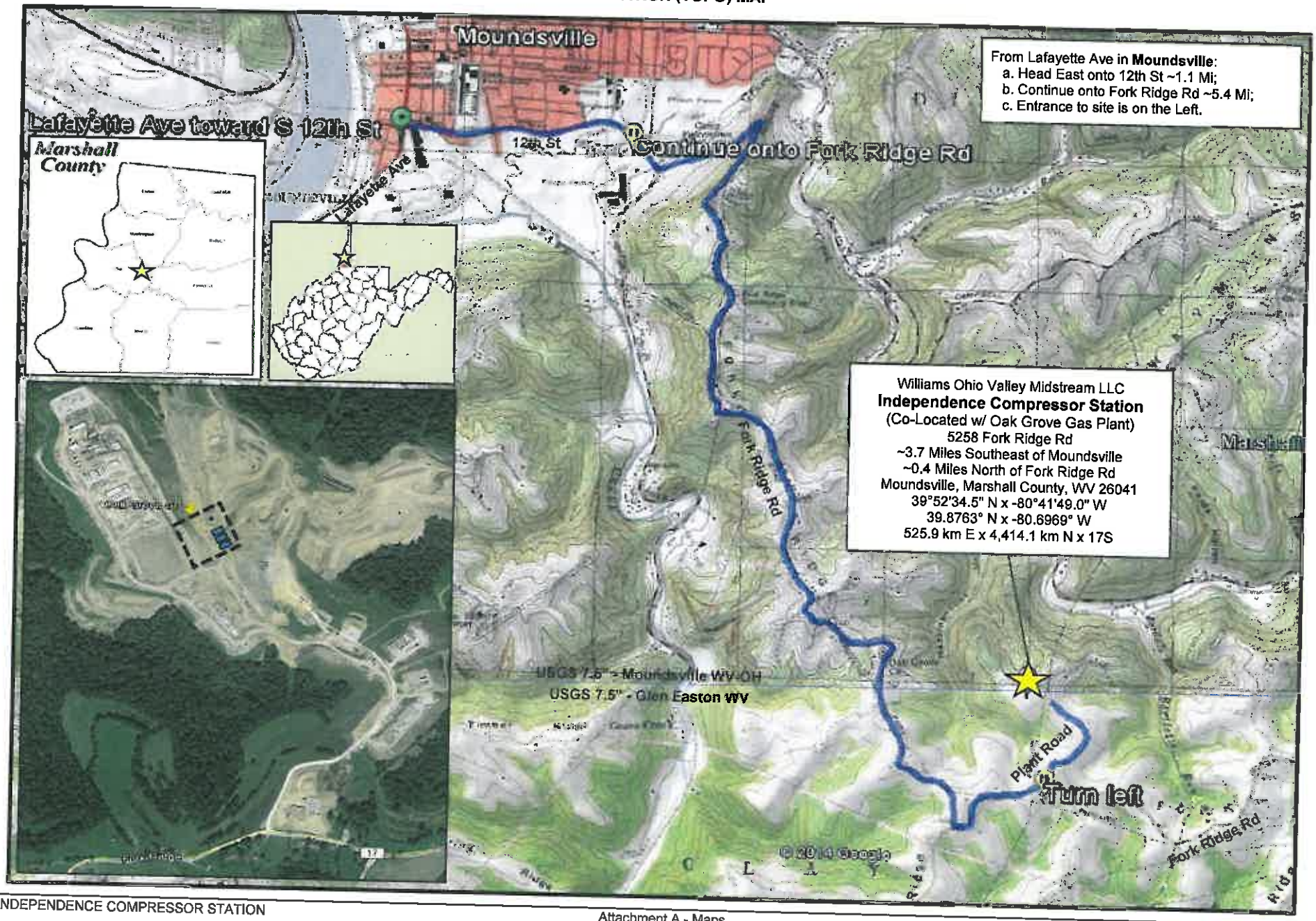
- **UTM:**
  525.9 km Easting x 4,414.1 km Northing x Zone 17S

- **Directions:**
  From Lafayette Ave/WV-2 in Moundsville:
  a. Head east onto 12th St ~1.1 Mile;
  b. Continue onto Fork Ridge Rd ~5.4 Mile;
  c. Entrance to site is on the left.

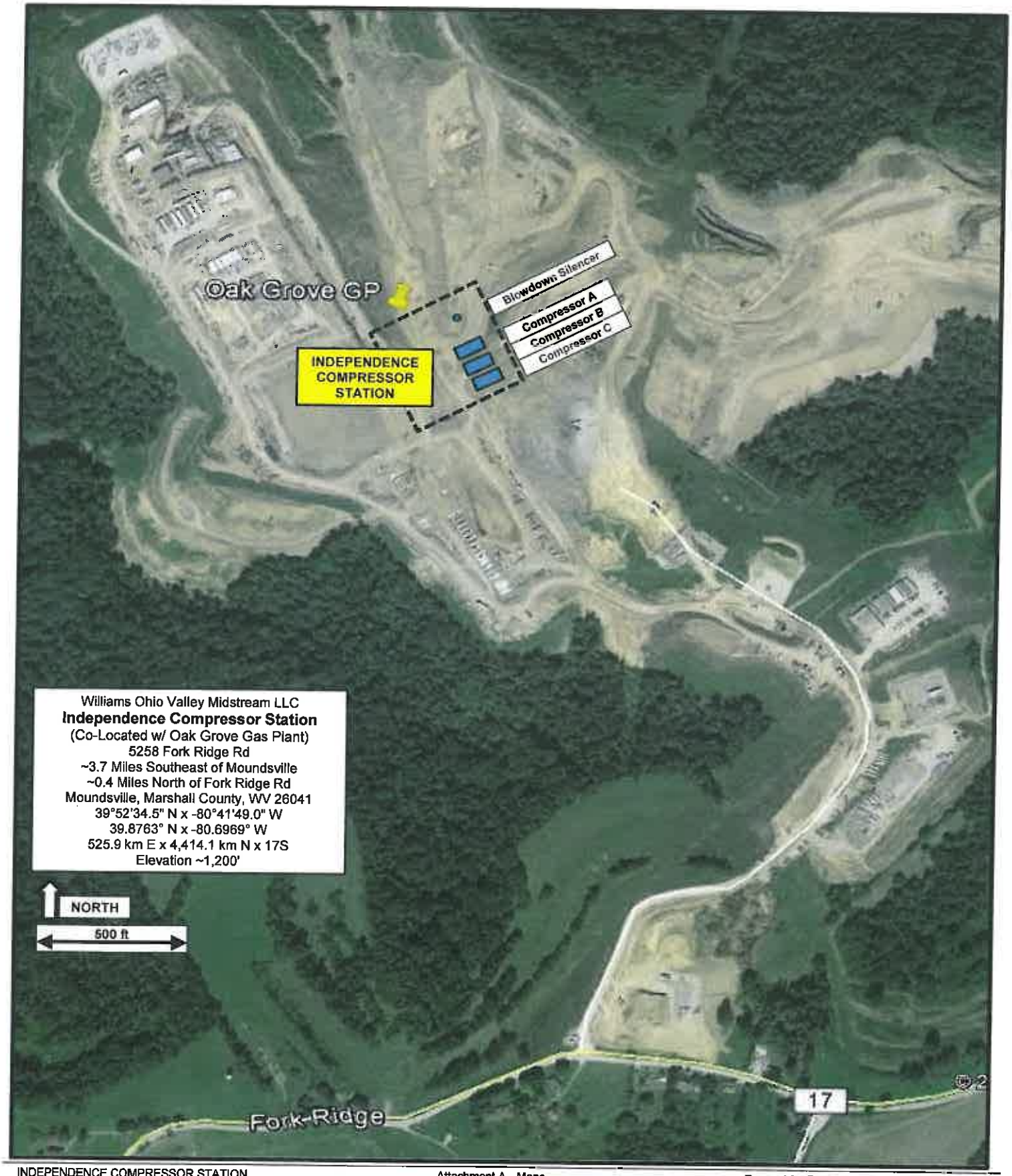
- **USGS:**
  7.5" Topographic - Moundsville WV-OH – 1997
  7.5" Topographic – Glen Easton WV – 1960

- **Oak Grove Gas Plant - Plot Plan**
- **Oak Grove Gas Plant - Aerial View**

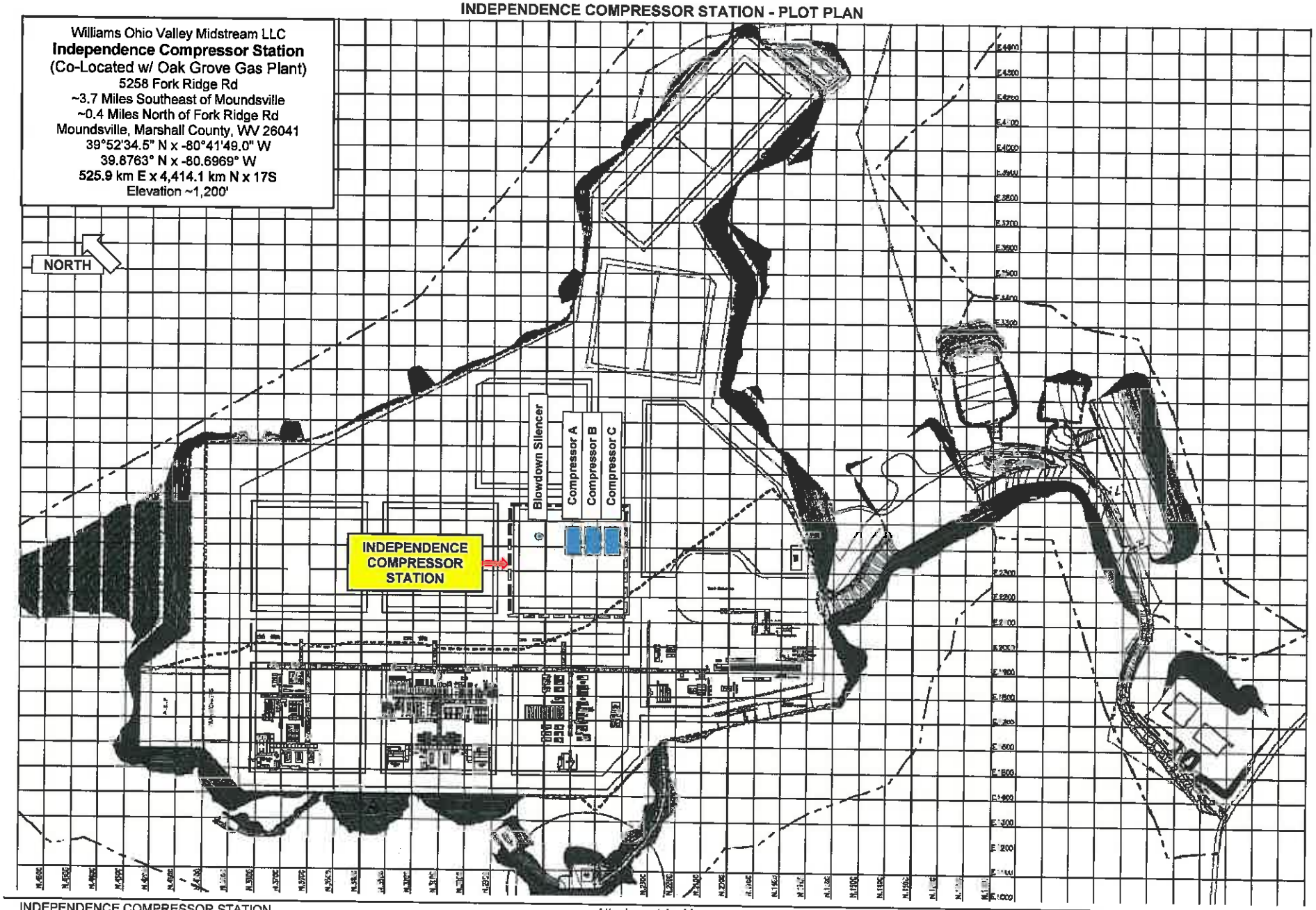
LOCATION (TOPO) MAP



AERIAL VIEW


Oak Grove GP
Blowdown Silencer
Compressor A
Compressor B
Compressor C
INDEPENDENCE COMPRESSOR STATION
Williams Ohio Valley Midstream LLC
Independence Compressor Station
(Co-Located w/ Oak Grove Gas Plant)
5258 Fork Ridge Rd
~3.7 Miles Southeast of Moundsville
~0.4 Miles North of Fork Ridge Rd
Moundsville, Marshall County, WV 26041
39°52'34.5" N x -80°41'49.0" W
39.8763° N x -80.6969° W
525.9 km E x 4,414.1 km N x 17S
Elevation ~1,200'
NORTH
500 ft
Fork Ridge
17

INDEPENDENCE COMPRESSOR STATION - PLOT PLAN



ATTACHMENT B

Detailed Process Flow Diagram

- **Independence Compressor Station - Process Flow Diagram (PFD)**

Williams Ohio Valley Midstream LLC

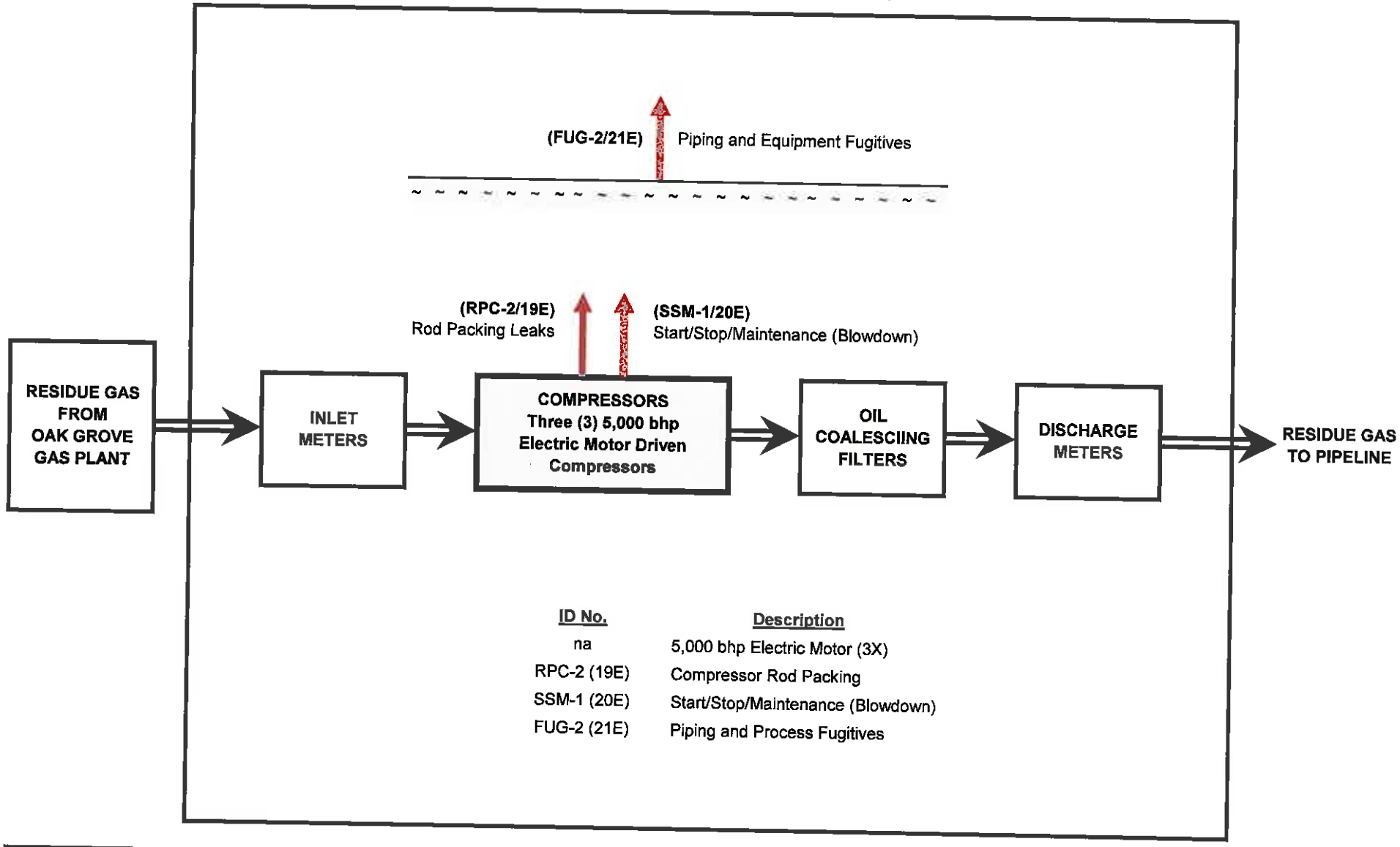
INDEPENDENCE COMPRESSOR STATION

(Co-Located with the Oak Grove Gas Plant)

Request for Determination of Permit Exemption

Attachment B - Detailed Process Flow Diagram

PROCESS FLOW DIAGRAM (PFD)



ID No.	Description
na	5,000 bhp Electric Motor (3X)
RPC-2 (19E)	Compressor Rod Packing
SSM-1 (20E)	Start/Stop/Maintenance (Blowdown)
FUG-2 (21E)	Piping and Process Fugitives

ATTACHMENT C

Detailed Process Description

Process Description - Williams OVM Independence Compressor Station

A. Project Overview

B. Electric Motor Driven Compressors

C. Compressor Rod Packing Leaks

D. Start/Stop/Maintenance (Blowdown) Emissions

E. Piping and Equipment Fugitives

Williams Ohio Valley Midstream LLC

INDEPENDENCE COMPRESSOR STATION

(Co-Located with the Oak Grove Gas Plant)

Request for Determination of Permit Exemption

Attachment C – Process Description

PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC proposes to install and operate the Independence Compressor Station at the Oak Grove Gas Plant. The compressor station will be comprised of the following equipment and activities:

- Three (3) Residue Gas Compressors, each driven by an electric motor
- Reciprocating Compressor Rod Packing Leaks
- Start/Stop/Maintenance (i.e., Blowdown)
- Piping and Equipment Fugitives

The purpose of the Independence Compressor Station is to boost the pressure of residue gas from the Oak Grove Gas Plant for shipment via pipeline.

It is important to note that the Independence Compressor Station will not generate any NOX, CO, SO2, PM, or Pb emissions. Further, the VOC (and HAP) emissions are insignificant; primarily because the residue gas has stripped of (nearly) all C3+ hydrocarbons.

B. Electric Motor Driven Compressors

Three (3) electric motor driven reciprocating compressors will generate insignificant quantities of VOC (and HAP) from associated Rod Packing Leaks (RPC-2/19E), Blowdown (SSM-1/20E), and Fugitives (FUG-2/21E); as described in the following paragraphs.

C. Compressor Rod Packing Leaks (RPC-2/19E)

The reciprocating compressors generate emissions from the wear of mechanical joints, seals, and rotating surfaces over time. The resulting emissions of residue gas (primarily methane and ethane) are released, without controls, to the atmosphere.

D. Start/Stop/Maintenance (Blowdown) (SSM-1/20E)

The Independence Compressor Station, including the compressors and associated piping and equipment, will be purged (blown-down) during compressor downtime; conservatively estimated at twice per week. The resulting emissions of residue gas (primarily methane and ethane) will routed to a blowdown silencer and vented to the atmosphere.

E. Piping and Equipment Fugitives (FUG-2/21E)

Leaking equipment, such as valves, pumps, and connectors, will generate de minimis quantities of VOC and HAP emissions at the Independence Compressor Station.

ATTACHMENT D

Material Safety Data Sheets (MSDS)

(And Representative Gas Analysis)

- **Residue Gas Composition**
- **Residue Gas Material Safety Data Sheet (MSDS)**

Williams Ohio Valley Midstream LLC

INDEPENDENCE COMPRESSOR STATION

Co-Located at the Oak Grove Gas Plant

Request for Determination of Permit Exemption

Attachment D - Material Safety Data Sheets

Residue Gas Composition

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	0.5900	0.005899	0.1888	1.113	497.44
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.2000	0.002000	0.0880	0.519	231.91
Methane*	75-82-8	CH4	16.04	93.7900	0.937778	15.0443	88.679	39,644.22
Ethane*	74-84-0	C2H6	30.07	5.3700	0.053693	1.6145	9.517	4,254.48
Propane**	74-98-6	C3H8	44.10	0.0600	0.000600	0.0265	0.156	69.71
i-Butane**	75-28-5	C4H10	58.12	---	---	---	---	---
n-Butane**	106-97-8	C4H10	58.12	---	---	---	---	---
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	---	---	---	---	---
n-Pentane**	109-66-0	C5H12	72.15	---	---	---	---	---
Cyclohexane**	110-82-7	C6H12	84.16	---	---	---	---	---
Other Hexanes**	varies	C6H14	86.18	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.19	---	---	---	---	---
Heptanes**	varies	C7H16	100.20	---	---	---	---	---
C8+ Heavies**	varies	C8H18	114.5 est	---	---	---	---	---
Benzene***	71-43-2	C6H6	78.11	0.0005	0.000005	0.0004	0.002	1.03
Ethylbenzene***	100-41-4	C8H10	106.17	0.0005	0.000005	0.0005	0.003	1.40
n-Hexane***	110-54-3	C6H14	86.18	0.0005	0.000005	0.0004	0.003	1.14
Toluene***	108-88-3	C7H8	92.14	0.0005	0.000005	0.0005	0.003	1.21
2,2,4-TMP***	540-84-1	C8H18	114.23	0.0005	0.000005	0.0006	0.003	1.50
Xylenes***	1330-20-7	C8H10	106.17	0.0005	0.000005	0.0005	0.003	1.40
Totals:				**100.01**	**1.00**	**16.96**	**100.00**	**44,705**
Total THC:				**99.22**	**0.99**	**16.69**	**98.37**	**43,976**
Total VOC:				**0.06**	**0.00**	**0.03**	**0.17**	**77**
Total HAP:				**0.003**	**0.00003**	**0.003**	**0.02**	**3**

The Residue Gas Analysis shows no HAP content. Values shown are the presumed detection limits.

* = 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%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.200	0.519	232	0.259	0.671	300
Methane	75-82-8	CH4	93.790	88.679	39,644	100.014	94.563	42,275
Ethane	74-84-0	C2H6	5.370	9.517	4,254	6.563	11.632	5,200
VOC	Various	C3+	0.060	0.155	69.7	0.077	0.201	90.0
Benzene	71-43-2	C6H6	0.001	0.002	1.0	0.0024	0.01	5.0
Ethylbenzene	110-54-3	C8H10	0.001	0.003	1.4	0.0018	0.01	5.0
n-Hexane	100-41-4	C6H14	0.001	0.003	1.1	0.0022	0.01	5.0
Toluene	108-88-3	C7H8	0.001	0.003	1.2	0.0021	0.01	5.0
2,2,4-TMP	540-84-1	C8H18	0.001	0.003	1.5	0.0017	0.01	5.0
Xylenes	1330-20-7	C8H10	0.001	0.003	1.4	0.0018	0.01	5.0
Total HAP	Various	C6+	0.003	0.02	7.7	0.0117	0.07	30.0

SAFETY DATA SHEET

1. Identification

Product identifier	**Natural Gas**
Other means of identification	Not available.
Synonyms	Methane, Natural Gas Sweet, Fuel Gas, Petroleum Gas, Methyl Hydride
Recommended use	Fuel.
Recommended restrictions	None known.

Manufacturer / Importer / Supplier / Distributor Information

Company name	Williams, Inc.
Address	One Williams Center Tulsa, OK 74172 US
Telephone	800-688-7507
E-mail	enterpriseehs@williams.com
Emergency phone number	888-677-2370

2. Hazard(s) identification

Physical hazards	Flammable gases	Category 1
	Gases under pressure	Compressed gas
Health hazards	Not classified.	
OSHA hazard(s)	Simple asphyxiant	

Label elements

Hazard symbol

Signal word	Danger
Hazard statement	Extremely flammable gas. Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.
Precautionary statement	
Prevention	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Response	Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Storage	Protect from sunlight. Store in a well-ventilated place.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Not classified.

3. Composition/information on ingredients

Substance

Hazardous components

Chemical name	Common name and synonyms	CAS number	%
Natural gas		8006-14-2	100

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation Move injured person into fresh air and keep person calm under observation. If breathing is difficult, give oxygen. Get medical attention if any discomfort continues.

Skin contact Frostbite: Do not remove clothes, but flush with copious amounts of lukewarm water. Call an ambulance and continue to flush during transportation to hospital.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.

Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Most important symptoms/effects, acute and delayed	Narcosis. Behavioral changes. Decrease in motor functions.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Extinguish with foam, carbon dioxide, dry powder or water fog.
Unsuitable extinguishing media	None.
Specific hazards arising from the chemical	Extremely flammable gas. Closed containers can burst violently when heated, due to excess pressure build-up. Gas may travel considerable distance to a source of ignition and flash back. Gases may form explosive mixtures with air. Fire or high temperatures create: Carbon monoxide. Carbon oxides. Sulfur oxides.
Special protective equipment and precautions for firefighters	Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.
Fire-fighting equipment/instructions	Evacuate area. Move container from fire area if it can be done without risk. Stay away from ends of tanks. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Cool equipment exposed to flames with water, if it can be done without risk. Close the valve if no risk is involved. Do not extinguish a leaking gas fire unless leak can be stopped. If leak cannot be stopped and no danger to surrounding area allow the fire to burn out. Fight fire from a protected location. Prevent buildup of vapors or gases to explosive concentrations.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Beware of accumulation in low areas or contained areas, where explosive concentrations may occur. Prevent from entering drains or any places where accumulation may occur. Ventilate well and allow to evaporate. Stay upwind. Avoid inhalation and contact with skin and eyes. For large spillages notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate personal protective equipment (See Section 8).
Methods and materials for containment and cleaning up	In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.
Environmental precautions	Stop leak if possible without any risk. Water may be useful in minimizing or dispersing vapors. If spill occurs on water notify appropriate authorities in accordance with all applicable regulations.

7. Handling and storage

Precautions for safe handling	Keep away from sources of ignition - No smoking. Take precautionary measures against static discharges. Observe good industrial hygiene practices. Wear appropriate personal protective equipment (See Section 8). Contents under pressure. Gas can accumulate in confined spaces and limit oxygen available for breathing. Use only with adequate ventilation. Use non-sparking hand tools and explosion-proof electrical equipment. The product can accumulate electrostatic charges, which may cause an electrical spark (ignition source). Ground container and transfer equipment to eliminate static electric sparks. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulfide (H2S) and flammability. Cold burns may occur during filling operations. Containers and delivery lines may become cold enough to present cold burn hazard. The use hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.

Conditions for safe storage, including any incompatibilities	Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post areas "No Smoking or Open Flame." Store away from incompatible materials. Protect against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes. Empty containers may contain flammable product residues. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
Natural gas (CAS 8006-14-2)	TWA	1000 ppm

Biological limit values	No biological exposure limits noted for the ingredient(s).
Exposure guidelines	No exposure standards allocated.
Appropriate engineering controls	Provide shower facilities near the work place. In confined spaces, make sure the area is well-ventilated and sufficient oxygen (19.5%) exists before entry. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear approved safety glasses as a good hygiene practice.
Skin protection	
Hand protection	Wear suitable gloves as a good hygiene practice.
Other	Wear suitable protective clothing.
Respiratory protection	A NIOSH approved, self-containing breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used in situations of oxygen deficiency (oxygen content less than 19.5 percent), unknown exposure concentrations, or situations that are immediately dangerous to life or health (IDLH). A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	Colorless gas.
Physical state	Gas Compressed.
Form	Gas.
Color	Colorless.
Odor	Odorless to slight, sweet.
Odor threshold	Not available.
pH	Not applicable.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	-259.6 °F (-162 °C)
Flash point	-304.6 °F (-187 °C)
Evaporation rate	Not available.
Flammability (solid, gas)	Extremely flammable gas.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	5 %
Flammability limit - upper (%)	15 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.

Vapor pressure	40 mm Hg (77°F/25°C)
Vapor density	0.55 Approximate.
Relative density	Not available.
Solubility(ies)	Slightly soluble in water.
Partition coefficient (n-octanol/water)	1.81
Auto-ignition temperature	> 550.4 °F (> 288 °C)
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Percent volatile	100

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Polymerization will not occur.
Conditions to avoid	Heat, sparks, flames, elevated temperatures. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Oxidizing agents.
Hazardous decomposition products	Carbon oxides. Sulfur oxides.

11. Toxicological information

Information on likely routes of exposure

Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Inhalation	High concentrations: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. In high concentrations, vapors are narcotic and may cause headache, fatigue, dizziness and nausea.
Skin contact	Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
Eye contact	Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
Symptoms related to the physical, chemical and toxicological characteristics	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). Contact with evaporating liquid may cause frostbite or freezing of skin. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped. Continued exposure can lead to hypoxia (inadequate oxygen), rapid breathing, cyanosis (bluish discoloration of skin), numbness of the extremities, unconsciousness and death.

Information on toxicological effects

Acute toxicity	Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

Product	**Species**	**Test Results**
Natural gas (CAS 8006-14-2)		
Acute		
Oral		
LD50	Rat	> 5 g/kg

Skin corrosion/irritation	Not classified.
Serious eye damage/eye irritation	Not classified.
Respiratory sensitization	Not classified.
Skin sensitization	Not a skin sensitizer.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.

Aspiration hazard	Not applicable.
Chronic effects	Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity	Not expected to be harmful to aquatic organisms.
Persistence and degradability	The hydrocarbons in this material are expected to be inherently biodegradable. In practice, hydrocarbon gases are not likely to remain in solution long enough for biodegradation to be a significant loss process. Hydrogen sulfide, if present in refinery gas streams, will be oxidized in water and insoluble sulfides precipitated from water when metallic radicals are present.
Bioaccumulative potential	The product is not expected to bioaccumulate.

Partition coefficient n-octanol / water (log Kow)

Natural gas	1.81

Mobility in soil	Not relevant, due to the form of the product.
Mobility in general	The product is a volatile substance, which may spread in the atmosphere.
Other adverse effects	The product is a volatile organic compound which has a photochemical ozone creation potential.

13. Disposal considerations

Disposal instructions	This material is a gas and would not typically be managed as a waste.
Local disposal regulations	Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.
Hazardous waste code	D001
Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN1971
UN proper shipping name	Natural gas, compressed
Transport hazard class(es)	2.1
Subsidary class(es)	Not available.
Packing group	Not available.
Special precautions for user	Not available.
Labels required	2.1
Packaging exceptions	306
Packaging non bulk	302
Packaging bulk	302

IATA

UN number	UN1971
UN proper shipping name	Natural gas, compressed
Transport hazard class(es)	2.1
Subsidary class(es)	-
Packaging group	Not available.
Environmental hazards	No
Labels required	2.1
ERG Code	10L
Special precautions for user	Not available.

IMDG

UN number	UN1971
UN proper shipping name	NATURAL GAS, COMPRESSED
Transport hazard class(es)	2.1
Subsidary class(es)	-
Packaging group	Not available.
Environmental hazards	
Marine pollutant	No
Labels required	2,1
EmS	F-D, S-U
Special precautions for user	Not available.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	No information available.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not on regulatory list.

CERCLA Hazardous Substance List (40 CFR 302.4)

Natural gas (CAS 8006-14-2) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Not listed.

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Not regulated.

DEA Exempt Chemical Mixtures Code Number

Not regulated.

Food and Drug Administration (FDA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Natural gas (CAS 8006-14-2)

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Natural gas (CAS 8006-14-2)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last version

Issue date	11-08-2012
Revision date	-
Version #	01
Further information	Not available.
References	Registry of Toxic Effects of Chemical Substances (RTECS)
Disclaimer	This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

ATTACHMENT E

Emission Calculations

Emission Summary Spreadsheets

- POTENTIAL-TO-EMIT (PTE) – CRITERIA – CONTROLLED
- POTENTIAL-TO-EMIT (PTE) – HAZARDOUS AIR POLLUTANTS – CONTROLLED
- POTENTIAL-TO-EMIT (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED

Unit-Specific Emission Spreadsheets

- Reciprocating Compressor Rod Packing Leaks (RPC-2/19E)
- Start/Stop/Maintenance (Blowdown) (SSM-1/20E)
- Piping and Equipment Fugitives (FUG-2/21E)

AP-42 and GHG Emission Factors

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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
na	na	Electric Motor to Drive Compressor	5,000 bhp	Electric Motor Driven Reciprocating Compressors ** No Emissions except from Rod Packing Leaks (RPC-2), Blowdown (SSM-1), and associated Fugitives (FUG-2) ** (See below)									
na	na	Electric Motor to Drive Compressor	5,000 bhp										
na	na	Electric Motor to Drive Compressor	5,000 bhp										
RPC-2	19E	Rod Packing - Reciprocating Compressors	3 Recips	---	---	---	---	0.03	0.12	---	---	---	---
SSM-1	20E	Start/Stop/Maintenance (i.e., Blowdown)	3 Recips	---	---	---	---	0.20	0.87	---	---	---	---
			TOTAL POINT SOURCE EMISSIONS:	---	---	---	---	**0.23**	**1.00**	---	---	---	---
FUG-2	21E	Piping and Equipment Fugitives - Gas	---	---	---	---	---	0.01	0.06	---	---	---	---
			TOTAL FUGITIVE EMISSIONS:	---	---	---	---	**0.01**	**0.06**	---	---	---	---
			TOTAL POINT SOURCE EMISSIONS:	---	---	---	---	**0.24**	**1.06**	---	---	---	---
			WVDEP "INSIGNIFICANT" THRESHOLD:	1.0 lb/hr *or* 5 tpy		1.0 lb/hr *or* 5 tpy		1.0 lb/hr *or* 5 tpy		1.0 lb/hr *or* 5 tpy		1.0 lb/hr *or* 5 tpy	

Notes:
1 - Emission estimates are based on operation at 100% of rated load for 8,760 hr/yr.
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.

POTENTIAL-TO-EMIT (PTE) – HAZARDOUS AIR POLLUTANTS – CONTROLLED

Unit ID	Point ID	Benzene CAS: 71-43-2 MW: 78.11 lb/lb-mol		Ethylbenzene CAS: 121-69-16 MW: 106.17 lb/lb-mol		Formaldehyde CAS: 121-69-26 MW: 30.03 lb/lb-mol		n-Hexane CAS: 121-69-34 MW: 86.18 lb/lb-mol		Toluene CAS: 121-69-87 MW: 92.14 lb/lb-mol		2,2,4-TMP CAS: 121-69-94 MW: 114.23 lb/lb-mol		Xylenes CAS: 121-69-99 MW: 106.17 lb/lb-mol		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
na	na	Electric Motor Driven Reciprocating Compressors – No Emissions except from Rod Packing Leaks (RPC-2), Blowdown (SSM-1), and associated Fugitives (FUG-2) – (See below)																	
na	na																		
na	na																		
RPC-2	19E	1.6E-03	0.01	1.6E-03	0.01	—	—	1.6E-03	0.01	1.6E-03	0.01	1.6E-03	0.01	1.6E-03	0.01	—	—	0.01	0.04
SSM-1	20E	1.1E-02	0.05	1.1E-02	0.05	—	—	1.1E-02	0.05	1.1E-02	0.05	1.1E-02	0.05	1.1E-02	0.05	—	—	6.7E-02	0.29
TOTAL POINT:		**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**
FUG-2	21E	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
TOTAL FUGITIVE:		**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**
TOTAL FACILITY:		**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**
THRESHOLD:		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy		0.1 lb/hr *or* 0.5 tpy	

Notes: 1 - Emission estimates are based on operation at 100% of rated load for 8,760 hr/yr.

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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: GWP: CO2 tpy	53.06 1 CO2e tpy	kg/MMBtu: GWP: CH4 tpy	1.00E-03 25 CO2e tpy	kg/MMBtu: GWP: N2O tpy	1.00E-04 298 CO2e tpy	TOTAL CO2e tpy
na	na	Electric Motor to Drive Compressor	Electric Motor Driven Reciprocating Compressors – No Emissions except from Rod Packing Leaks (RPC-2), Blowdown (SSM-1), and associated Fugitives (FUG-2) – (See below)								
na	na	Electric Motor to Drive Compressor									
na	na	Electric Motor to Drive Compressor									
RPC-2	19E	Rod Packing - Reciprocating Compressors	—	8,760	0.41	0.41	57	1,437	—	—	1,438
SSM-1	20E	Start/Stop/Maintenance (i.e., Blowdown)	—	—	3	3	411	10,266	—	—	10,269
		TOTAL POINT SOURCE EMISSIONS:			**3**	**3**	**468**	**11,704**	**---**	**—**	**11,707**
FUG-2	21E	Piping and Equipment Fugitives - Gas	—	8,760	0.21	0.21	30	750	---	—	750
		TOTAL FUGITIVE EMISSIONS:			**---**	**---**	**30**	**750**	**---**	**—**	**750**
		TOTAL FACILITY-WIDE PTE:			**3**		**498**		**---**		**12,457**

Notes:
1 - Emission estimates are based on operation at 100% of rated load for 8,760 hr/yr.
2 - Fugitive emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.
3 - All other GHG emissions are based on default values in 40CFR98, Subpart C, Table C-1.

RECIPROCATING COMPRESSOR ROD PACKING LEAKS (RPC-2/19E)

Unit Description	No. of Recip Comp-ressors	Cyl per Recip Comp-ressor	scfh per Cylinder	Contin-gency	Total Leak Rate	VOC 90 lb/MMscf		HCHO --- lb/MMscf		n-Hex, BTEX, 2,2,4-TMP (Ea) 5 lb/MMscf		Total HAP 30 lb/MMscf		CO2 300 lb/MMscf		CH4 42,275 lb/MMscf		CO2e 1,057,175 lb/MMscf	
					MMscf/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Rod Packing - Residue	3	6.0	15	15%	2.72	0.03	0.12	---	---	1.6E-03	0.01	0.01	0.04	0.09	0.41	13.13	57.49	328	1,438
Total RPC Emissions:						**0.03**	**0.12**	**---**	**---**	**1.6E-03**	**0.01**	**0.01**	**0.04**	**0.09**	**0.41**	**13.13**	**57.49**	**328**	**1,438**

Notes:

1 - Misc. equipment leaks 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.

2 - Rod packing leaks include three (3)residue gas reciprocating compressors.

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

Pollutant	Representative Gas Analysis				Worst-Case Assumption			
CO2	232	lb/MMscf	0.52	wgt%	**300**	**lb/MMscf**	0.67	wgt%
CH4	39,644	lb/MMscf	88.68	wgt%	**42,275**	**lb/MMscf**	94.56	wgt%
VOC	70	lb/MMscf	0.16	wgt%	**90**	**lb/MMscf**	0.20	wgt%
Hex, BTEX, TMP (ea)	1.3	lb/MMscf	0.003	wgt%	**5**	**lb/MMscf**	0.01	wgt%
Total HAP	7.7	lb/MMscf	0.02	wgt%	**30**	**lb/MMscf**	0.07	wgt%

IMPORTANT NOTE:
The natural gas that is compressed at the Independence CS is residue gas; i.e., nearly all of the VOC (and HAP) components have been removed.

4 - Estimates of Recip Compressor Leaks are based on vendor data w/ an appropriate contingency.

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START/STOP/MAINTENANCE (BLOWDOWN) (SSM-1/20E)

Unit Description	No of Units	bhp	Total bhp	Blowdown Gas		Site-Wide SSM Events	Total Gas Vented	VOC	HCHO	Hex, BTEX, TMP (Ea)	Total HAP	CO2	CH4	CO2e
								90.00	---	5	30	300	42,275	1,057,175
				scf/bhp	scf/SSM	SSM/yr	MMscf/yr	lb/MMscf tpy	lb/MMscf tpy	lb/MMscf tpy	lb/MMscf tpy	lb/MMscf tpy	lb/MMscf tpy	lb/MMscf tpy
Compressor Blowdown	3	5,000	15,000	6.22	93,228	208	19.39	0.87	---	0.05	0.29	2.91	409.89	10,250
Pig Launcher	2	—	—	—	3,000	6	0.04	1.6E-03	—	9.0E-05	5.4E-04	0.01	0.76	19
						Pre-Control:	19.43	0.87	0.00	0.05	0.29	2.91	410.65	10,269
						Control Efficiency:	0.0%							
						Controlled:		0.87	---	0.05	0.29	3	411	10,269

Notes:

1 - SSM Emissions are the sum of natural gas that is purged (aka blowdown) from the compressors and associated piping and equipment as well as gas releases during pig launching events.

2 - These compressor blowdown estimates 4.0 Facility-wide Blowdowns each week.

3 - It is estimated that two 24 inch pig launchers will each be used up to six times per year.

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

Pollutant	Representative Gas Analysis		Worst-Case Assumption	
CO2	232 lb/MMscf	0.52 wgt%	300 lb/MMscf	0.67 wgt%
CH4	39,644 lb/MMscf	88.68 wgt%	42,275 lb/MMscf	94.56 wgt%
VOC	70 lb/MMscf	0.16 wgt%	90 lb/MMscf	0.20 wgt%
n-Hex, BTEX, TMP (ea)	1.3 lb/MMscf	0.003 wgt%	5 lb/MMscf	0.01 wgt%
Total HAP	7.7 lb/MMscf	0.02 wgt%	30 lb/MMscf	0.07 wgt%

IMPORTANT NOTE:
The natural gas that is compressed at the Independence CS is residue gas; i.e., nearly all of the VOC (and HAP) components have been removed.

5 - This estimate of SSM emissions is sufficient to account for other infrequent and (often) de-minimis emissions from various maintenance activities at the facility that are not necessarily associated with compressor blowdowns.

PIPING AND EQUIPMENT FUGITIVES (FUG-2/21E)

Unit Description	Component (Unit) Type (Gas)	Unit Count	THC Factor lb/hr/ Unit	LDAR Control Credit	Tot Hydrocarbons (THC)		VOC 0.20 Wgt%		HCHO — Wgt%		Hex, BTEX, TMP (Ea) 0.01 Wgt%		Total HAP 0.07 Wgt%		CO2 0.67 Wgt%		CH4 94.56 Wgt%		CO2e GWP = 25	
					lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG-2 Piping and Equipment Fugitives (Gas)	Valves	514	0.00992	—	5.10	22.33	0.01	0.04	—	—	5.7E-04	2.5E-03	3.4E-03	0.01	0.03	0.15	4.82	21.12	121	528
	Pump Seals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Other	60	0.01940	—	1.16	5.10	2.3E-03	0.01	—	—	1.3E-04	5.7E-04	7.8E-04	3.4E-03	0.01	0.03	1.10	4.82	28	121
	Connectors	1,474	0.00044	—	0.65	2.85	1.3E-03	0.01	—	—	7.3E-05	3.2E-04	4.4E-04	1.9E-03	4.4E-03	0.02	0.61	2.69	15	67
	Flanges	240	0.00086	—	0.21	0.90	4.2E-04	1.8E-03	—	—	2.3E-05	1.0E-04	1.4E-04	6.1E-04	1.4E-03	0.01	0.20	0.85	5	21
	Open-ended lines	28	0.00441	—	0.12	0.54	2.5E-04	1.1E-03	—	—	1.4E-05	6.0E-05	8.3E-05	3.6E-04	8.3E-04	3.6E-03	0.12	0.51	3	13
		2,316	Total - Gas:		7.24	31.72	0.01	0.06	—	—	8.1E-04	3.5E-03	4.9E-03	0.02	0.05	0.21	6.85	30.00	171	750

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

2 - Component counts are based on the default counts for compressor stations (GRI-HAPCalc model) multiplied by: **200%**

3 - Gas/Vapor emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995.

TABLE 2.4 O&G PROD (AVE)	Residue Gas			
Valves	4.5E-03	kg/hr	9.9E-03	lb/hr
Pump Seals	na	kg/hr	na	lb/hr
Others	8.8E-03	kg/hr	1.9E-02	lb/hr
Connectors	2.0E-04	kg/hr	4.4E-04	lb/hr
Flanges	3.9E-04	kg/hr	8.6E-04	lb/hr
Open-Ended Lines	2.0E-03	kg/hr	4.4E-03	lb/hr

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

5 - To be conservative, the following gas composition was assumed:

Pollutant	Residue Gas Analysis				Worst-Case Assumption			
CO2	232	lb/MMscf	0.52	wgt%	300	lb/MMscf	0.67	wgt%
CH4	39,644	lb/MMscf	88.68	wgt%	42,275	lb/MMscf	94.56	wgt%
VOC	70	lb/MMscf	0.16	wgt%	90	lb/MMscf	0.20	wgt%
Hex, BTEX, TMP (ea)	1.3	lb/MMscf	0.003	wgt%	5	lb/MMscf	0.01	wgt%
Total HAP	7.7	lb/MMscf	0.02	wgt%	30	lb/MMscf	0.07	wgt%

IMPORTANT NOTE:
The natural gas that is compressed at the Independence CS is residue gas; i.e., nearly all of the VOC (and HAP) components have been removed.

Potentially Applicable

AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

	Pollutant	GAS-FIRED ENGINE AP-42 Table 3.2-1, 3.2-2, 3.2-3 07/00			GAS-FIRED TURBINE 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)	3.170E+00	4.080E+00	2.210E+00	3.200E-01	1.300E-01	9.900E-02
	CO (≥ 90% Load)	3.860E-01	3.170E-01	3.720E+00	8.200E-02	3.000E-02	1.500E-02
	THC (TOC)	1.640E+00	1.470E+00	3.580E-01	1.100E-02	1.100E-02	1.100E-02
	NMHC (THC-CH4)	1.900E-01	2.200E-01	1.280E-01	2.400E-03	2.400E-03	2.400E-03
	NMNEHC (NMHC-C2H6)	1.191E-01	1.150E-01	5.760E-02	2.100E-03	2.100E-03	2.100E-03
	VOC	1.200E-01	1.180E-01	2.960E-02	2.100E-03	2.100E-03	2.100E-03
	SO2*** (2,000 gr-S/MMscf)	5.880E-04	5.880E-04	5.880E-04	3.400E-03	3.400E-03	3.400E-03
	PM10/2.5 (Filter+Cond)	4.831E-02	9.987E-03	1.941E-02	6.600E-03	6.600E-03	6.600E-03
HAPs	Benzene	1.940E-03	4.400E-04	1.580E-03	1.200E-05	1.200E-05	9.100E-07
	Ethylbenzene	1.080E-04	3.970E-05	2.480E-05	3.200E-05	3.200E-05	3.200E-05
	Formaldehyde (HCHO)	5.520E-02	5.280E-02	2.050E-02	7.100E-04	7.100E-04	2.000E-05
	n-Hexane	4.450E-04	1.110E-03	---	---	---	---
	Methanol (MeOH)	2.480E-03	2.500E-03	3.060E-03	---	---	---
	Toluene	3.630E-04	4.080E-04	5.580E-04	1.300E-04	1.300E-04	1.300E-04
	TMP, 2,2,4- (i-Octane)	8.460E-04	2.500E-04	---	---	---	---
	Xylenes	2.680E-04	1.840E-04	1.950E-04	6.400E-05	6.400E-05	6.400E-05
	Other HAPs	1.715E-02	1.443E-02	6.359E-03	1.061E-04	1.061E-04	1.061E-04
GHG	CO2**** (GWP=1)	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02
	CH4 (GWP=25)	1.450E+00	1.250E+00	2.300E-01	8.600E-03	8.600E-03	8.600E-03
	N2O (GWP=298)	*2.205E-04*	*2.205E-04*	*2.205E-04*	3.000E-03	3.000E-03	3.000E-03
	CO2e	*1.533E+02*	*1.483E+02*	*1.228E+02*	*1.181E+02*	*1.181E+02*	*1.181E+02*

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

	Pollutant	GAS-FIRED EXTERNAL COMBUSTION AP-42 Table 1.4-1, 1.4-2, 1.4-3 (<100 MMBtu/hr) 07/98			FLARE 13.5-1 04/15	DIESEL ENGINE 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	9.804E-02	4.902E-02	3.137E-02	6.800E-02	4.410E+00
	CO	8.235E-02	8.235E-02	8.235E-02	3.100E-01	9.500E-01
	THC (TOC)	1.078E-02	1.078E-02	1.078E-02	≥98% Destruction and Removal Efficiency	3.600E-01
	NMHC (THC-CH4)	8.529E-03	8.529E-03	8.529E-03		3.534E-01
	NMNEHC (NMHC-C2H6)	5.490E-03	5.490E-03	5.490E-03		3.503E-01
	VOC (NMNEHC+HCHO)	5.564E-03	5.564E-03	5.564E-03		3.600E-01
	SO2 (2,000 gr-S/MMscf)	5.882E-04	5.882E-04	5.882E-04	*5.882E-04*	2.900E-01
	PM10/2.5 (Filter+Condense)	7.451E-03	7.451E-03	7.451E-03	*7.451E-03*	3.100E-01
HAPs	Benzene	2.059E-06	2.059E-06	2.059E-06	≥98% Destruction and Removal Efficiency	9.330E-04
	Ethylbenzene	---	---	---		---
	HCHO (Formaldehyde)	7.353E-05	7.353E-05	7.353E-05		1.180E-03
	n-Hexane	1.765E-03	1.765E-03	1.765E-03		---
	Methanol (MeOH)	---	---	---		---
	Toluene	3.333E-06	3.333E-06	3.333E-06		4.090E-04
	2,2,4-TMP (i-Octane)	---	---	---		---
	Xylenes	---	---	---		2.850E-04
	Other HAPs	1.861E-06	1.861E-06	1.861E-06		1.050E-03
GHG	CO2 (GWP=1)	1.176E+02	1.176E+02	1.176E+02	*1.176E+02*	1.640E+02
	CH4 (GWP=25)	2.255E-03	2.255E-03	2.255E-03	*98% DRE*	*6.614E-03*
	N2O (GWP=298)	2.157E-03	6.275E-04	6.275E-04	*2.157E-03*	*1.323E-03*
	CO2e	*1.183E+02*	*1.179E+02*	*1.179E+02*	*1.183E+02*	*1.646E+02*

Fuel Type	40 CFR 98 - DEFAULT EMISSION FACTORS 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	163.054	6.614E-03	1.323E-03
Propane	0.091 MMBtu/gal	138.605	6.614E-03	1.323E-03
Natural Gas	1,026 Btu/scf	116.977	2.205E-03	2.205E-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

#Revised by EPA on 11/29/13

Conversion Factors

http://www.on-line-conversion.com/

1.0 lb	=	453.592 g
1.0 kg	=	2.205 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	=	1.340 hp-hr
1.0 cf	=	7.481 gal
1.0 gal H2O	=	8.338 lb
1.0 cf H2O	=	62.371 gal
1.0 m	=	3.281 ft
1.0 km	=	0.621 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 SOX (2,000 gr/MMscf).

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

Rev 05/14/15

***** End of Request for Determination of Permit Exemption ****